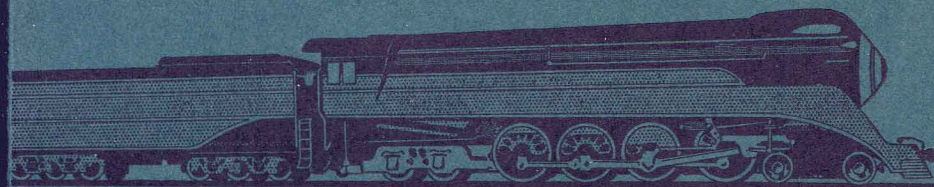


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FLANNERY STAYBOLTS



FLANNERY BOLT COMPANY
BRIDGEVILLE - - PENNSYLVANIA

FLANNERY BOLT COMPANY

PATENTEES

AND

MANUFACTURERS

OF

STAYBOLTS

PARTS

AND

INSTALLATION TOOLS

1938

CATALOG

BRIDGEVILLE ∞ PENNSYLVANIA ∞ U. S. A.

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FLANNERY BOLT COMPANY
BRIDGEVILLE, PA., U. S. A.

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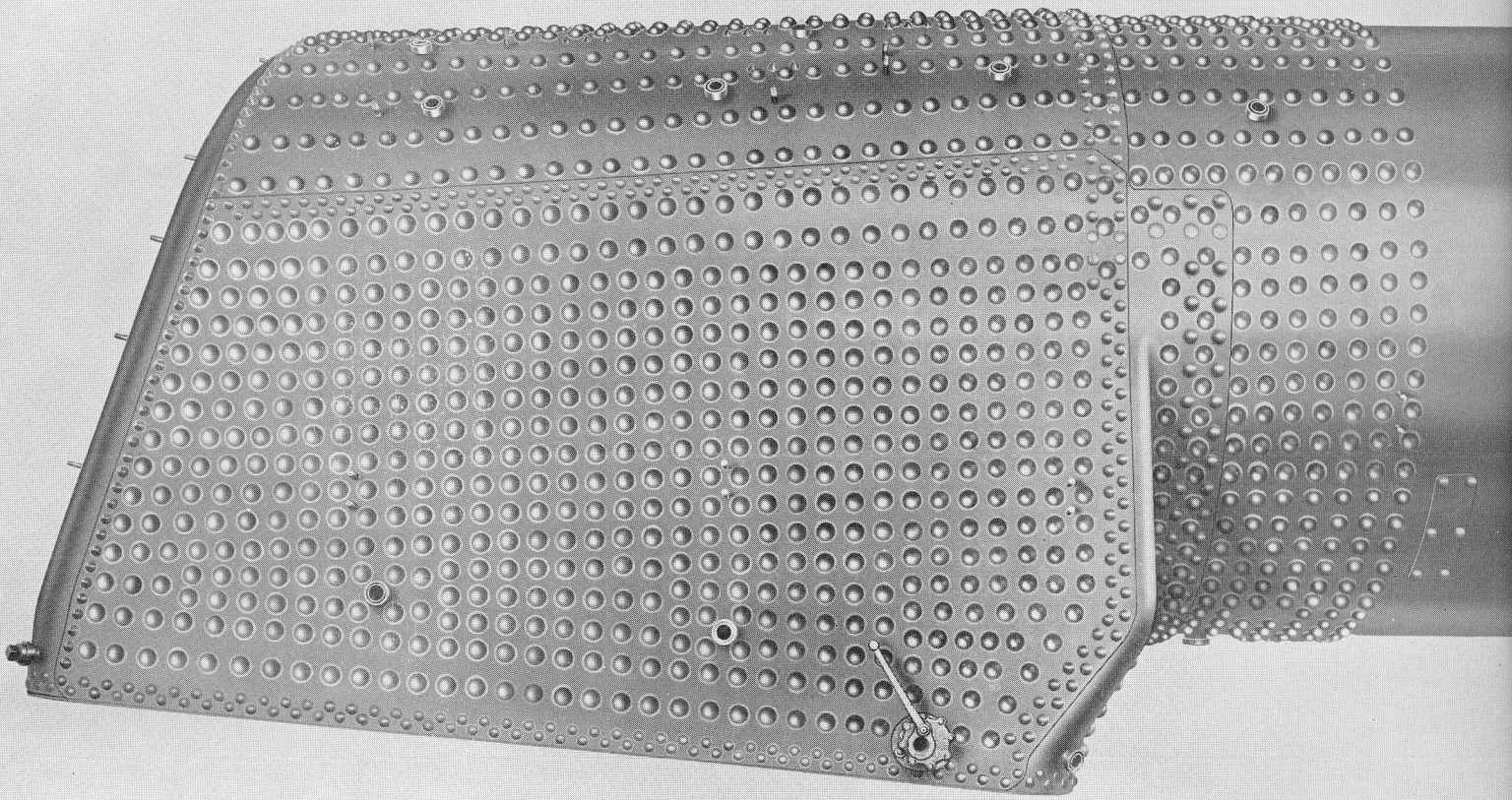
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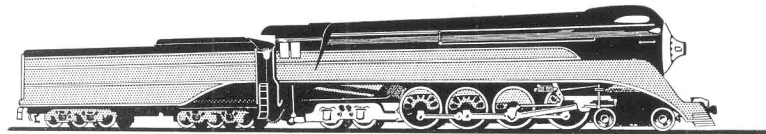
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FLANNERY BOLT COMPANY

BRIDGEVILLE, PA., U. S. A.



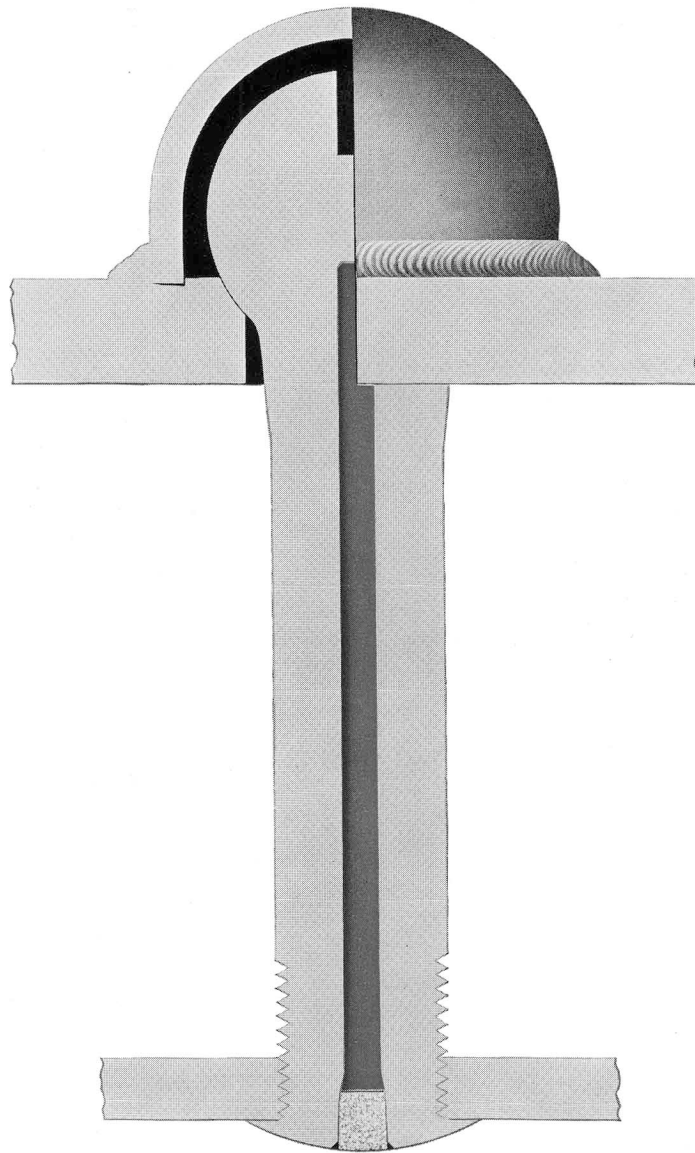
**Flexible
Staybolt Installation
F. B. C. Two-Piece Assemblage**



F. B. C. TWO-PIECE

MK-S

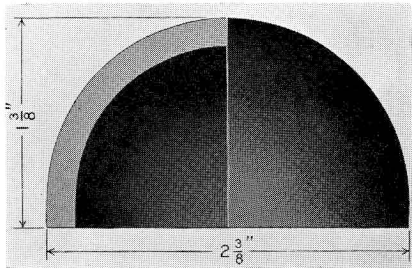
ASSEMBLAGE



FLANNERY BOLT COMPANY

Bridgeville, Pennsylvania

CAPS MK AND MKS

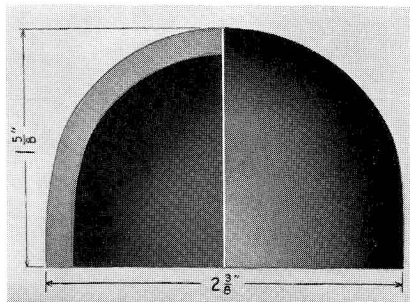


Cap MK

Cap MK is the cover for the bolt head used in the simplest, most practical flexible assemblage yet devised for staying locomotive boilers. See Pages 5 and 13 for complete MK Cap Assemblage.

The Cap MK is suitable for installation on any angle or radius encountered in boilers having wrapper sheets $1 \frac{1}{16}$ " or over.

For instructions on installation see Page 46.



Cap MK-S

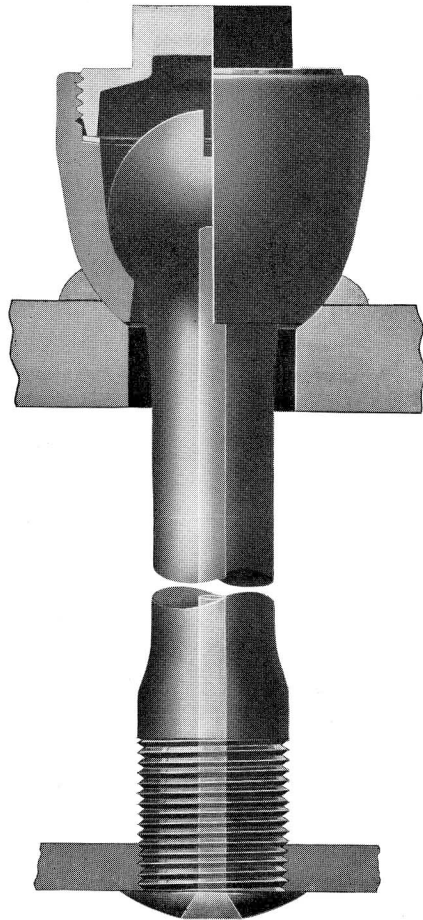
Cap MK-S is furnished for use in boilers where the wrapper sheet thickness is less than $1 \frac{1}{16}$ ". The greater height of this cap insures the recommended clearance of $\frac{3}{16}$ " between bolt head and cap where thin sheets are used.

For instructions on installation see Page 46.

The caps illustrated above are used in connection with the Flannery Two-Piece Assemblage illustrated on previous page.

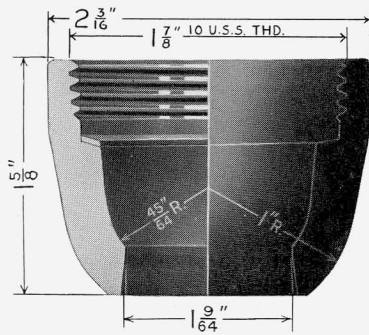
We recommend Type K, KK, KJ, KH or KG Bolts to complete the Assemblage. These bolts must be of the Tell-Tale Type, due to the Two-Piece construction. See illustrations of bolts on Pages 28 and 29.

F. B. C. THREE-PIECE ASSEMBLAGE



FLANNERY BOLT COMPANY
Bridgeville, Pennsylvania

F. B. C. WELDED TYPE SLEEVES



Universal Sleeve UW

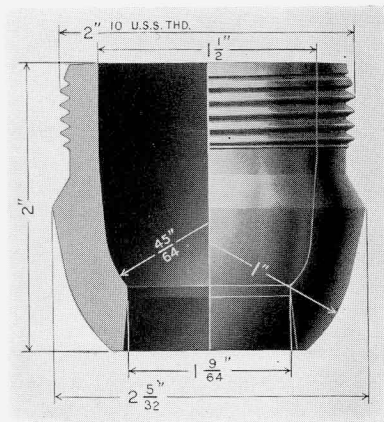
SLEEVE UW

For use with the D head bolts on all parts of the firebox except where flush sleeves are preferred.

Furnished with copper gasket inserted.

Cap A required.

For new installation work use Counterboring Reamer UW, and when replacing threaded sleeves use Counterboring Reamer UW-T.



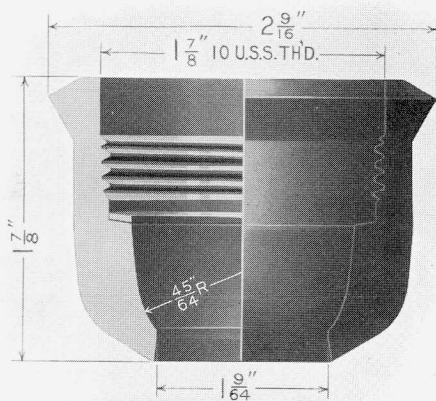
Universal Sleeve U

SLEEVE U

This sleeve is designed for use with the D head bolt when an outside cap is preferred.

Cap U required.

For new installation work use Counterboring Reamer UW, and when replacing threaded sleeves use Counterboring Reamer UW-T.



Flush Sleeve FW

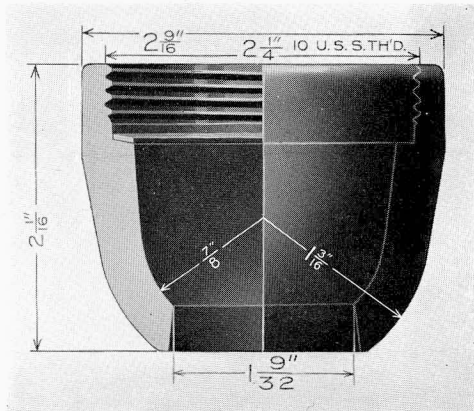
SLEEVE FW (FLUSH TYPE)

Recommended for use where projecting sleeves and caps interfere with other fittings. For the D head bolt only. Furnished with copper gasket inserted.

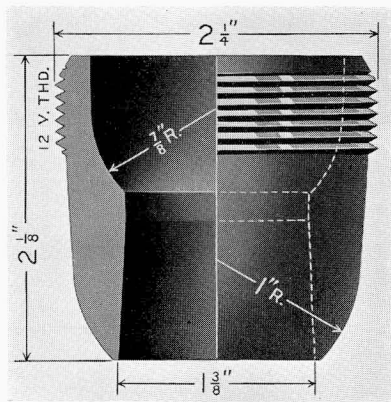
Cap A required.

For new installation work or replacing threaded sleeves use Counterboring Reamer FW.

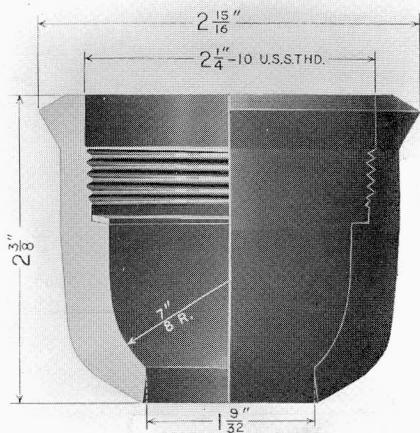
F. B. C. WELDED TYPE SLEEVES



Universal Sleeve URW



Universal Sleeve WR



Flush Sleeve FRW

SLEEVE URW

For use with K head bolts in all parts of the firebox except in locations where flush sleeves are preferred.

Furnished with copper gasket inserted.

Cap R required.

For new installation work use Counterboring Reamer URW, and when replacing Tate Threaded Sleeves use Counterboring Reamer URW-T.

SLEEVE WR

This sleeve is designed for crown stay installations in connection with our Round Nut KN. Its design permits unobstructed access to the shank end of bolt for cutting off.

Our Standard K Head bolt may also be used with the WR Sleeve.

Cap WR required.

For new installation work use Counterboring Reamer UW and when replacing threaded sleeves use Counterboring Reamer UW-T.

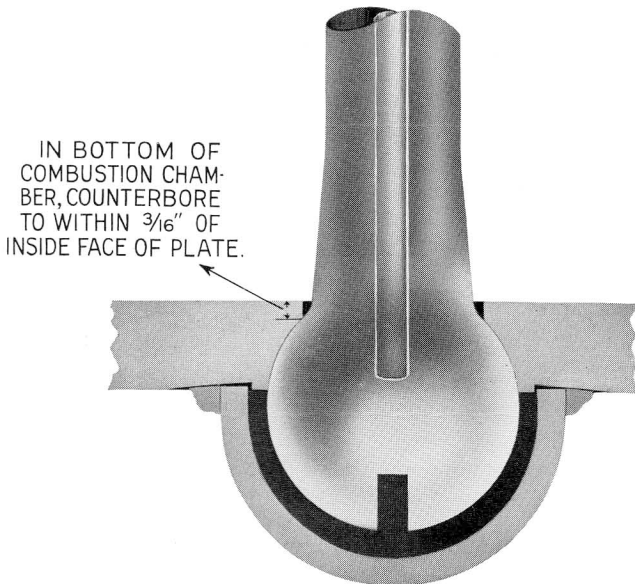
SLEEVE FRW

Recommended for use where projecting sleeves and caps interfere with other fittings. For the K head bolt, or Round Nut Assemblage. Furnished with copper gasket inserted.

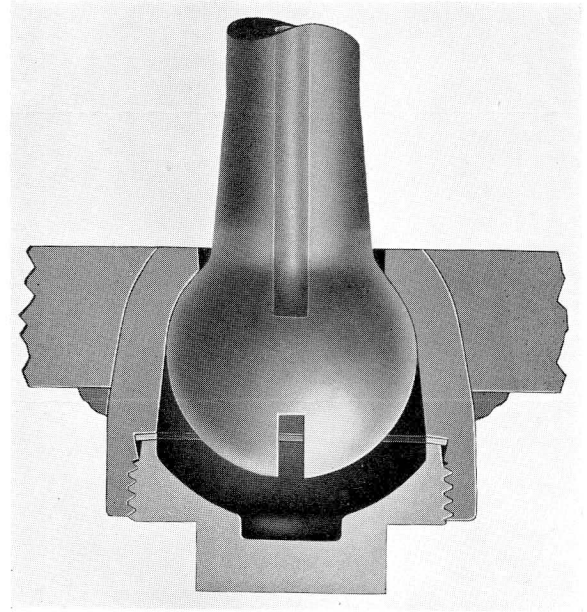
Cap R required.

For new installation work or replacing threaded sleeves use Counterboring Reamer FRW.

> COMBUSTION CHAMBER INSTALLATIONS <



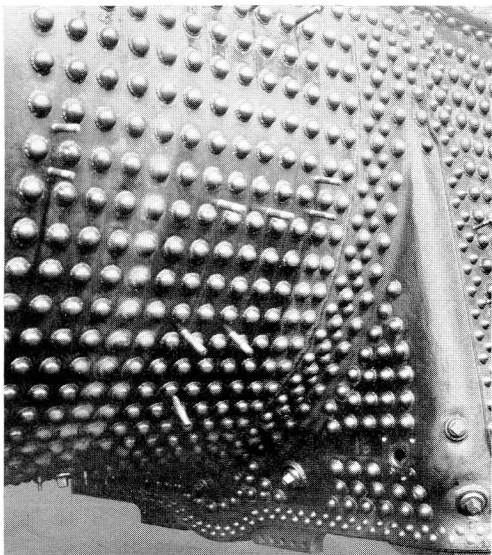
Cap MK or MK-S—Bolt K



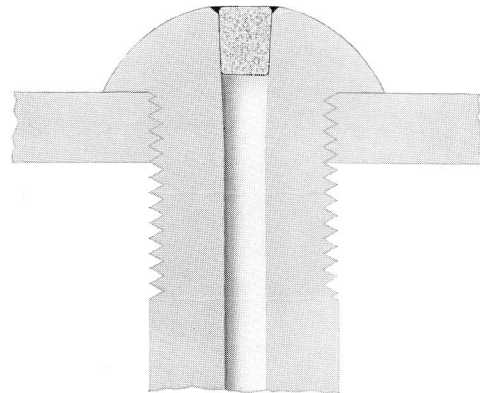
Sleeve URW-S and Cap R—Bolt K

Either of the installations illustrated above is satisfactory for staying the bottom sections of combustion chambers. The short opening or mouth prevents the accumulation of scale in sufficient volume to lock the bolt and make it rigid. For instructions on the installation of the MK type see page 46.

Sleeve URW-S is designed for use **only with the bottom rows** of staybolts of the combustion chamber. For all other locations where type K bolts are required, use sleeve URW shown on page 9.



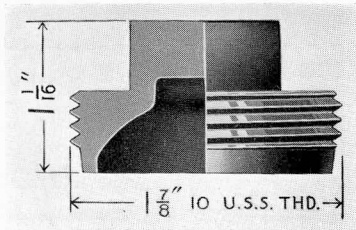
Two-Piece Combustion Chamber Installation



We recommend that in the **bottom of combustion chambers only**, the riveted over ends of the staybolts be kept as high as possible, as shown in illustration, the object being to permit leakage from the flues, condensation from the soot blowers, etc., to flow around the staybolts and out of the combustion chamber, rather than into the tell-tale holes.

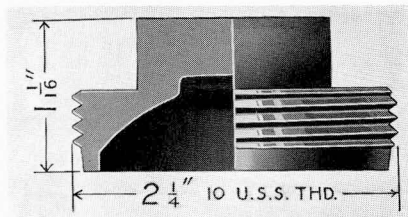
FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

CAPS FOR WELDED TYPE SLEEVES



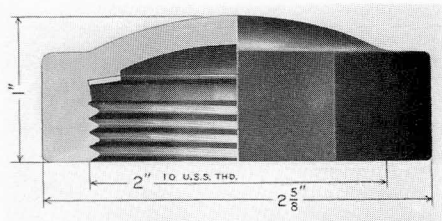
Cap A

Cap A is standard for use with Sleeves UW and FW, illustrated on Page 8.



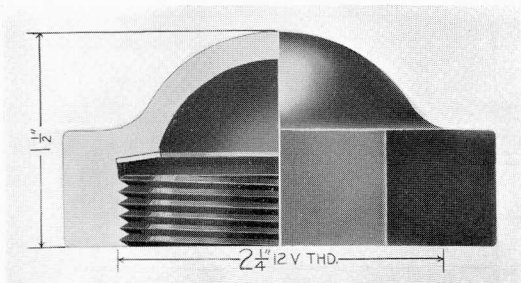
Cap R

Cap R is standard for use with Sleeves URW and FRW, illustrated on Page 9, and with Sleeve URW-S, shown on Page 10.



Cap U

Cap U is standard for use with Sleeve U, shown on Page 8, and is supplied with copper gasket inserted.



Cap WR

Cap WR is standard for use with Sleeve WR, shown on Page 9, and is supplied with copper gasket inserted.

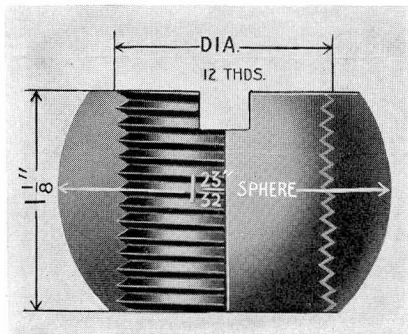
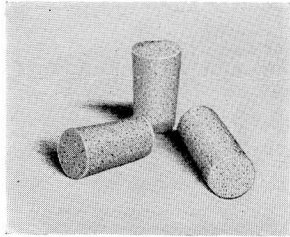
POROUS PLUGS—NUTS—GASKETS

FLANNERY FIREPROOF POROUS PLUGS

Porous Plugs are provided to close the bolt ends so that foreign matter from the firebox may not accumulate in the tell-tale holes. Flannery Plugs remain porous when exposed to extreme firebox temperatures.

This porosity assures, in the event of a broken or fractured bolt, leakage of steam and water, through the tell-tale hole and plug, into the firebox, to serve as a warning of the unfit condition of that particular bolt.

Fireproof Porous Plugs are furnished in two colors, namely buff and blue. This provision is made so that, following each annual electrical inspection and hydrostatic test, plugs may be installed which differ in color from those removed at the start of the inspection, such change of color being a requirement of I. C. C. Rule 23, copy of which is printed on Page 21 of this catalog.



Round Nut KN

Standard Round Nuts KN are furnished in 1" to 1 $\frac{3}{16}$ " diameters with V, US or Whitworth Threads, 12 per inch. Specify diameter and form of thread desired when ordering.

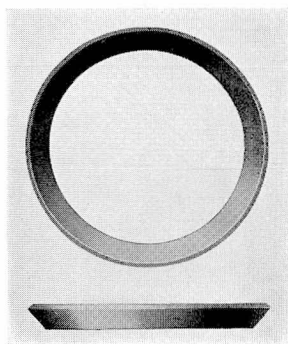
The Round Nut provides perfect flexibility for crown stay work when used with stays of the taper head or button head types in combination with F. B. C. Welded Sleeves WR or FRW, or with Tate Threaded Type Sleeves HK, JK, KK or LK.

COPPER GASKETS

We are prepared to furnish Copper Gaskets of all sizes required for our various sleeves and caps.

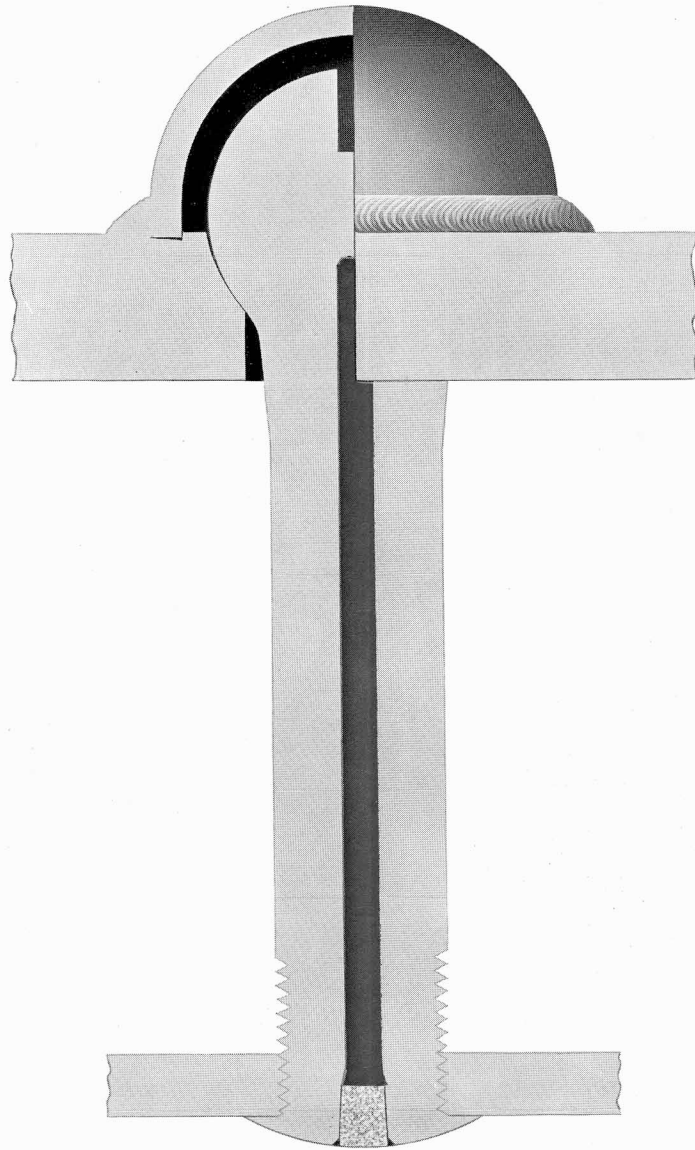
When gaskets have become worn, or damaged, same should be removed and replaced. Place new gasket on its seat in the sleeve or cap, small side outward. Screw home the other half of the assemblage, and the gasket will be forced into place.

When ordering gaskets, please specify the sleeve or cap in which they are to be used.



Copper Gaskets

> F.B.C. TWO-PIECE TELL-TALE ASSEMBLAGE <



THE F. B. C. TWO PIECE TELL-TALE ASSEMBLAGE

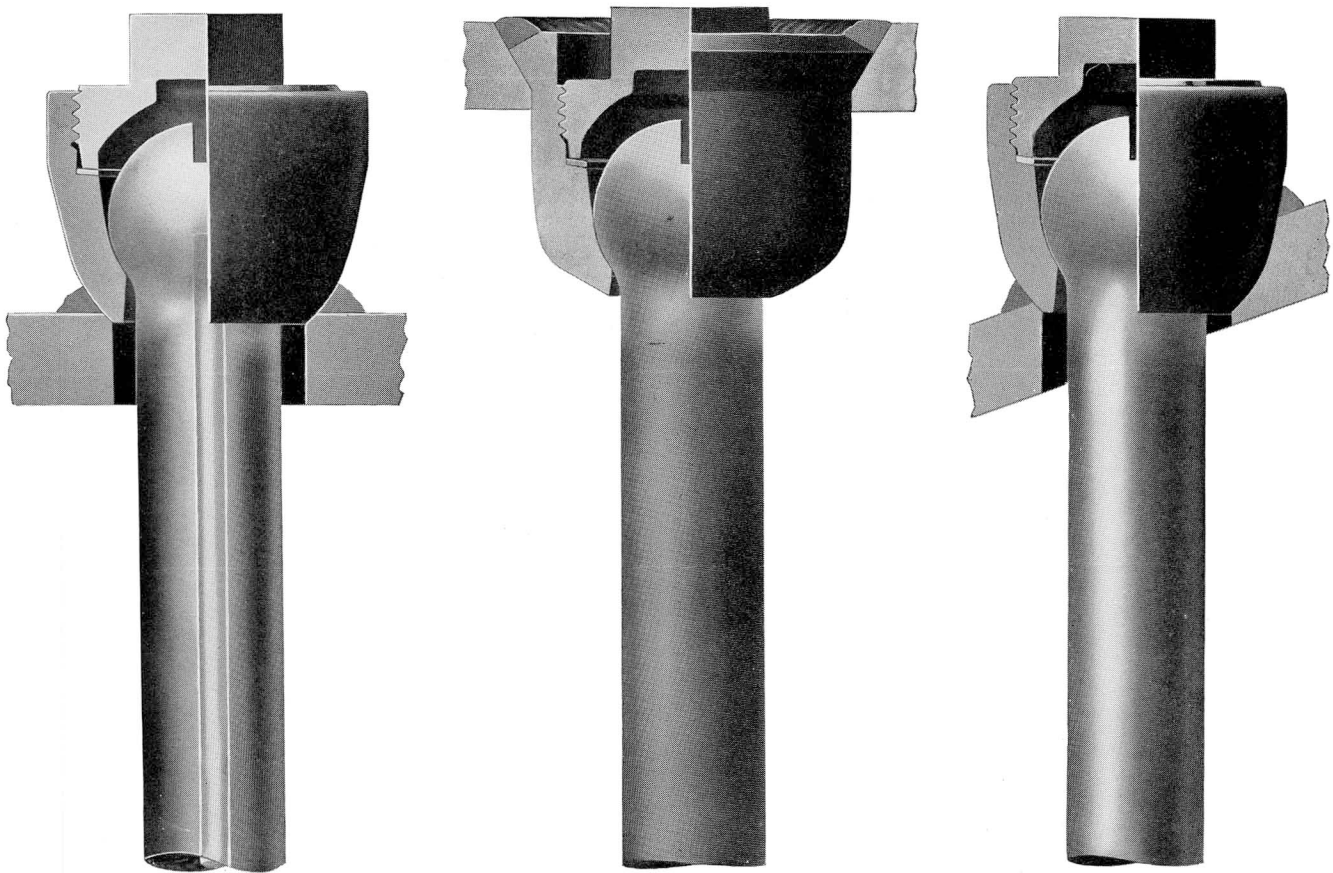
We believe that the combination of our MK Cap and K Head Bolt as shown above or the MK-S Cap and K Head bolt as shown on page 5, is the most simple, economical and mechanically sound assemblage that has been devised for staying locomotive boilers.

One style of cap and one style of bolt may be used on all parts of a modern firebox with a consequent reduction in the quantity and value of items to be carried in stores for repairs.

Interesting information as to installations of this assemblage with service records is available upon request.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

> F. B. C. WELDED SLEEVE ASSEMBLAGES <

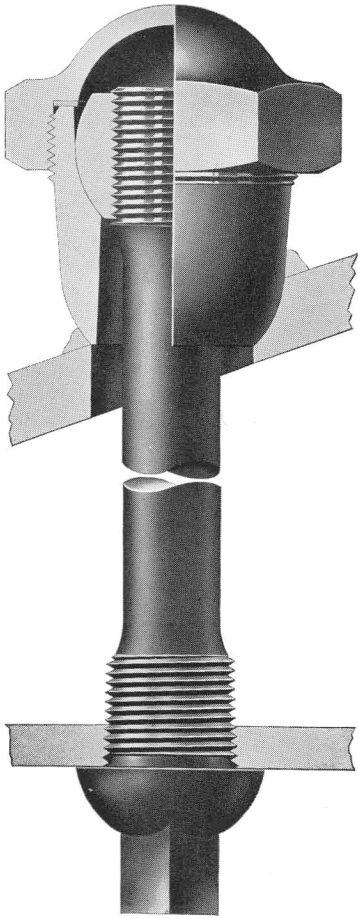


The UW Assemblage, consisting of Sleeve UW, Cap A, and Bolt D, is illustrated in the right and left hand pictures. Either type of bolt shown is standard for the UW Assemblage, but that on the left, the Tell-Tale type, is highly recommended because of its protection for the boiler. Tell-Tale Flexible Bolts can be accurately and economically inspected with the Flannery Tester. See Pages 18 to 23 for detailed information about the Tell-Tale Bolt and the method of inspection.

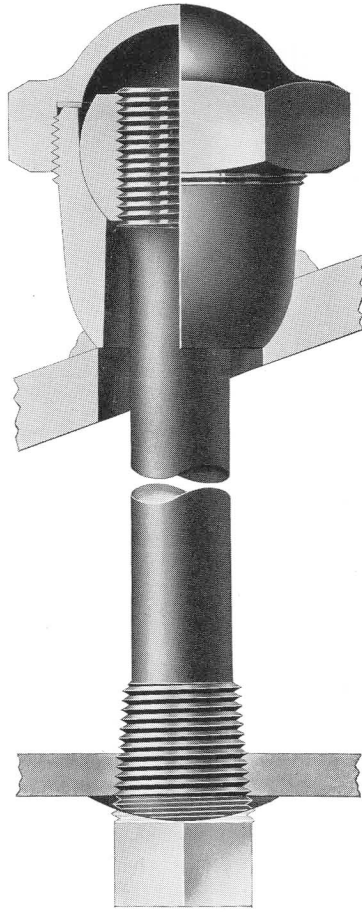
When installing the UW Sleeve, counterbore the sheet just sufficiently to provide a seat for the sleeve, and to insure proper alignment between the sleeve and bolt. See Installation Angle Table on Page 51.

The Flush Sleeve Assemblage, illustrated in the center, is recommended for use where projecting sleeves interfere with other fixtures.

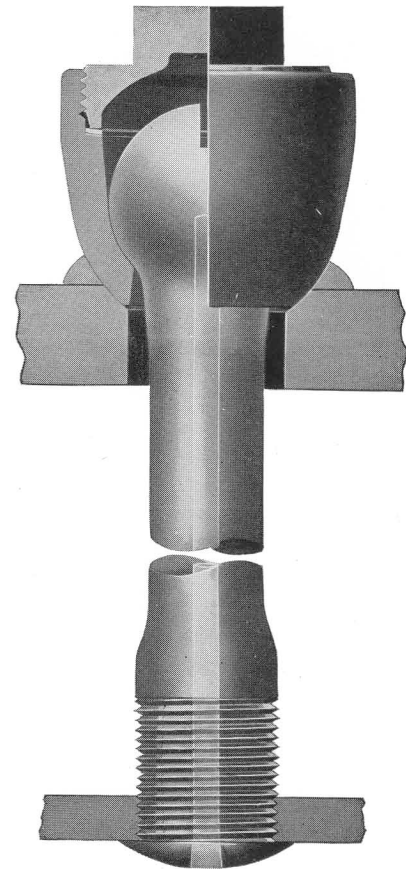
> F. B. C. WELDED SLEEVE ASSEMBLAGES <



WR Assemblage Round Nut and
Button Head Stay



WR Assemblage Round Nut and
Taper Head Stay



URW Standard Assemblage
with Standard K Head Stay

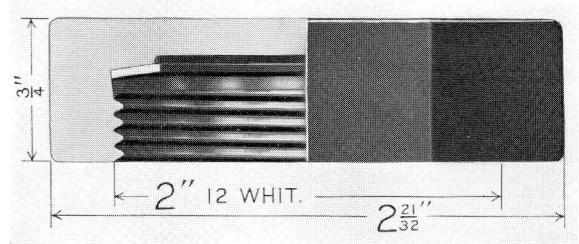
Of the three types of assemblages, illustrated above, for staying the crown sheet of the locomotive firebox, the assemblage on the right, using the K head type of flexible staybolt, is recommended. Comparing the hollow flexible with the hollow button head or taper head crown stay, or, comparing the solid flexible with solid button head or taper head crown stay it has the advantage of a lower first cost and is easier and cheaper to apply.

Taper or button head stays for assembly with the Round Nut, as illustrated, can be furnished for those who prefer these types. See pages 30 to 37 inclusive, for crown stays.

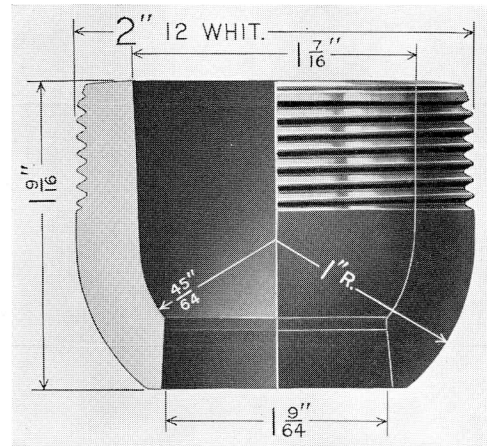
> F. B. C. WELDED SLEEVE ASSEMBLAGE <



US Assemblage



Cap US



Sleeve US

The above illustration shows another type of Welded Sleeve Assemblage with the outside cap.

This was designed for use with D, DK and DJ Flexible Tell-Tale Bolts or D, DM, DL, DK and DJ Flexible Solid Bolts.

Cap is furnished with Copper Gasket inserted.

When counterboring sheets for Sleeve US use Counterboring Reamer UW.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

TELL-TALE FLEXIBLE BOLTS



DESCRIPTION

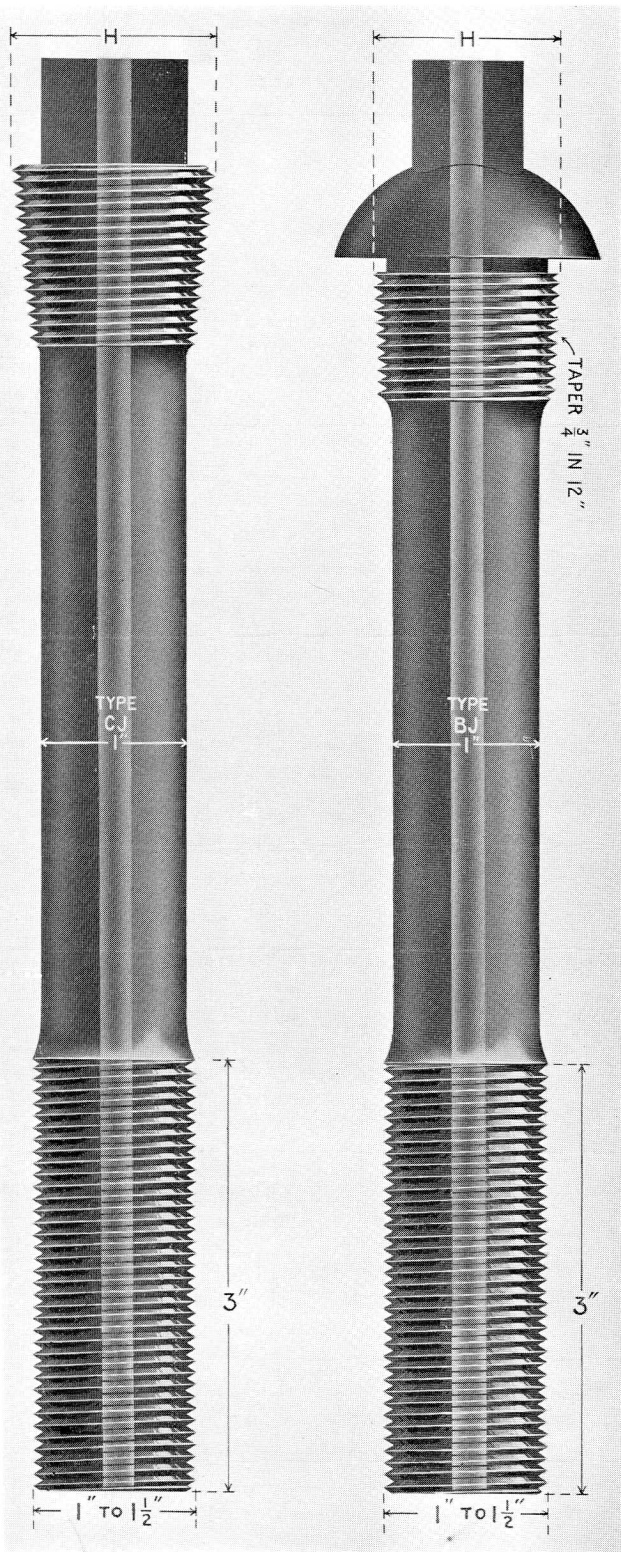


PREPARATION



INSPECTION

TELL-TALE FLEXIBLE BOLTS



TAPER AND BUTTON HEAD CROWN STAYS

We are prepared to furnish taper and button head bolts with body diameters of $1\frac{5}{16}$ " or greater, in the Tell-Tale Type, for assembling as flexible stays with the Round Nut and Welded Sleeves WR and FRW, or with the Threaded Sleeves HK, JK, KK, LK or SN.

As shown in the illustrations, these crown bolts are drilled with a tell-tale hole extending the full length of the bolt. After the bolt has been installed and the KN Nut applied, the bolt is cut to proper length and the Round Nut end of bolt is closed with a tapered steel plug which we supply with each bolt.

The Steel Plug should be driven into the end of the tell-tale hole, and sealed in place by means of the arc weld.

The firebox end of the Tell-Tale Crown Stay is to be prepared for the Porous Plug, as shown in the several illustrations covering the preparation of Flannery Tell-Tale Flexible Bolts, shown on following page.

However, we strongly recommend the Flannery Tell-Tale Flexible Bolt, K Head Type (Pages 28 and 29) for Crown Sheet staying. These bolts are sufficiently strong to meet all requirements and have the advantage of being considerably cheaper in first cost and installation over the taper and button head types.

For dimension "H", see pages 30 and 33 for Taper Head Stays, and pages 34 and 37 for Button Head Stays

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

> PREPARATION OF NEW TELL-TALE BOLTS <

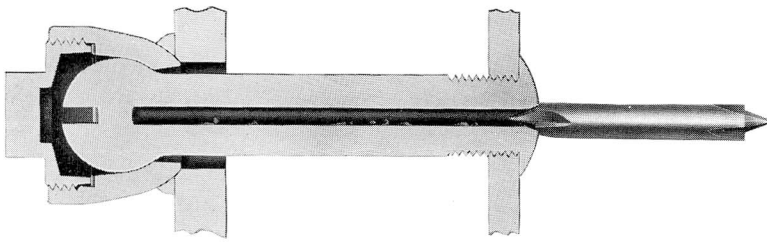


Figure 1

Tell-Tale Bolts are applied exactly the same as the ordinary flexible bolts. If the method of riveting closes the end of the tell-tale hole, it must be re-opened, using the Flannery Double Pointed 45° Hole Opener shown in Figure 1.

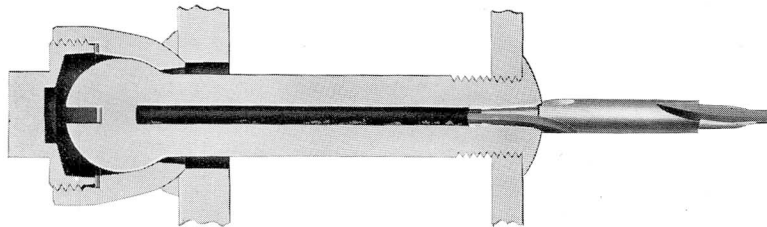


Figure 2

After re-opening, ream the hole, as in Figure 2, to fit the porous plug, using the Flannery standard No. 4 Plug Reamer for the operation.

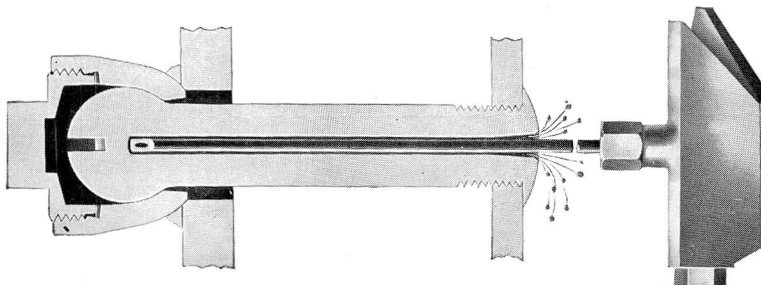


Figure 3

After the tell-tale holes are reamed, clear the holes of drill chips or any other foreign substances by means of the Air Tool which we provide for this purpose. See Figure 3.

Where a considerable quantity of drill chips accumulate in the tell-tale holes, as in the bottom of the combustion chamber, insert the tube of the Air Tool into the tell-tale hole, turn on the compressed air fully, and, with the air pressure still on, quickly withdraw the tube. Repeat this operation until all chips are removed.

It is absolutely necessary that all holes be clean.

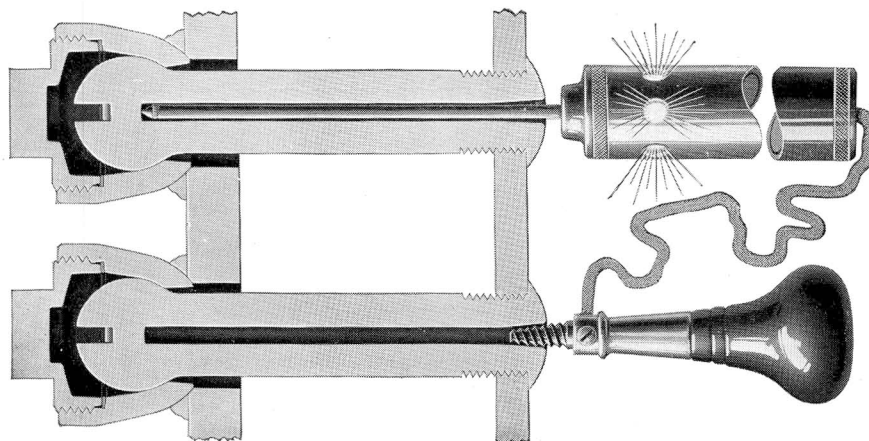


Figure 4

After all the holes are cleared, insert the rod of the Electric Contact Tester into each bolt to insure its clear condition. This will be indicated by a steady light, when the tip of the tester rod reaches the end of the hole, as shown in Figure 4. See note Page 42 relative to Special Flexible Rods.

Before the installation of arch tubes and syphons, the above operations must be completed on all bolts where space would later be insufficient for operation of motor and tools.

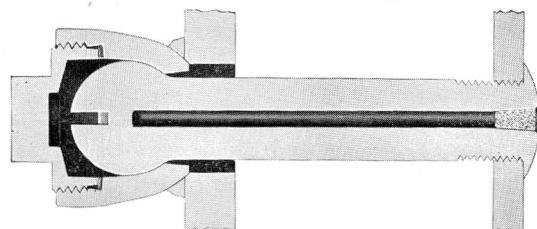


Figure 5

Finally close the ends of the tell-tale holes with Fire-proof Porous Plugs, as shown in Figure 5. The plugs must be tightly driven in as described in last paragraph of page 44.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

I. C. C. INSPECTION

REPRINT OF AMENDED RULE 23 GOVERNING INSPECTION OF FLEXIBLE STAYBOLTS

ORDER

At a General Session of the INTERSTATE COMMERCE
COMMISSION, held at its office in Washington, D. C.,
on the 28th day of July, A. D. 1925

IN THE MATTER OF RULES AND INSTRUCTIONS FOR THE IN-
SPECTION AND TESTING OF LOCOMOTIVES AND TEN-
DERS IN ACCORDANCE WITH ACT OF FEBRUARY 17,
1911, AMENDED MARCH 4, 1915, AND JUNE 7, 1924

ORDER AMENDING RULE 23

The subject of the rules and instructions for the inspection and testing of locomotives and tenders and their appurtenances being under consideration.

It is ordered, That Rule 23, as approved in the order of the commission entered April 7, 1919, be, and the same is hereby, amended to read as follows:

23. Method of testing flexible staybolts with caps.—Except as provided in paragraph (b), all staybolts having caps over the outer ends shall have the caps removed at least once every two (2) years and the bolts and sleeves examined for breakage. Each time the hydrostatic test is applied the hammer test required by Rules 21 and 22 shall be made while the boiler is under hydrostatic pressure not less than the allowed working pressure.

(b) When all flexible staybolts with which any boiler is equipped are provided with a tell-tale hole not less than three-sixteenths ($\frac{3}{16}$) inch nor more than seven thirty-seconds ($\frac{7}{32}$) inch in diameter, extending the entire length of the bolt and into the head not less than one third ($\frac{1}{3}$) of its diameter, and these holes are protected from becoming closed by rust and corrosion by copper plating or other approved method, and are opened and tested, each time the hydrostatic test is applied, with an electrical or other instrument approved by the Bureau of Locomotive Inspection, that will positively indicate when the tell-tale holes are open their entire length, the caps will not be required to be removed. When this test is completed the hydrostatic test must be applied and all staybolts removed which show leakage through the tell-tale hole.

The inner ends of the tell-tale holes must be kept closed with a fireproof porous material that will exclude foreign matter and permit leakage of steam or water, if the bolt is broken or fractured, into the tell-tale hole. When this test is completed the ends of the tell-tale holes shall be closed with material of different color than that removed and a record kept of colors used.

(c) The removal of flexible staybolt caps and other tests shall be reported on the report of inspection Form No. 3, and a proper record kept in the office of the railroad company of the inspections and tests made.

(d) Firebox sheets must be carefully examined at least once every month for mud burn, bulging, and indication of broken staybolts.

(e) Staybolt caps shall be removed or any of the above tests made whenever the United States inspector or the railroad company's inspector considers it desirable in order to thoroughly determine the condition of staybolts or staybolt sleeves.

BY THE COMMISSION.

(SEAL)

GEORGE B. MCGINTY, Secretary.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

INSPECTION OF TELL-TALE BOLTS

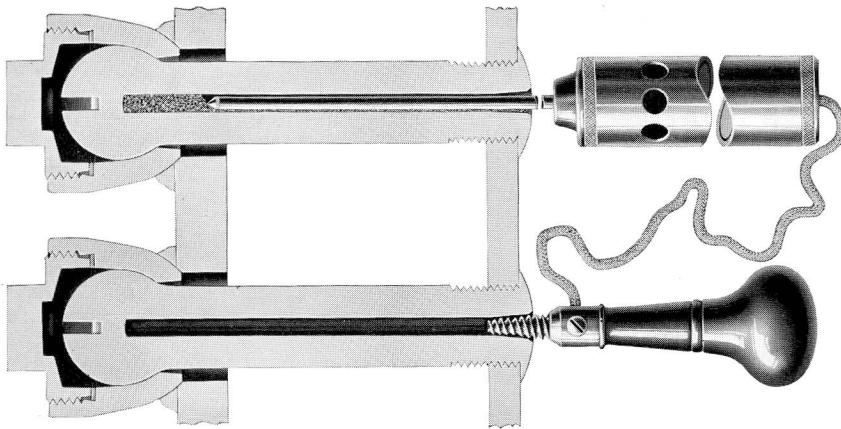


Figure 10

Failure to get a light when the tester rod is inserted into a Tell-Tale hole indicates that the hole is obstructed. (See Figure 10).

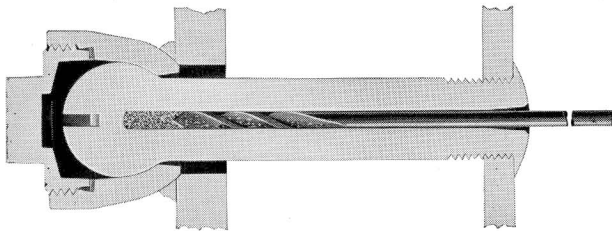


Figure 11

The obstructed Tell-Tale hole must be cleaned. For this purpose use a Cleaning Drill, (see Figure 11).

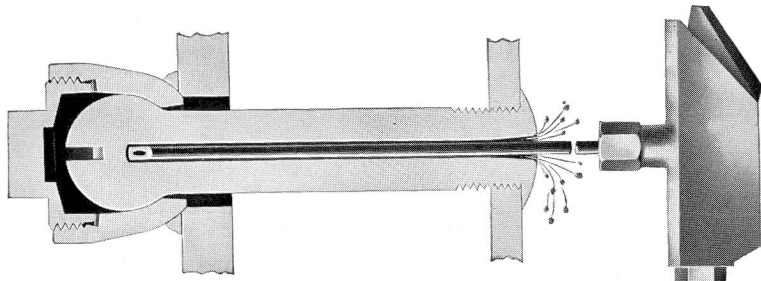


Figure 12

The Air Tool is used to expel any remaining particles of material loosened, but not removed, by the Cleaning Drill. (See Figure 12).

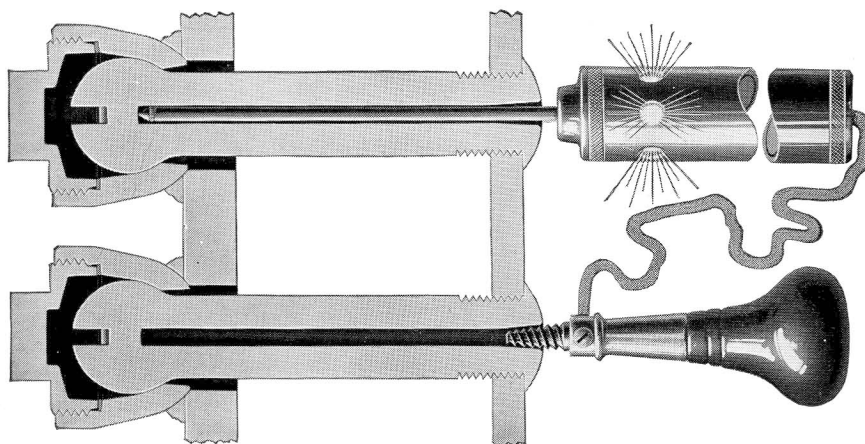


Figure 13

Re-insert the Tester Rod. If the hole is clean, light will appear in the Tester handle, and the bolt is now ready for the hydrostatic test. (See Figure 13).

If no light appears in the Tester handle, the above operations must be repeated until the hole is clean and light obtained; otherwise, bolt must be replaced.

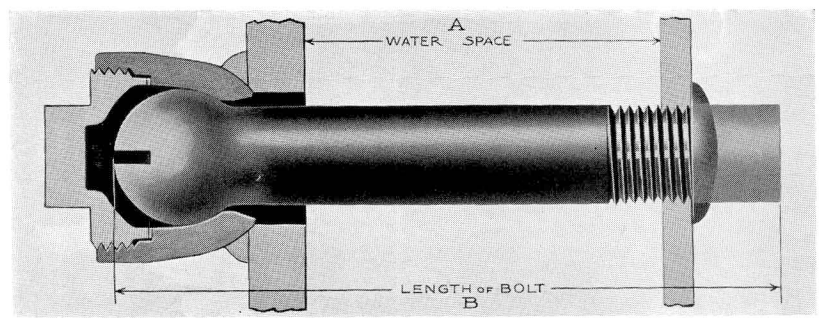
When the above tests have been completed, the hydrostatic test must be applied, and all staybolts removed which show leakage through the tell-tale hole. (See Page 21. Par. b).

Apply porous plugs of different color than those last used, to all Tell-Tale holes.

Securing Electrical Contact in Tell-Tale Hole does not indicate that the bolt is in good condition, but only that the hole is clean.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

> **RULE FOR OBTAINING BOLT LENGTHS** <



Section of Welded Sleeve Assemblage

$B = A + C$

For MK Cap.....	Bolts K, KG, KH, KJ, KK.....	The Value of C=3"
For Sleeve, UW.....	Bolts D, DJ, DK, DL, DM.....	The Value of C=3 1/8"
For Sleeve, U.....	Bolts D, DJ, DK, DL, DM.....	The Value of C=3 1/8"
For Flush Sleeve, FW.....	Bolts D, DJ, DK, DL, DM.....	The Value of C=1 5/8"
For Sleeve, URW.....	Bolts K, KG, KH, KJ, KK, KL.....	The Value of C=3 1/2"
For Flush Sleeve, FRW.....	Bolts K, KG, KH, KJ, KK, KL.....	The Value of C=1 1/2"
For Crown Sleeve, WR.....	Button or Taper Head Crown Stays.....	The Value of C=3 1/2"

The value of C is based on the use of a 5/8" outer plate, and 3/8" firebox plate; when plates run over 3/4" and 1/2" respectively, make allowances for such and add to C.

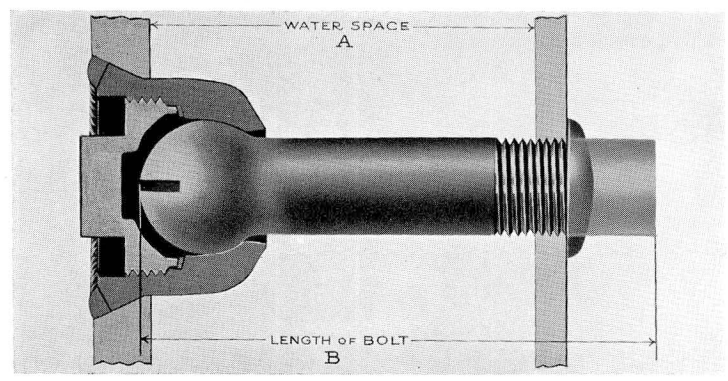
ILLUSTRATION

The Sleeve UW will be used on 5/8" plate—water space is 4". What is the length of bolt to order?

A—Water Space.....	4"
C—Constant for Sleeve UW.....	3 1/8"
<hr/>	
B—Calculated length of bolt (See following notes).....	7 1/8"

Note: When bolt lengths run under the inch or half-inch measurements, order the next longer inch or half inch length.

When calculating water space widths, use the next longer one-half inch measurement for Value A, since construction measurements seldom actually check with blue print measurements.



Section of Flush Welded Sleeve Assemblage

FLEXIBLE BOLTS

TELL-TALE AND SOLID

TAPER HEAD CROWN BOLTS

TELL-TALE, HOLLOW AND SOLID

BUTTON HEAD CROWN BOLTS

TELL-TALE, HOLLOW AND SOLID

STRAIGHT BODY RIGID STAYS

HOLLOW-TELL-TALE AND SOLID

REDUCED BODY RIGID STAYS

HOLLOW-TELL-TALE AND SOLID

When no preference as to the brand of iron desired is indicated on orders, we supply a standard brand which conforms to the specifications of the Association of American Railroads or American Society for Testing Materials.

Unless specifically ordered otherwise, all Flannery Flexible Staybolts will be furnished with the ball heads especially treated under our **Nu-Tate** process.

Under this process the following important advantages are secured:

Minimized Friction. When a boiler is under steam pressure the bolt heads are drawn tightly against their seats. Ordinarily this causes undue friction thus restricting the movements of the bolts. This condition is minimized by the hardened surface produced by the **Nu-Tate** process.

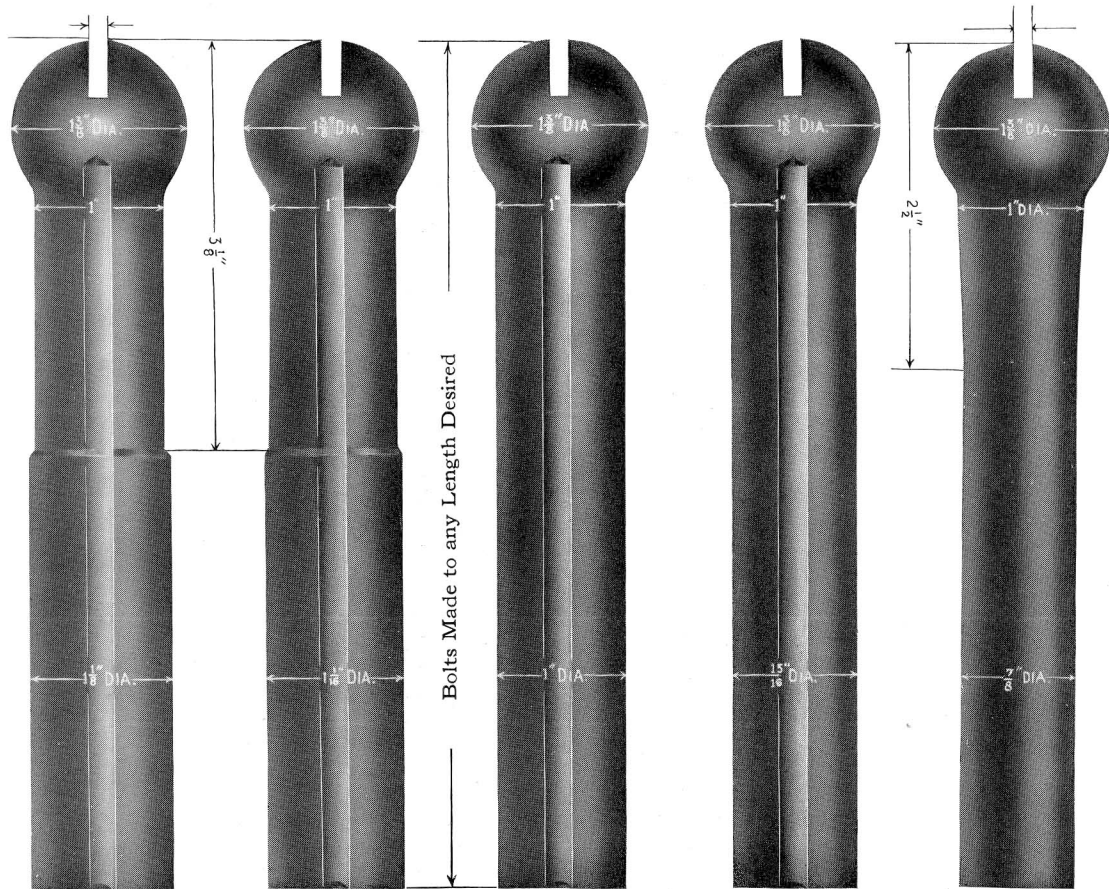
Increased Strength. Due to the increased tensile strength produced by the **Nu-Tate** process, it is practically impossible to break off the heads of any bolts manufactured by this method.

Refined Grain Structure. A proper grain structure is essential to the life of the bolt. After forging, a uniform and refined grain structure is obtained, in the bolt head, by the **Nu-Tate** process of normalization.

The walls of the holes in all Tell-Tale Flexible Bolts, as well as in all Taper and Buttonhead Crown Bolts when used in connection with Sleeves, Caps and Round Nuts, are treated at the factory to insure against rust and corrosion, as required by the Interstate Commerce Commission.

FORGED FLEXIBLE BOLTS

The width of the driving slot in all flexible bolt heads, both D and K head types is $\frac{13}{64}$ "



*See Footnote

TYPE D FLEXIBLE BOLT

We recommend $\frac{15}{16}$ " , 1" , $1\frac{1}{16}$ " and $1\frac{1}{8}$ " diameters for TELL-TALE Bolts.

All of the bolts illustrated above can be furnished SOLID, if desired.

The above bolts are used in connection with Welded Type Sleeves UW, U, US, and FW, also Threaded Type Sleeves D, E, ER, F, FA, FB, FC, FR, G, H and SM.

For description of Tell-Tale Bolts and Method of Testing same, see Pages 18 to 23 inclusive.

See instructions on Page 24 for determining length of bolts to order for Welded Type Sleeves and Page 70 for rules to obtain length of bolts for Threaded Type Sleeves.

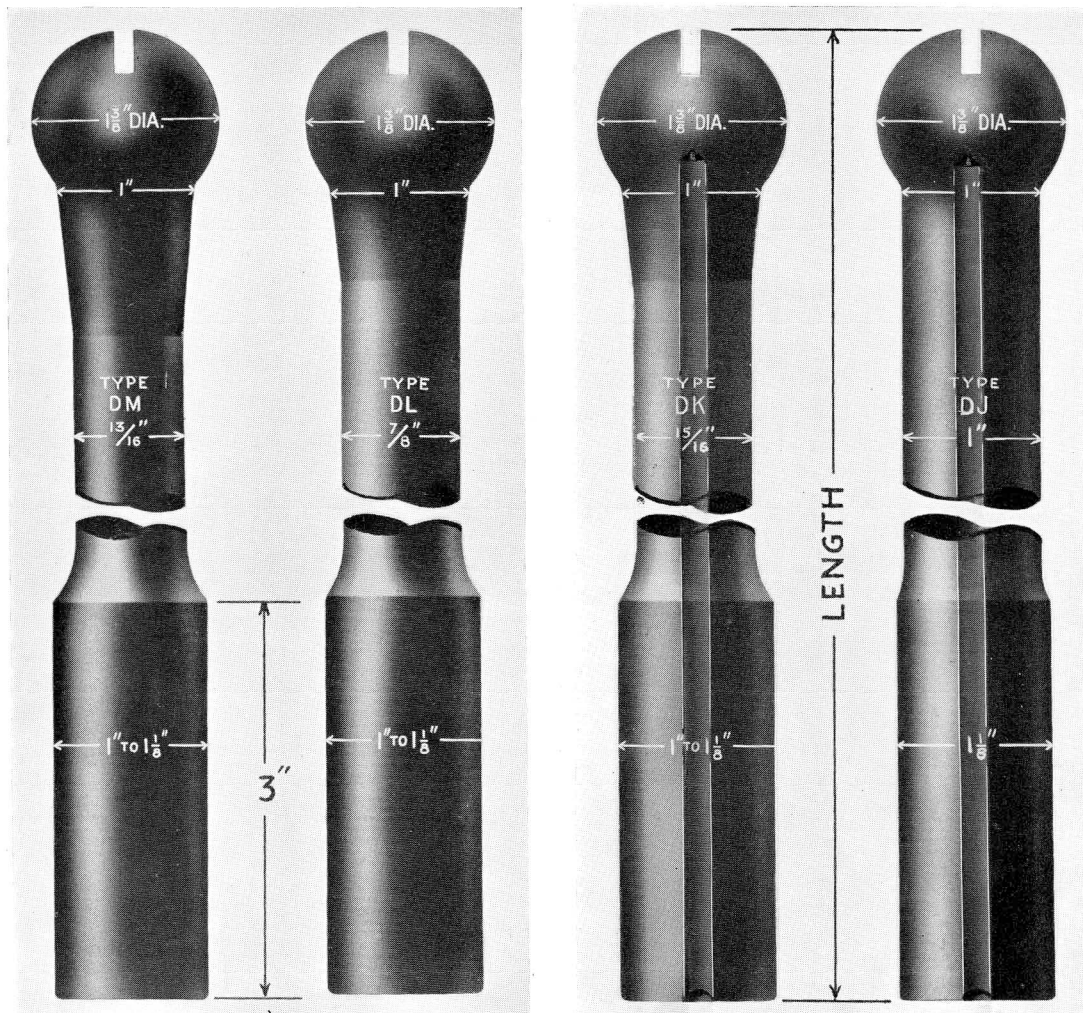
When ordering specify type of bolt, shank diameter, length overall, and whether TELL-TALE or SOLID bolts are desired.

When threaded bolts are desired, specify form of thread and number of threads per inch.

**When the D Type Bolt $1\frac{1}{8}$ " in diameter is required, we strongly recommend that orders be placed for Type DJ Bolt (1" body, $1\frac{1}{8}$ " shank end, shown on the page opposite), for the reason that we furnish all bolts approximately $\frac{1}{32}$ " oversize to allow for full threads. As bolts are usually threaded for only 3", the unthreaded portion of the bolt will not enter the sleeve on account of being too large.*

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

FORGED FLEXIBLE BOLTS



TYPES DM, DL, DK, AND DJ BOLTS

We recommend the DK and DJ Types for TELL-TALE Bolts.

All of the bolts illustrated above can be furnished SOLID, if desired.

The above bolts are used in connection with Welded Type Sleeves UW, U, US, FW, and Threaded Type Sleeves D, E, ER, F, FA, FB, FC, FR, G, H and SM.

For description of Tell-Tale Bolts and Method of Testing same, see Pages 18 to 23 inclusive.

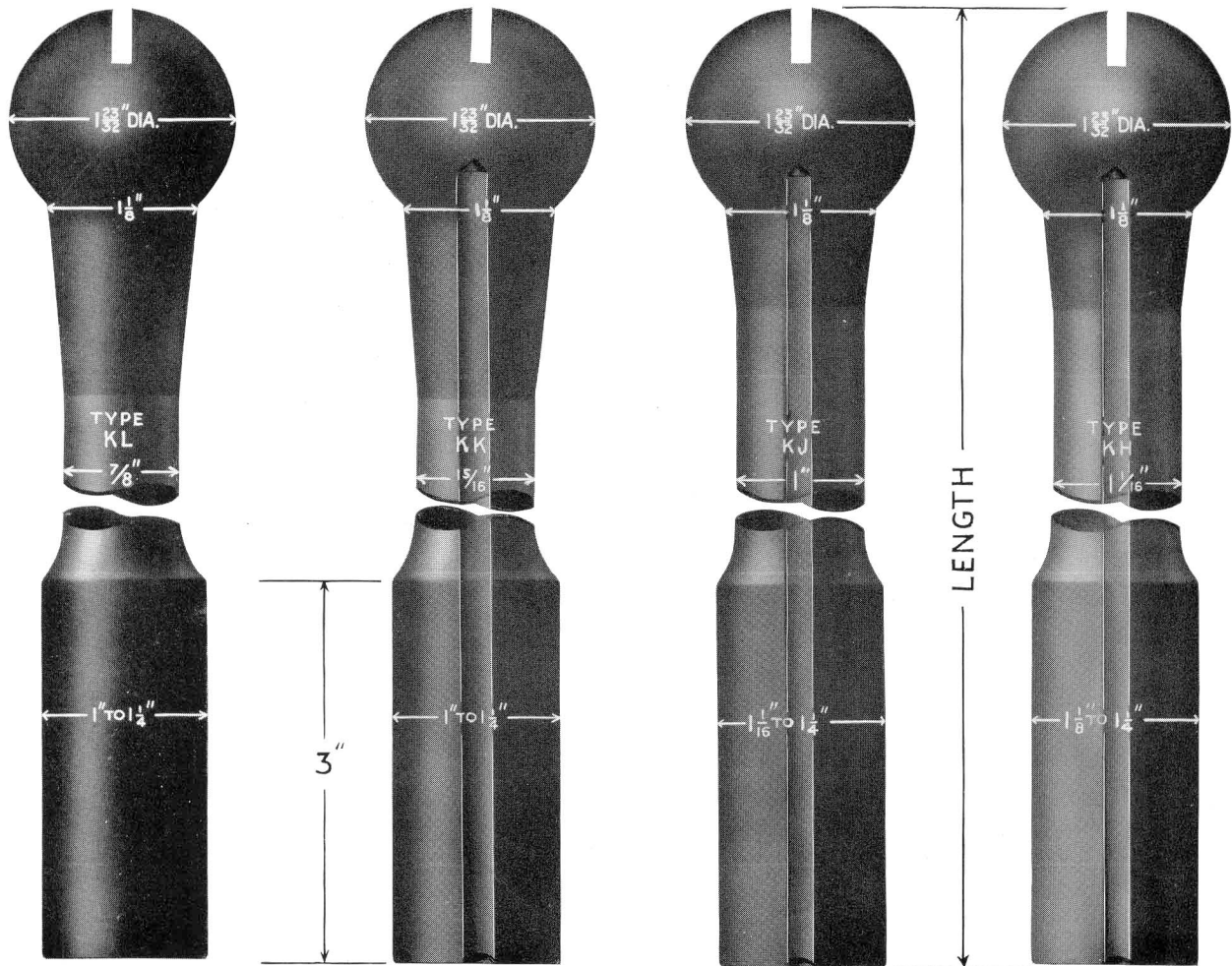
See instructions on Page 24 for determining length of bolts to order for Welded Type Sleeves and Page 70 for rules to obtain length of bolts for Threaded Type Sleeves.

When ordering specify type of bolt, shank diameter, length overall, and whether TELL-TALE or SOLID bolts are desired.

When threaded bolts are desired, specify form of thread and number of threads per inch.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

FORGED FLEXIBLE BOLTS



TYPES KL, KK, KJ AND KH BOLTS

We recommend the KK, KJ and KH Types for TELL-TALE Bolts.

All of the bolts illustrated above can be furnished SOLID, if desired.

The above bolts are used in connection with Welded Type Sleeves URW and FRW, and Cap MK in the Flannery Two Piece Assemblage, also Threaded Type Sleeves HK, JK, KK, LK and SN.

For description of Tell-Tale Bolts and Method of Testing same, see Pages 18 to 23 inclusive.

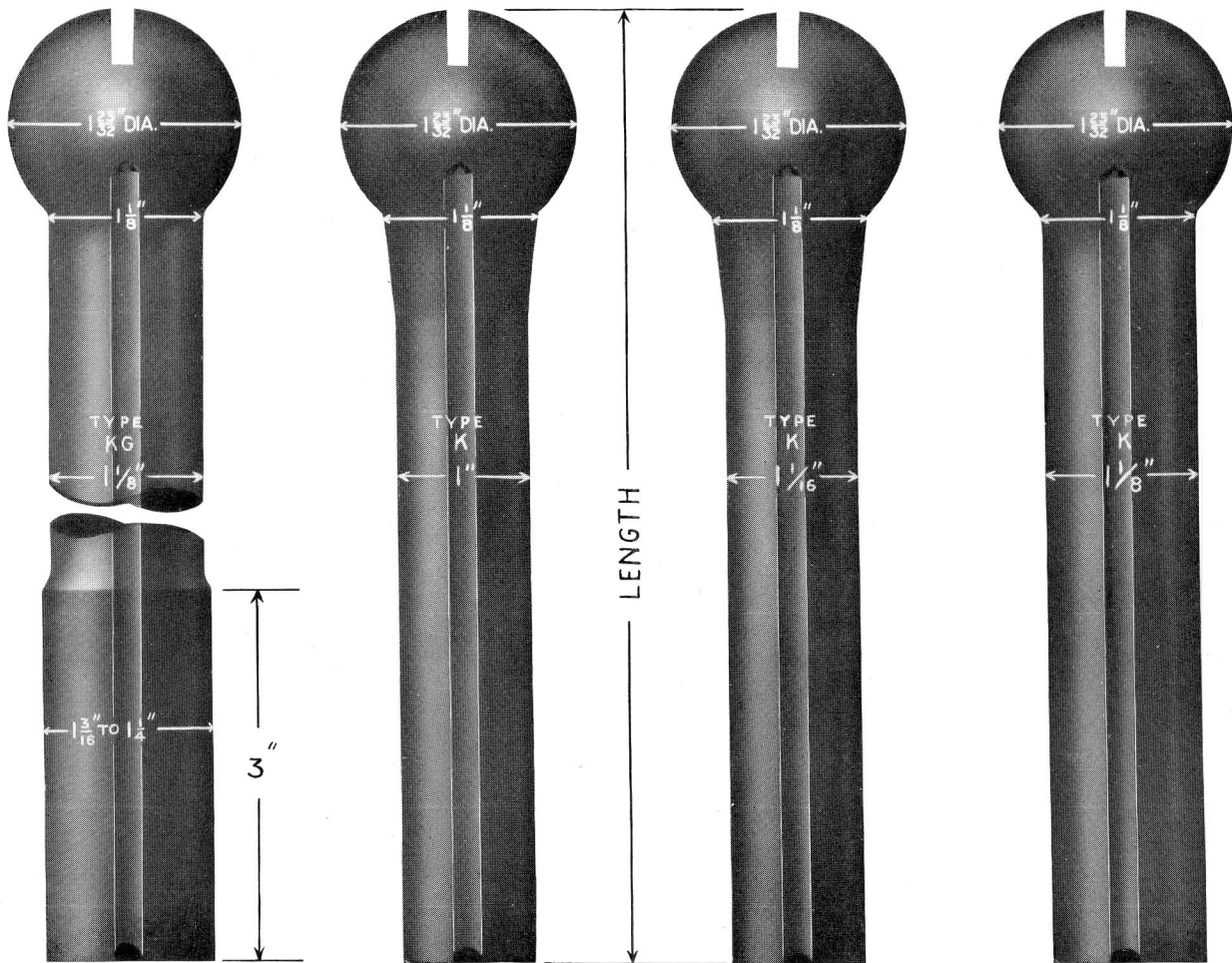
See instructions on Page 24 for determining length of bolts to order for Welded Type Sleeves and Page 70 for rules to obtain length of bolts for Threaded Type Sleeves.

When ordering specify type of bolt, shank diameter, length overall, and whether TELL-TALE or SOLID bolts are desired.

When threaded bolts are desired, specify form of thread and number of threads per inch.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

FORGED FLEXIBLE BOLTS



TYPES KG AND K BOLTS

We recommend all of the above types for TELL-TALE Bolts.

All of the bolts illustrated above can be furnished SOLID, if desired.

The above bolts are used in connection with Welded Type Sleeves URW and FRW, and Cap MK in the Flannery Two Piece Assemblage, also Threaded Type Sleeves HK, JK, KK, LK and SN.

For description of Tell-Tale Bolts and Method of Testing same, see Pages 18 to 23 inclusive.

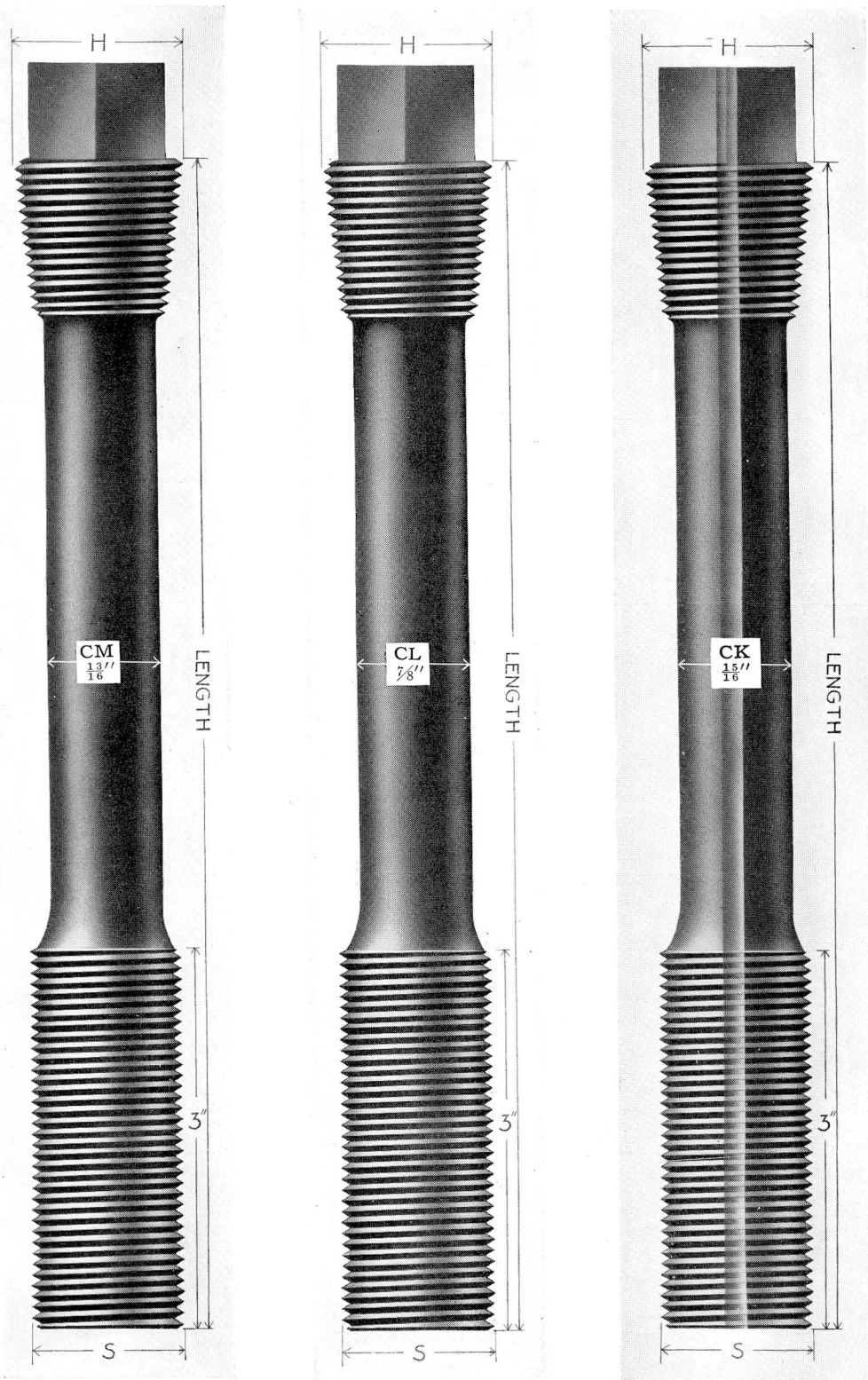
See instructions on Page 24 for determining length of bolts to order for Welded Type Sleeves and Page 70 for rules to obtain length of bolts for Threaded Type Sleeves.

When ordering specify type of bolt, shank diameter, length overall, and whether TELL-TALE or SOLID bolts are desired.

When threaded bolts are desired, specify form of thread and number of threads per inch.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

TAPER HEAD CROWN STAYS



FOR
LARGER
SIZED
TAPER
HEAD
CROWN
STAYS
SEE
PAGE
32

TYPES CM, CL AND CK BOLTS

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

TAPER HEAD CROWN STAYS

WHEN ORDERING SPECIFY QUANTITY—BOLT
NUMBER—LENGTH—FORM OF THREADING
AND TAPER DESIRED

When Taper is 2" in 12", Length of Taper is 1 1/4".
When Taper is 1 1/2" in 12", Length of Taper is 1 1/2".

TYPE CM			TYPE CL			TYPE CK		
With 1 3/16" Body			With 7/8" Body			With 1 5/16" Body		
Bolt No.	Dimensions in Inches		Bolt No.	Dimensions in Inches		Bolt No.	Dimensions in Inches	
	S	H		S	H		S	H
1	1	1 5/32	22	1	1 7/32	49	1	1 9/32
2	1	1 7/32	23	1	1 9/32	50	1	1 11/32
3	1	1 9/32	24	1	1 11/32	51	1	1 13/32
4	1	1 11/32	25	1	1 13/32	52	1	1 15/32
5	1	1 13/32	26	1	1 15/32	53	1	1 17/32
6	1	1 15/32	27	1	1 17/32	54	1	1 19/32
7	1 1/16	1 7/32	28	1 1/16	1 7/32	55	1 1/16	1 9/32
8	1 1/16	1 9/32	29	1 1/16	1 9/32	56	1 1/16	1 11/32
9	1 1/16	1 11/32	30	1 1/16	1 11/32	57	1 1/16	1 13/32
10	1 1/16	1 13/32	31	1 1/16	1 13/32	58	1 1/16	1 15/32
11	1 1/16	1 15/32	32	1 1/16	1 15/32	59	1 1/16	1 17/32
12	1 1/8	1 9/32	33	1 1/16	1 17/32	60	1 1/16	1 19/32
13	1 1/8	1 11/32	34	1 1/8	1 9/32	61	1 1/8	1 9/32
14	1 1/8	1 13/32	35	1 1/8	1 11/32	62	1 1/8	1 11/32
15	1 1/8	1 15/32	36	1 1/8	1 13/32	63	1 1/8	1 13/32
16	1 3/16	1 11/32	37	1 1/8	1 15/32	64	1 1/8	1 15/32
17	1 3/16	1 13/32	38	1 1/8	1 17/32	65	1 1/8	1 17/32
18	1 3/16	1 15/32	39	1 3/16	1 11/32	66	1 1/8	1 19/32
19	1 1/4	1 13/32	40	1 3/16	1 13/32	67	1 3/16	1 11/32
20	1 1/4	1 15/32	41	1 3/16	1 15/32	68	1 3/16	1 13/32
21	1 5/16	1 15/32	42	1 3/16	1 17/32	69	1 3/16	1 15/32
			43	1 1/4	1 13/32	70	1 3/16	1 17/32
			44	1 1/4	1 15/32	71	1 3/16	1 19/32
			45	1 1/4	1 17/32	72	1 1/4	1 13/32
			46	1 5/16	1 15/32	73	1 1/4	1 15/32
			47	1 5/16	1 17/32	74	1 1/4	1 17/32
			48	1 3/8	1 17/32	75	1 1/4	1 19/32
						76	1 5/16	1 15/32
						77	1 5/16	1 17/32
						78	1 5/16	1 19/32
						79	1 3/8	1 17/32
						80	1 3/8	1 19/32
						81	1 7/16	1 19/32

Taper Head Crown Stays are furnished in lengths from 12" up, varying by 1/2".

Taper Head Stays are preferred by many roads over the button head type for crown stay work. They may be applied as flexible stays by using the Flannery Round Nut KN with the F.B.C. Welded Sleeve WR, or with the Welded Flush Sleeve FRW. They are also used with Tate Threaded Sleeves HK, JK, KK, LK or SN.

Where it is desired to use a Taper Head Crown Stay with the Round Nut in a Flexible Tell-Tale Bolt Assemblage, it is necessary that the hole in the bolt be copper plated in accordance with I. C. C. rules. (See Page 21).

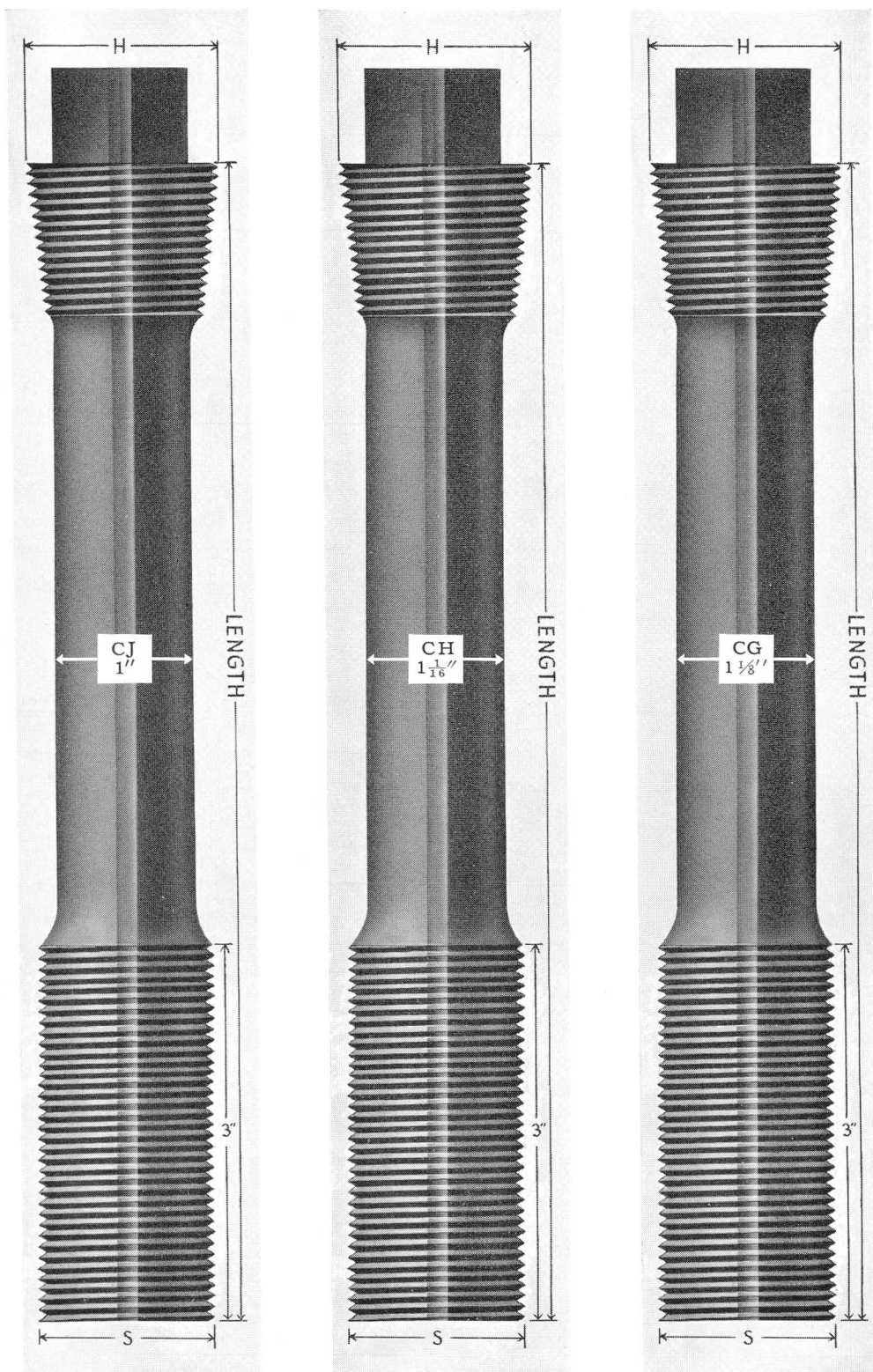
We recommend the CK, CJ, CH and CG Types for Tell-Tale Bolts.

Hollow Taper Head Crown Stays are furnished without copper plated holes, for Rigid Installations, when so specified.

All Types of Taper Head Crown Stays can be furnished SOLID, if desired.

See the following pages for additional notes, and for larger sized Taper Head Crown Stays.

TAPER HEAD CROWN STAYS



FOR
SMALLER
SIZED
TAPER
HEAD
CROWN
STAYS
SEE
PAGE
30

TYPES CJ, CH AND CG BOLTS

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

TAPER HEAD CROWN STAYS

WHEN ORDERING SPECIFY QUANTITY—BOLT
NUMBER—LENGTH—FORM OF THREADING
AND TAPER DESIRED

When Taper is 2" in 12", Length of Taper is 1¼".
When Taper is 1½" in 12", Length of Taper is 1½".

TYPE CJ			TYPE CH			TYPE CG		
With 1" Body			With 1¼" Body			With 1⅝" Body		
Bolt No.	Dimensions in Inches		Bolt No.	Dimensions in Inches		Bolt No.	Dimensions in Inches	
	S	H		S	H		S	H
82	1	1¼ ₃₂	121	1¼ ₁₆	1¼ ₃₂	151	1⅝	1¼ ₃₂
83	1	1⅜ ₃₂	122	1¼ ₁₆	1⅝ ₃₂	152	1⅝	1⅜ ₃₂
84	1	1⅝ ₃₂	123	1¼ ₁₆	1⅞ ₃₂	153	1⅝	1⅞ ₃₂
85	1	1⅞ ₃₂	124	1¼ ₁₆	1⅞ ₃₂	154	1⅝	1⅞ ₃₂
86	1	1⅞ ₃₂	125	1¼ ₁₆	1⅞ ₃₂	155	1⅝	1⅞ ₃₂
87	1	1⅞ ₃₂	126	1⅝	1⅞ ₃₂	156	1⅝	1⅞ ₃₂
88	1¼ ₁₆	1⅞ ₃₂	127	1⅝	1⅞ ₃₂	157	1⅝	1⅞ ₃₂
89	1¼ ₁₆	1⅞ ₃₂	128	1⅝	1⅞ ₃₂	158	1⅝	1⅞ ₃₂
90	1¼ ₁₆	1⅞ ₃₂	129	1⅝	1⅞ ₃₂	159	1¼	1⅞ ₃₂
91	1¼ ₁₆	1⅞ ₃₂	130	1⅝	1⅞ ₃₂	160	1¼	1⅞ ₃₂
92	1¼ ₁₆	1⅞ ₃₂	131	1⅝	1⅞ ₃₂	161	1¼	1⅞ ₃₂
93	1¼ ₁₆	1⅞ ₃₂	132	1⅝	1⅞ ₃₂	162	1¼	1⅞ ₃₂
94	1⅝	1⅞ ₃₂	133	1⅝	1⅞ ₃₂	163	1⅝	1⅞ ₃₂
95	1⅝	1⅞ ₃₂	134	1⅝	1⅞ ₃₂	164	1⅝	1⅞ ₃₂
96	1⅝	1⅞ ₃₂	135	1⅝	1⅞ ₃₂	165	1⅝	1⅞ ₃₂
97	1⅝	1⅞ ₃₂	136	1¼	1⅞ ₃₂	166	1⅝	1⅞ ₃₂
98	1⅝	1⅞ ₃₂	137	1¼	1⅞ ₃₂	167	1⅝	1⅞ ₃₂
99	1⅝	1⅞ ₃₂	138	1¼	1⅞ ₃₂	168	1⅝	1⅞ ₃₂
100	1⅝	1⅞ ₃₂	139	1¼	1⅞ ₃₂	169	1⅝	1⅞ ₃₂
101	1⅝	1⅞ ₃₂	140	1¼	1⅞ ₃₂	170	1⅝	1⅞ ₃₂
102	1⅝	1⅞ ₃₂	141	1⅝	1⅞ ₃₂	171	1⅝	1⅞ ₃₂
103	1⅝	1⅞ ₃₂	142	1⅝	1⅞ ₃₂	172	1¼	1⅞ ₃₂
104	1⅝	1⅞ ₃₂	143	1⅝	1⅞ ₃₂			
105	1⅝	1⅞ ₃₂	144	1⅝	1⅞ ₃₂			
106	1¼	1⅞ ₃₂	145	1⅝	1⅞ ₃₂			
107	1¼	1⅞ ₃₂	146	1⅝	1⅞ ₃₂			
108	1¼	1⅞ ₃₂	147	1⅝	1⅞ ₃₂			
109	1¼	1⅞ ₃₂	148	1⅞	1⅞ ₃₂			
110	1¼	1⅞ ₃₂	149	1⅞	1⅞ ₃₂			
111	1⅝	1⅞ ₃₂	150	1½	1⅞ ₃₂			
112	1⅝	1⅞ ₃₂						
113	1⅝	1⅞ ₃₂						
114	1⅝	1⅞ ₃₂						
115	1⅝	1⅞ ₃₂						
116	1⅝	1⅞ ₃₂						
117	1⅝	1⅞ ₃₂						
118	1⅞	1⅞ ₃₂						
119	1⅞	1⅞ ₃₂						
120	1¼	1⅞ ₃₂						

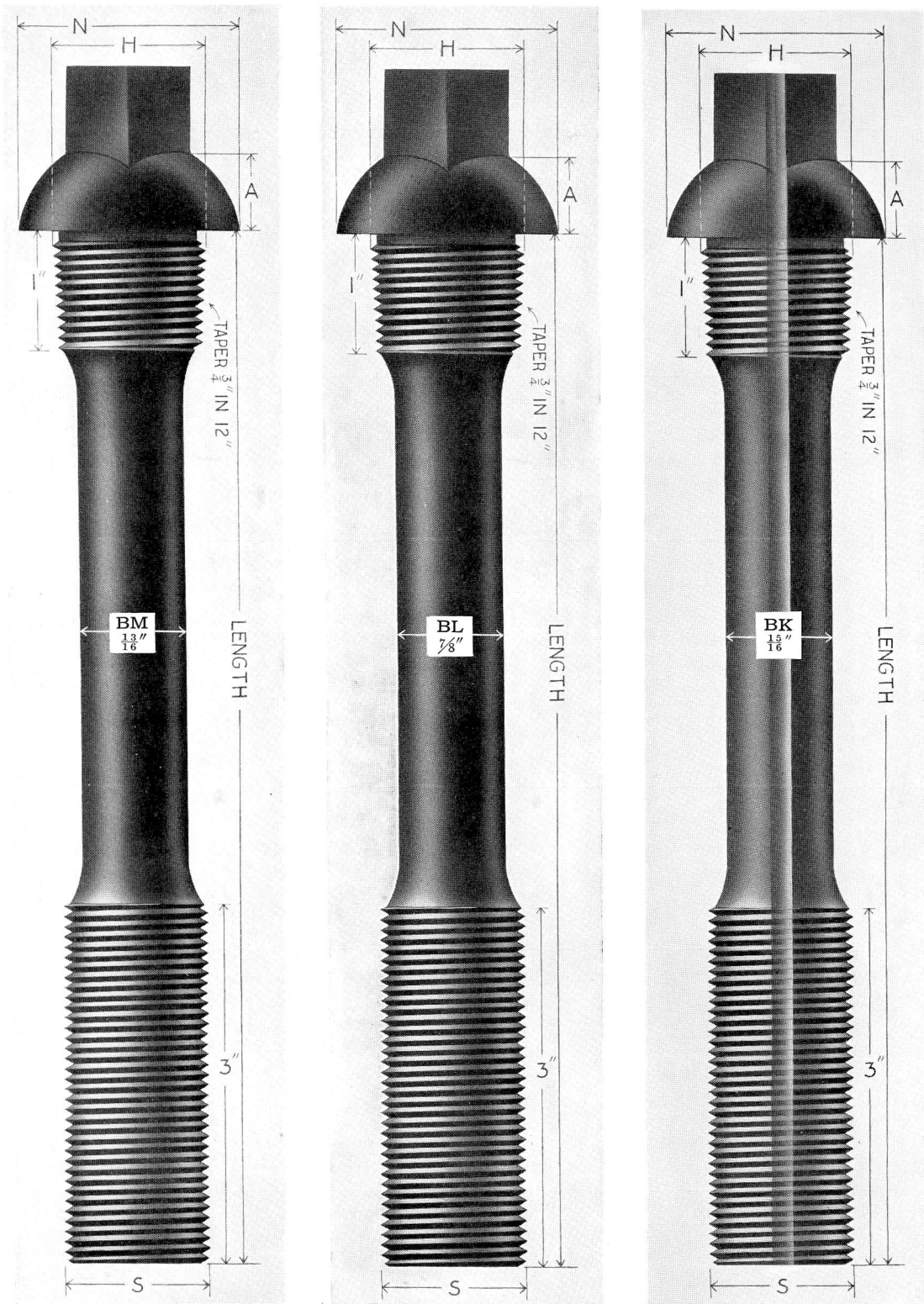
When Taper Head Crown Stays are furnished with the head unthreaded, we allow ¼" extra on the diameter of the head as ordered, to allow for various methods of threading.

Owing to the variations in diameters of iron bars as received from the rolling mills, it is impossible to meet, in every case, the exact bolt lengths ordered. We reserve the right to furnish crown bolts one-quarter inch longer or shorter than specified.

Crown Stay Taps can be supplied to your order. See Page 60 for illustration and data on same.

See the preceding pages for additional notes, and for smaller sized Taper Head Crown Stays.

BUTTON HEAD CROWN STAYS



FOR
LARGER
SIZED
BUTTON
HEAD
CROWN
STAYS
SEE
PAGE
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TYPES BM, BL AND BK BOLTS

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

> **BUTTON HEAD CROWN STAYS** <

WHEN ORDERING SPECIFY QUANTITY—BOLT NUMBERS—LENGTH—FORM OF
THREADING. FURNISHED WITH TAPER $\frac{3}{4}$ " IN 12"

TYPE BM					TYPE BL					TYPE BK				
With $\frac{13}{16}$ " Body					With $\frac{7}{8}$ " Body					With $\frac{15}{16}$ " Body				
Bolt No.	Dimensions in Inches				Bolt No.	Dimensions in Inches				Bolt No.	Dimensions in Inches			
	S	H	A	N		S	H	A	N		S	H	A	N
173	1	$1\frac{3}{32}$	$\frac{1}{2}$	$1\frac{9}{16}$	194	1	$1\frac{5}{32}$	$\frac{9}{16}$	$1\frac{11}{16}$	221	1	$1\frac{7}{32}$	$\frac{9}{16}$	$1\frac{11}{16}$
174	1	$1\frac{5}{32}$	$\frac{9}{16}$	$1\frac{11}{16}$	195	1	$1\frac{7}{32}$	$\frac{9}{16}$	$1\frac{11}{16}$	222	1	$1\frac{9}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$
175	1	$1\frac{7}{32}$	$\frac{9}{16}$	$1\frac{11}{16}$	196	1	$1\frac{9}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	223	1	$1\frac{11}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$
176	1	$1\frac{9}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	197	1	$1\frac{11}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	224	1	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$
177	1	$1\frac{11}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	198	1	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	225	1	$1\frac{15}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$
178	1	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	199	1	$1\frac{15}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	226	1	$1\frac{17}{32}$	$\frac{3}{4}$	$2\frac{1}{16}$
179	$1\frac{1}{16}$	$1\frac{5}{32}$	$\frac{9}{16}$	$1\frac{11}{16}$	200	$1\frac{1}{16}$	$1\frac{5}{32}$	$\frac{9}{16}$	$1\frac{11}{16}$	227	$1\frac{1}{16}$	$1\frac{7}{32}$	$\frac{9}{16}$	$1\frac{11}{16}$
180	$1\frac{1}{16}$	$1\frac{7}{32}$	$\frac{9}{16}$	$1\frac{11}{16}$	201	$1\frac{1}{16}$	$1\frac{7}{32}$	$\frac{9}{16}$	$1\frac{11}{16}$	228	$1\frac{1}{16}$	$1\frac{9}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$
181	$1\frac{1}{16}$	$1\frac{9}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	202	$1\frac{1}{16}$	$1\frac{9}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	229	$1\frac{1}{16}$	$1\frac{11}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$
182	$1\frac{1}{16}$	$1\frac{11}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	203	$1\frac{1}{16}$	$1\frac{11}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	230	$1\frac{1}{16}$	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$
183	$1\frac{1}{16}$	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	204	$1\frac{1}{16}$	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	231	$1\frac{1}{16}$	$1\frac{15}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$
184	$1\frac{1}{8}$	$1\frac{7}{32}$	$\frac{9}{16}$	$1\frac{11}{16}$	205	$1\frac{1}{16}$	$1\frac{15}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	232	$1\frac{1}{16}$	$1\frac{17}{32}$	$\frac{3}{4}$	$2\frac{1}{16}$
185	$1\frac{1}{8}$	$1\frac{9}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	206	$1\frac{1}{8}$	$1\frac{7}{32}$	$\frac{9}{16}$	$1\frac{11}{16}$	233	$1\frac{1}{8}$	$1\frac{7}{32}$	$\frac{9}{16}$	$1\frac{11}{16}$
186	$1\frac{1}{8}$	$1\frac{11}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	207	$1\frac{1}{8}$	$1\frac{9}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	234	$1\frac{1}{8}$	$1\frac{9}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$
187	$1\frac{1}{8}$	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	208	$1\frac{1}{8}$	$1\frac{11}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	235	$1\frac{1}{8}$	$1\frac{11}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$
188	$1\frac{3}{16}$	$1\frac{9}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	209	$1\frac{1}{8}$	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	236	$1\frac{1}{8}$	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$
189	$1\frac{3}{16}$	$1\frac{11}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	210	$1\frac{1}{8}$	$1\frac{15}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	237	$1\frac{1}{8}$	$1\frac{15}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$
190	$1\frac{3}{16}$	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	211	$1\frac{3}{16}$	$1\frac{9}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	238	$1\frac{1}{8}$	$1\frac{17}{32}$	$\frac{3}{4}$	$2\frac{1}{16}$
191	$1\frac{1}{4}$	$1\frac{11}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	212	$1\frac{3}{16}$	$1\frac{11}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	239	$1\frac{3}{16}$	$1\frac{9}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$
192	$1\frac{1}{4}$	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	213	$1\frac{3}{16}$	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	240	$1\frac{3}{16}$	$1\frac{11}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$
193	$1\frac{5}{16}$	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	214	$1\frac{3}{16}$	$1\frac{15}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	241	$1\frac{3}{16}$	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$
					215	$1\frac{1}{4}$	$1\frac{11}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$	242	$1\frac{3}{16}$	$1\frac{15}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$
					216	$1\frac{1}{4}$	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	243	$1\frac{3}{16}$	$1\frac{17}{32}$	$\frac{3}{4}$	$2\frac{1}{16}$
					217	$1\frac{1}{4}$	$1\frac{15}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	244	$1\frac{1}{4}$	$1\frac{11}{32}$	$\frac{5}{8}$	$1\frac{13}{16}$
					218	$1\frac{5}{16}$	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	245	$1\frac{1}{4}$	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$
					219	$1\frac{5}{16}$	$1\frac{15}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	246	$1\frac{1}{4}$	$1\frac{15}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$
					220	$1\frac{3}{8}$	$1\frac{15}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$	247	$1\frac{1}{4}$	$1\frac{17}{32}$	$\frac{3}{4}$	$2\frac{1}{16}$
										248	$1\frac{5}{16}$	$1\frac{13}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$
										249	$1\frac{5}{16}$	$1\frac{15}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$
										250	$1\frac{5}{16}$	$1\frac{11}{32}$	$\frac{3}{4}$	$2\frac{1}{16}$
										251	$1\frac{3}{8}$	$1\frac{15}{32}$	$\frac{11}{16}$	$1\frac{15}{16}$
										252	$1\frac{3}{8}$	$1\frac{17}{32}$	$\frac{3}{4}$	$2\frac{1}{16}$
										253	$1\frac{1}{16}$	$1\frac{17}{32}$	$\frac{3}{4}$	$2\frac{1}{16}$

For use as flexible stays, these bolts may be applied in combination with the Round Nut and the Welded Sleeve WR or FRW. They are also used with Threaded Sleeves HK, JK, KK, LK or SN.

Where it is desired to use a Button Head Crown Stay with the Round Nut in a Flexible Tell-Tale Bolt Assemblage, it is necessary that the hole in the bolt be copper plated in accordance with I. C. C. Rule (See Page 21).

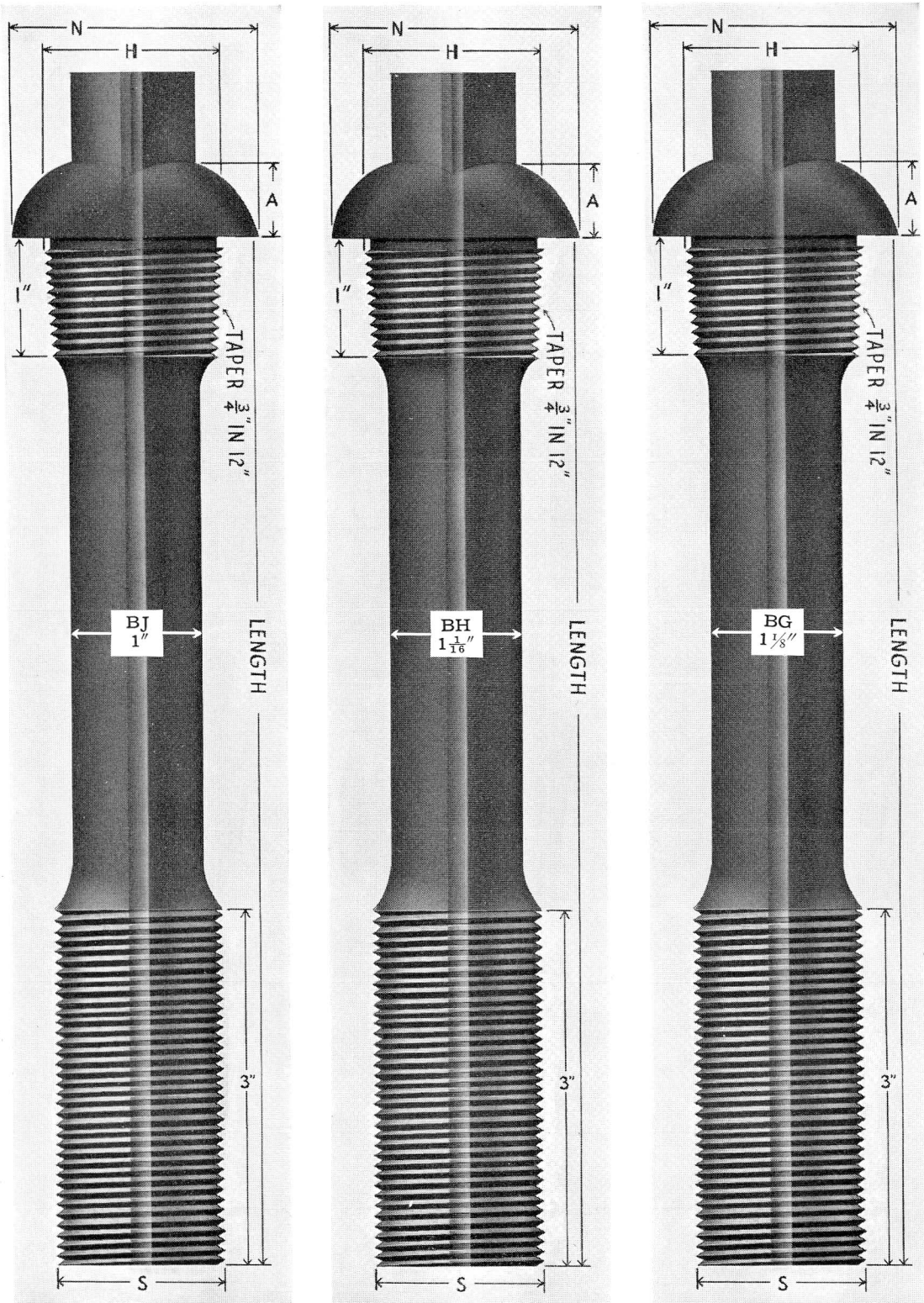
We recommend the BK, BJ, BH and BG Types for Tell-Tale Bolts.

Hollow Button Head Crown Stays are furnished without copper plated holes for Rigid Installations, when so specified.

All types of Button Head Crown Stays can be furnished SOLID if desired.

See the following pages for additional notes, and for larger sized Button Head Crown Stays.

BUTTON HEAD CROWN STAYS



FOR
SMALLER
SIZED
BUTTON
HEAD
CROWN
STAYS
SEE
PAGE
34

TYPES BJ, BH AND BG BOLTS

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

> **BUTTON HEAD CROWN STAYS** <

WHEN ORDERING SPECIFY QUANTITY—BOLT NUMBERS—LENGTH—FORM OF
THREADING. FURNISHED WITH TAPER $\frac{3}{4}$ " IN 12"

TYPE BJ					TYPE BH					TYPE BG				
With 1" Body					With 1 $\frac{1}{16}$ " Body					With 1 $\frac{1}{8}$ " Body				
Bolt No.	Dimensions in Inches				Bolt No.	Dimensions in Inches				Bolt No.	Dimensions in Inches			
	S	H	A	N		S	H	A	N		S	H	A	N
254	1	1 $\frac{9}{32}$	$\frac{5}{8}$	1 $\frac{13}{16}$	293	1 $\frac{1}{16}$	1 $\frac{11}{32}$	$\frac{5}{8}$	1 $\frac{13}{16}$	323	1 $\frac{1}{8}$	1 $\frac{13}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$
255	1	1 $\frac{11}{32}$	$\frac{5}{8}$	1 $\frac{13}{16}$	294	1 $\frac{1}{16}$	1 $\frac{13}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	324	1 $\frac{1}{8}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$
256	1	1 $\frac{13}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	295	1 $\frac{1}{16}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	325	1 $\frac{1}{8}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$
257	1	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	296	1 $\frac{1}{16}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	326	1 $\frac{1}{8}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$
258	1	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	297	1 $\frac{1}{16}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	327	1 $\frac{3}{16}$	1 $\frac{13}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$
259	1	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	298	1 $\frac{1}{8}$	1 $\frac{11}{32}$	$\frac{5}{8}$	1 $\frac{13}{16}$	328	1 $\frac{3}{16}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$
260	1 $\frac{1}{16}$	1 $\frac{9}{32}$	$\frac{5}{8}$	1 $\frac{13}{16}$	299	1 $\frac{1}{8}$	1 $\frac{13}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	329	1 $\frac{3}{16}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$
261	1 $\frac{1}{16}$	1 $\frac{11}{32}$	$\frac{5}{8}$	1 $\frac{13}{16}$	300	1 $\frac{1}{8}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	330	1 $\frac{3}{16}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$
262	1 $\frac{1}{16}$	1 $\frac{13}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	301	1 $\frac{1}{8}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	331	1 $\frac{1}{4}$	1 $\frac{13}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$
263	1 $\frac{1}{16}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	302	1 $\frac{1}{8}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	332	1 $\frac{1}{4}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$
264	1 $\frac{1}{16}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	303	1 $\frac{3}{16}$	1 $\frac{11}{32}$	$\frac{5}{8}$	1 $\frac{13}{16}$	333	1 $\frac{1}{4}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$
265	1 $\frac{1}{16}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	304	1 $\frac{3}{16}$	1 $\frac{13}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	334	1 $\frac{1}{4}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$
266	1 $\frac{1}{8}$	1 $\frac{9}{32}$	$\frac{5}{8}$	1 $\frac{13}{16}$	305	1 $\frac{3}{16}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	335	1 $\frac{5}{16}$	1 $\frac{13}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$
267	1 $\frac{1}{8}$	1 $\frac{11}{32}$	$\frac{5}{8}$	1 $\frac{13}{16}$	306	1 $\frac{3}{16}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	336	1 $\frac{5}{16}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$
268	1 $\frac{1}{8}$	1 $\frac{13}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	307	1 $\frac{3}{16}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	337	1 $\frac{5}{16}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$
269	1 $\frac{1}{8}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	308	1 $\frac{1}{4}$	1 $\frac{11}{32}$	$\frac{5}{8}$	1 $\frac{13}{16}$	338	1 $\frac{5}{16}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$
270	1 $\frac{1}{8}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	309	1 $\frac{1}{4}$	1 $\frac{13}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	339	1 $\frac{5}{16}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$
271	1 $\frac{1}{8}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	310	1 $\frac{1}{4}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	340	1 $\frac{3}{8}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$
272	1 $\frac{3}{16}$	1 $\frac{9}{32}$	$\frac{5}{8}$	1 $\frac{13}{16}$	311	1 $\frac{1}{4}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	341	1 $\frac{3}{8}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$
273	1 $\frac{3}{16}$	1 $\frac{11}{32}$	$\frac{5}{8}$	1 $\frac{13}{16}$	312	1 $\frac{1}{4}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	342	1 $\frac{7}{16}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$
274	1 $\frac{3}{16}$	1 $\frac{13}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	313	1 $\frac{5}{16}$	1 $\frac{13}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	343	1 $\frac{7}{16}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$
275	1 $\frac{3}{16}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	314	1 $\frac{5}{16}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	344	1 $\frac{1}{2}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$
276	1 $\frac{3}{16}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	315	1 $\frac{5}{16}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$					
277	1 $\frac{3}{16}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	316	1 $\frac{5}{16}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$					
278	1 $\frac{1}{4}$	1 $\frac{11}{32}$	$\frac{5}{8}$	1 $\frac{13}{16}$	317	1 $\frac{3}{8}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$					
279	1 $\frac{1}{4}$	1 $\frac{13}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	318	1 $\frac{3}{8}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$					
280	1 $\frac{1}{4}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	319	1 $\frac{3}{8}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$					
281	1 $\frac{1}{4}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	320	1 $\frac{7}{16}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$					
282	1 $\frac{1}{4}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$	321	1 $\frac{7}{16}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$					
283	1 $\frac{5}{16}$	1 $\frac{13}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$	322	1 $\frac{1}{2}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$					
284	1 $\frac{5}{16}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$										
285	1 $\frac{5}{16}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$										
286	1 $\frac{5}{16}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$										
287	1 $\frac{3}{8}$	1 $\frac{15}{32}$	1 $\frac{1}{16}$	1 $\frac{15}{16}$										
288	1 $\frac{3}{8}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$										
289	1 $\frac{3}{8}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$										
290	1 $\frac{7}{16}$	1 $\frac{17}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$										
291	1 $\frac{7}{16}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$										
292	1 $\frac{1}{2}$	1 $\frac{19}{32}$	$\frac{3}{4}$	2 $\frac{1}{16}$										

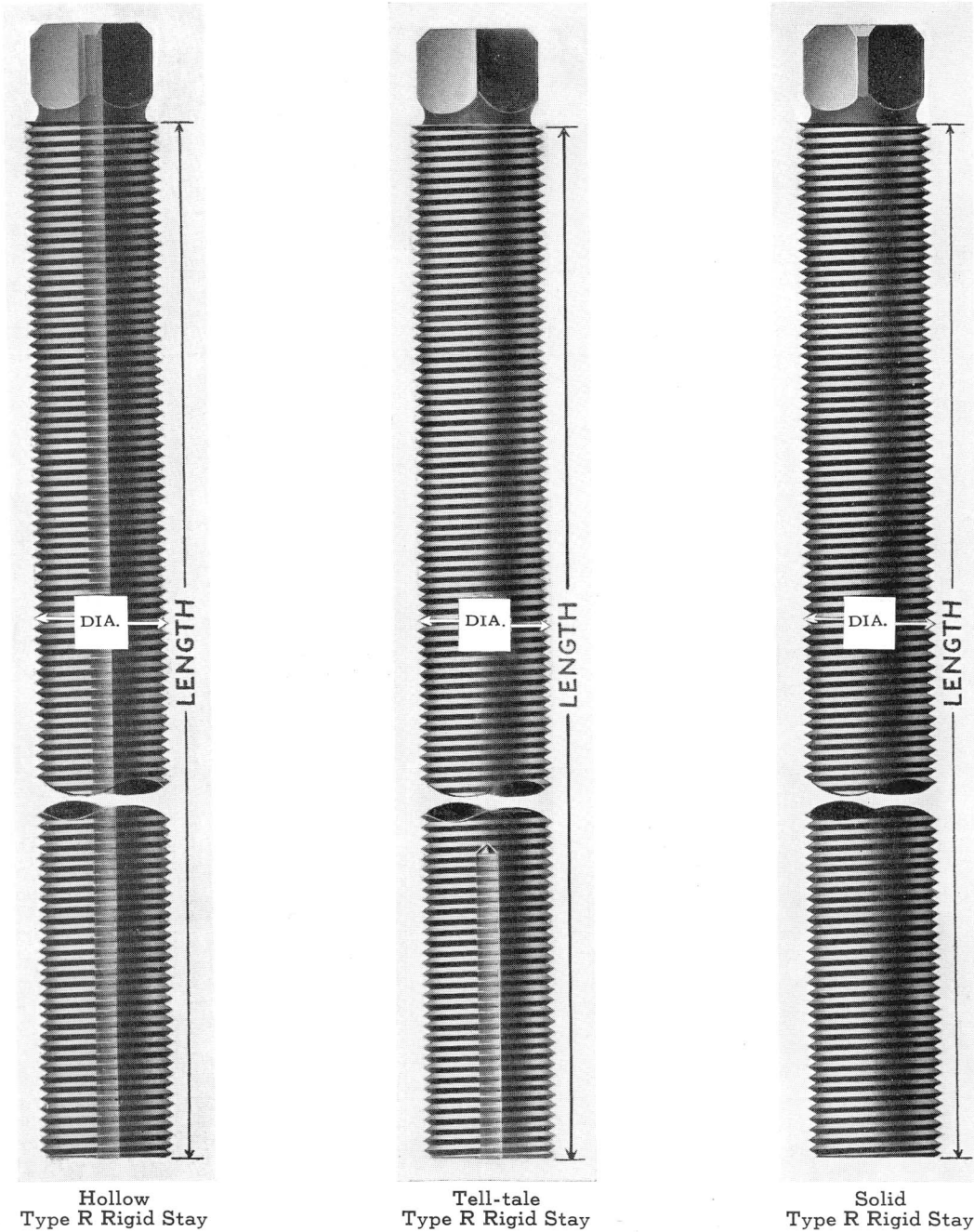
Owing to the variations in diameters of iron bars as received from the rolling mills, it is impossible to meet, in every case, the exact bolt lengths ordered. We reserve the right to furnish crown bolts one-quarter inch longer or shorter than specified.

Crown Stay Taps can be supplied to your order. See Page 60 for illustration and data on same.

See the preceding pages for additional notes, and for smaller sized Button Head Crown Stays.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

STRAIGHT BODY RIGID STAYS



Hollow
Type R Rigid Stay

Tell-tale
Type R Rigid Stay

Solid
Type R Rigid Stay

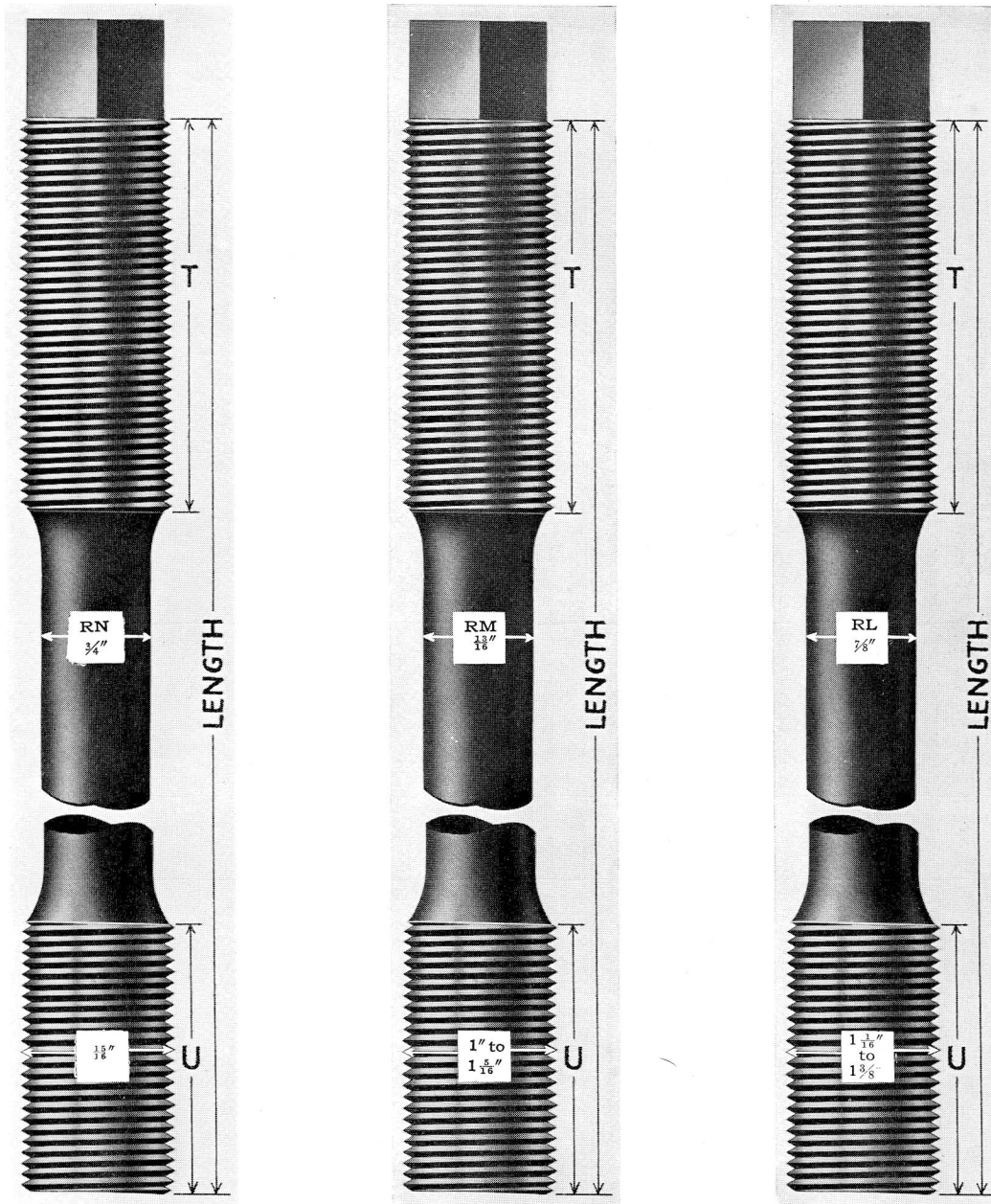
We manufacture Rigid Staybolts of all types. Our method produces bolts square on the end and chamfered, so that threads may be properly cut for easy entry. The square end on the bolt is necked to facilitate removal. The length of the body is accurate and not subject to variations of length, due to incomplete threads, which are unavoidable in other processes.

Unless otherwise specified, all holes are drilled $\frac{7}{32}$ " diameter.

When ordering bolts, please specify quantity, type, diameter, length, form of thread, number of threads per inch, and whether bolts are desired hollow, or with tell-tale hole, or solid.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

REDUCED BODY RIGID STAYS



Reduced Body Rigid Stays

When ordering bolts, please specify quantity, type, diameter, length, form of thread, number of threads per inch, and whether bolts are desired solid, or with tell-tale hole, or hollow entire length.

Unless otherwise ordered all bolts 9" and under are supplied with tell-tale hole extending into the reduced body section.

Table of Thread Lengths for Reduced Body Rigid Stays.

Bolt Length	T	U
5".....	1 1/2"	1 1/4"
6", 7", 8", 9".....	2"	1 1/2"
10" and over.....	3"	1 1/2"

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

REDUCED BODY RIGID STAYS



Reduced Body Rigid Stays

When ordering bolts, please specify quantity, type, diameter, length, form of thread, number of threads per inch, and whether bolts are desired solid, or with tell-tale hole, or hollow entire length.

Unless otherwise ordered all bolts 9" and under are supplied with tell-tale hole extending into the reduced body section.

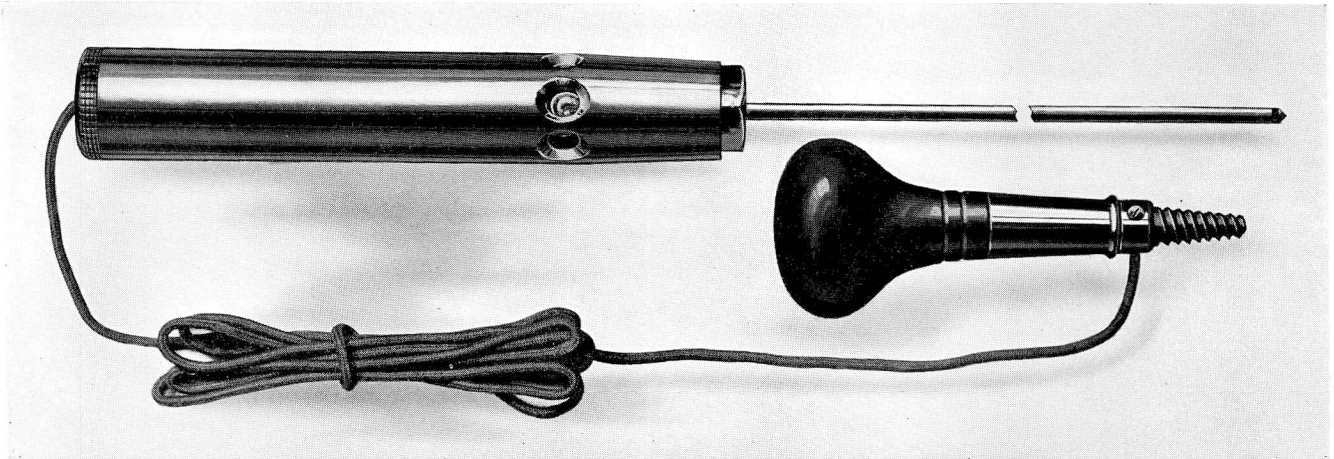
Table of Thread Lengths for Reduced Body Rigid Stays.

Bolt Length	T	U
5".....	1 1/2"	1 1/4"
6", 7", 8", 9".....	2"	1 1/2"
10" and over.....	3"	1 1/2"

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

TOOLS
FOR
PREPARATION
AND
INSPECTION
OF
TELL-TALE FLEXIBLE BOLTS

> ELECTRIC CONTACT TESTER AND TOOLS <



Electric Contact Tester, equipped with indicating electric light in Tester handle.

These Testers are not sold but are loaned to users of Flannery Tell-Tale Flexible Bolts, for the purpose of testing Flannery Tell-Tale Bolts exclusively.

Testers are furnished with 18" and 36" rods. When longer rod is necessary same will be furnished upon request.

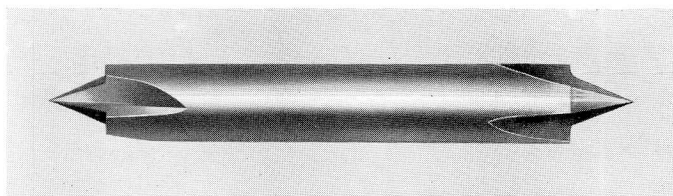
Occasionally it will be found necessary to inspect Tell-Tale Bolts situated behind arch tubes or syphons where, because of insufficient clearance, the rigid rods supplied with each Tester cannot be used. For this work we are prepared to furnish a **Special Flexible Rod**.



Cleaning Drill for Flannery Tell-Tale Bolts

When testing Tell-Tale Bolts with the Electric Contact Tester, a bolt may be found occasionally with its hole obstructed, this condition being indicated by the failure of the electric bulb in the Tester handle to light. Since it is absolutely necessary that electrical contact be obtained in every Tell-Tale Bolt, an obstructed hole must be cleaned with a drill before proceeding with the test. The Tester, when re-inserted, will then show that the hole has been cleared by establishing electrical contact at its extreme inner end.

Cleaning Drills, having a shank diameter of $\frac{3}{16}$ ", are made in five lengths, namely 12", 18", 24", 30" and 36". When ordering, designate the length of Cleaning Drill desired.

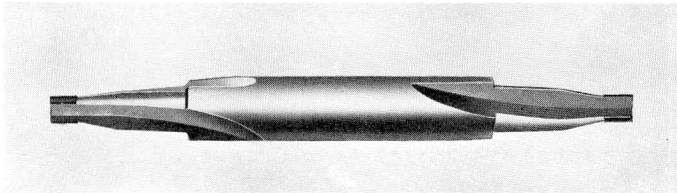


Flannery Double Pointed 45° Hole Opener

When the method of riveting the bolt closes the end of the tell-tale hole, it should be re-opened with the tool shown opposite.

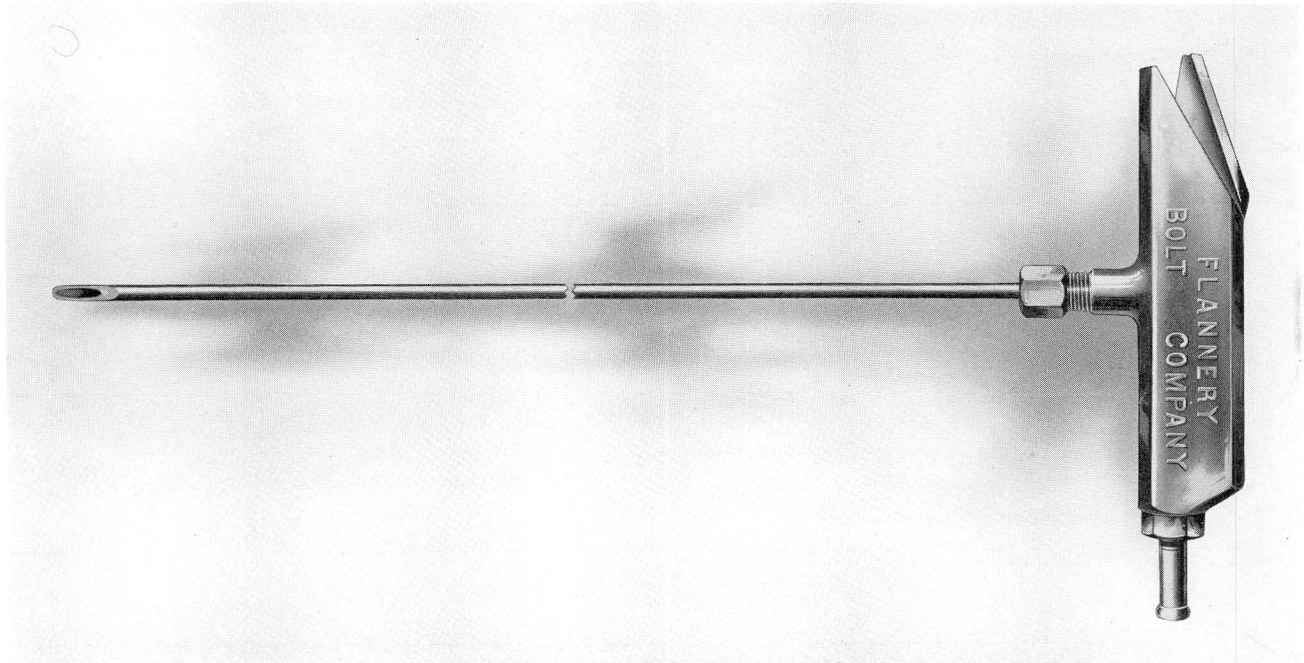
FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

> **TOOLS FOR TELL-TALE BOLTS** <



Flannery No. 4 Plug Reamer

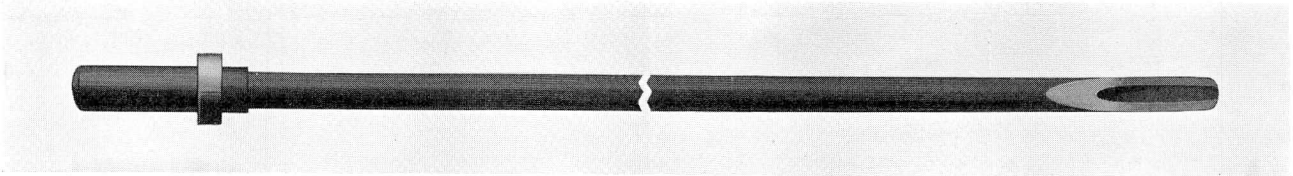
Tell-Tale Bolt ends should be reamed accurately to conform to the taper of Flannery Porous Plugs. The use of the tool illustrated will insure this.



The **Air Tool** is used for expelling drill chips and other obstructions from tell-tale holes before they are closed with porous closures. It is also used for cleaning out of tell-tale holes preparatory to inspection with the Electric Contact Tester.

The **Air Tool**, as sold, includes a handle with valve contained therein, Two Tubes and ten foot hose with $\frac{1}{4}$ " and $\frac{3}{8}$ " hose fittings attached.

When ordering **Air Tools**, note the range in lengths of bolts to be installed or tested, so that Tubes of suitable length may be supplied, as we are prepared to furnish either 15", 30", or 36" Tubes as requested.

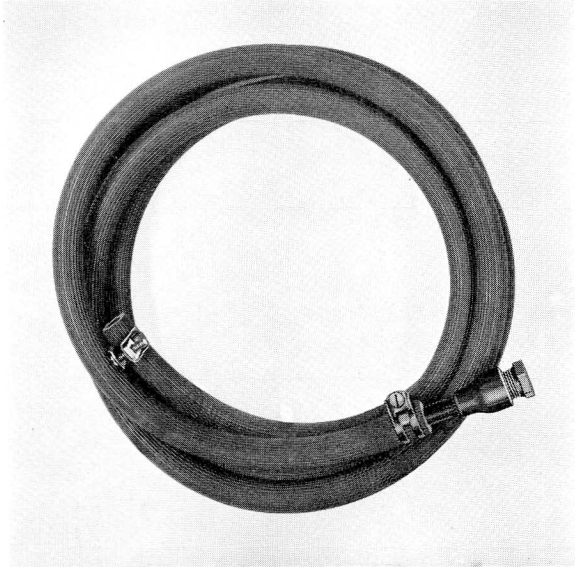


SPARE TUBE FOR FLANNERY AIR TOOL

Extra **Air Tool Tubes**, can be supplied when required. Designate, when ordering, the length of Air Tool Tube required, 15", 30" or longer.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

> **TOOLS FOR TELL-TALE BOLTS** <



HOSE FOR THE FLANNERY AIR TOOL

This item is listed since we are prepared to furnish a suitable quality and size of Rubber Hose for use with the Flannery Air Tool. Quarter-Inch Hose is sold in ten foot lengths, with $\frac{1}{4}$ " and $\frac{3}{8}$ " couplings attached.



Installing Fireproof Porous Plugs in
Tell-Tale Flexible Bolts

FLANNERY FIREPROOF POROUS PLUGS

These plugs are furnished in two colors, buff and blue, and on renewal a different color than that last used must be installed. The installation is very simple and is easily and quickly made, and no special tools are required.

Insert the plug, by hand, into the hole, and then with a small wooden mallet or the end of a hammer handle drive the plug tightly into the hole. The Plug should be flush with the bolt end or slightly deeper if necessary to get a tight fit. See Page 12 for further references to plugs.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

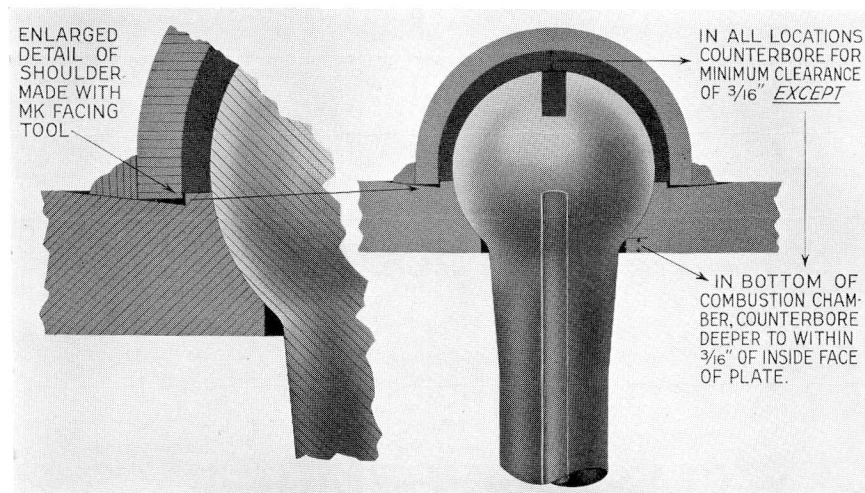
Installation Tools

FOR

WELDED ASSEMBLAGES

Our object in offering these tools to the railroad shops is to provide the most efficient means for the installation of our staybolts, at the lowest price consistent with the quality of the tools.

> INSTALLATION OF CAPS MK AND MK-S <



When installing Caps MK and MK-S, described on page 6, the following points should be considered.

When counterboring the wrapper sheet for the K Bolt head, use Counterboring Reamer ARW. The reamer on this tool will enter a $1\frac{1}{8}$ " hole. Where shell plates are drilled instead of punched, $\frac{1}{8}$ " may be added to diameter of bore when Caps MK and MK-S are to be used. This increase eliminates $\frac{1}{8}$ " of reaming with the ARW Counterboring Reamer, thus materially reducing the cost of operation.

The depth of counterbore for the bolt head should provide a minimum clearance of $\frac{3}{16}$ " between the head of the bolt and the inner surface of the Cap when they are installed. In the bottom of the combustion chamber, counterbore to leave approximately $\frac{3}{16}$ " between the bottom of the counterbore, and the inside face of the wrapper sheet.

See Page 10 for additional remarks on combustion chamber installations.

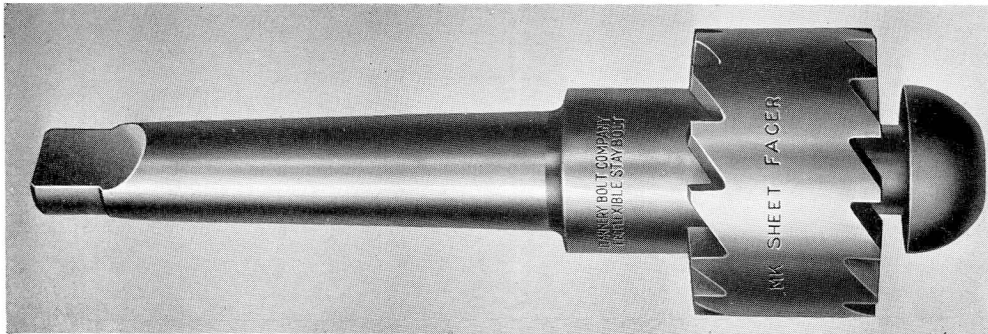
Use the Flannery Facing Tool MK, page 47, for cleaning the sheet surface preparatory to welding on the Cap. The cutter on this tool is provided with a 5° bevel, so that when the outside edge of the cutter has cleaned sufficient metal from the plate to provide a good welding surface, the inside edge of the cutter will have cut a slight shoulder in the plate for centralizing the Cap over the bolt head.

When riveting over bolt end, after bolt has been installed and cut to length, cushion the air hammer blows with a dolly bar whose end has a radius to fit the bolt head.

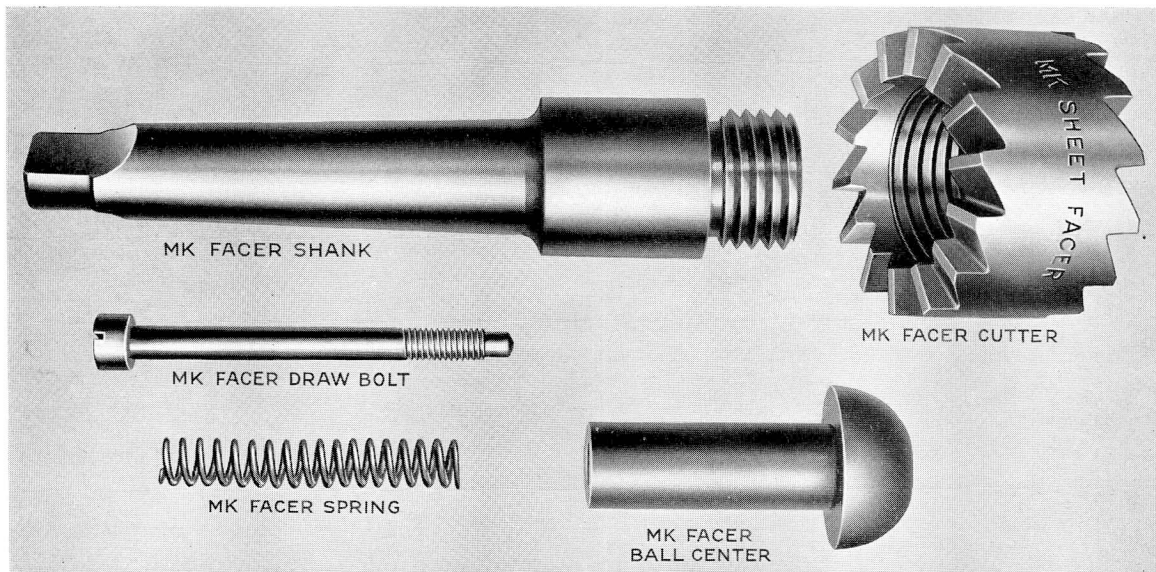
Center the Cap MK or MK-S over the bolt head, and seal to the wrapper sheet with the arc weld.

See Page 20 for preparation of Tell-Tale Bolts to complete the installation.

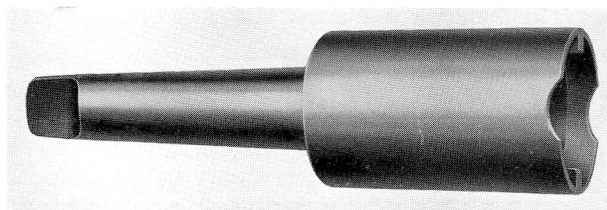
INSTALLATION TOOLS



Facing Tool MK is used for cleaning metal surrounding holes in the wrapper plate and centralizing MK and MK-S cap over bolt head, prior to welding. The tool is supplied with No. 4 Morse taper shank. See notes relative to the use of Facing Tool MK on Page 46.



Parts for Facing Tool MK are available to your order. When requisitioning same, kindly designate the part desired by the letters and names noted.



KN Nut Driver, for screwing KN Nuts on the shank ends of taper and button head crown stays, when these bolts are used in flexible assemblages. The tool is supplied with No. 3 Morse taper shank.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

> INSTALLATION OF WELDED SLEEVES <

GENERAL INSTRUCTIONS

WE desire to direct attention to a few essential points, in shop practice, with reference to installation of F.B.C. Flexible Staybolts, which have shown excellent results when followed.

Counterboring of sheets is for the purpose of providing, for the Sleeve, a seat that will ensure proper alignment of the Sleeve with the Bolt.

Depth of counterbore depends on the angle of the bolt with the outer sheet. Where bolts are at right angles, a width of seat of approximately $\frac{1}{8}$ " will be found to be ample. This counterboring operation is readily and quickly performed.

Use a Guide Bar, such as illustrated on the bottom of Page 58, when reaming, to hold the Counterboring Reamer at the correct angle to the wrapper sheet. The Guide Bar is furnished with a shank diameter of $1\frac{1}{16}$ ", which can readily be turned down to a size conforming to the holes in the firesheet.

When our standard counterbore tools are used, lubricants are not necessary and are objectionable, as the grease formation on sheet is difficult to remove and interferes with efficient and economical welding.

When UW and U Sleeves are applied to new boilers, use Counterboring Reamer UW, the reamer of which will enter a $1\frac{1}{8}$ " hole. When these sleeves are installed in old boilers, replacing the Threaded Sleeves, use Counterboring Reamer UW-T, the reamer of which will enter a $1\frac{3}{8}$ " hole.

When URW Sleeves are applied to new boilers, use Counterboring Reamer URW, the reamer of which will enter a $1\frac{1}{8}$ " hole. When these sleeves are installed in old boilers, replacing threaded sleeves, use Counterboring Reamer URW-T, the reamer of which will enter a $1\frac{1}{2}$ " hole.

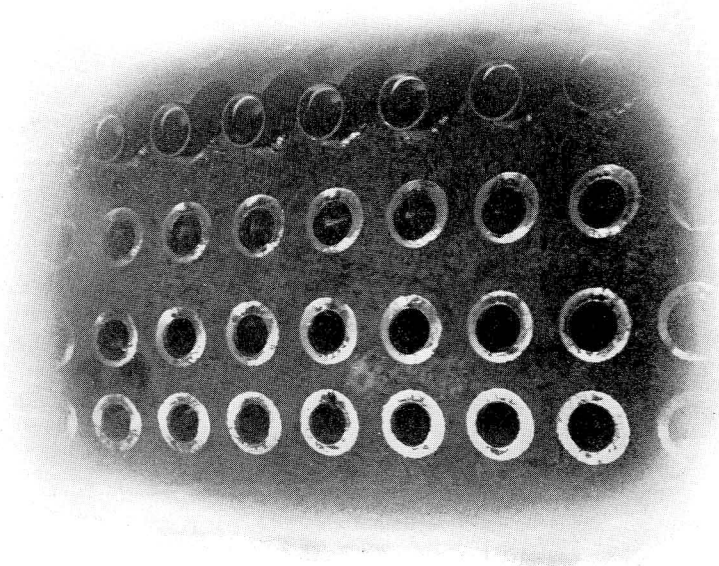
For FW Sleeve (used only where flush surfaces are required), use Counterboring Reamer FW, the reamer portion of which will enter a 2" hole.

For FRW Sleeve (used only where flush surfaces are required on roof sheet), use Counterboring Reamer FRW, the reamer portion of which will enter a $2\frac{3}{8}$ " hole.

When installing Sleeve WR, use Counterboring Reamer UW. The reamer on this tool will enter a $1\frac{1}{8}$ " hole. The WR Sleeve is standard for installations of Taper Head and Button Head Crown Stays as flexible bolts, with the KN Round Nut. See illustration of assemblages on Page 15. It may also be used with our Standard K Head Bolt.

> INSTALLATION OF WELDED SLEEVES <

GENERAL INSTRUCTIONS (Continued)



Metal Surrounding Holes Cleaned with Sheet Cleaner to Insure Clean Welding Surface. See Tool, Page 55.

Preparation for welding should consist of thoroughly cleaning the sheets of scale and foreign substances, including oil and grease. Where sand-blast is available, this will be found to be the most effective as well as economical method. Where such apparatus is not available, our sheet cleaning tool—shown on Page 55—operated by a light high-speed air motor, effectively accomplishes the desired results.

Our Sleeve Applicator, shown on page 56, should always be used to hold the sleeve securely in its proper position during the welding operation. One size fits all types of sleeves. The movable member of the Applicator, which is tapered, threaded and hardened, slides on the spindle and engages securely through the hole in the fire sheet.

> INSTALLATION OF WELDED SLEEVES <

GENERAL INSTRUCTIONS

(Continued)



We recommend just sufficient weld to secure a tight seal. The above cut illustrates a reasonable and proper amount of welding to secure satisfactory results.

Increasing the amount of weld does not improve results, but does increase installation costs.

Tapping the inner sheet in perfect alignment with the sleeve is essential to the proper assembling of the bolt. We recommend a centralizing bushing to support tap and motor, and to prevent tap from cutting the sleeve.

Bolts and firebox sheets must be threaded to a neat fit. Either too tight or too loose threading is objectionable, and cannot be expected to give good results.

When large or complete installations of flexible bolts are made, we recommend securing the inner sheet about every fourth or fifth row. This can readily be done by applying the flexible bolt at these intervals, just seating the bolt in the sleeve, then inserting a punch burr of suitable thickness and apply the cap. This will hold the plates parallel while remainder of the bolts are being applied.

All bolts should be released slightly from close contact with the sleeve before riveting.

Standard Riveting Plugs, illustrated on pages 57 and 58, should be used for holding-on while riveting up bolts.

Thorough cleaning out of the gasket seat and thread before applying caps is essential. This is easily accomplished with an air hose and medium pressure.

Each sleeve or cap of the F.B.C. type is provided with a copper gasket which assures a tight joint with ordinary wrench leverage. If for any reason the gasket becomes damaged, it can readily be removed and replaced.

For this purpose we furnish extra gaskets in conical form, which should be inserted with small section outward—screwing cap to its seat forces the gasket into place.

Graphite and cylinder oil mixed thin should be applied to the threads of the caps, each time they are assembled with the sleeve, to ensure easy removal for inspection.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

> WELDED ASSEMBLAGE ANGLES AND TOOLS <

Angles Not to be Exceeded F.B.C. Welded Assemblages

Table of Maximum Angles in Degrees of Installation

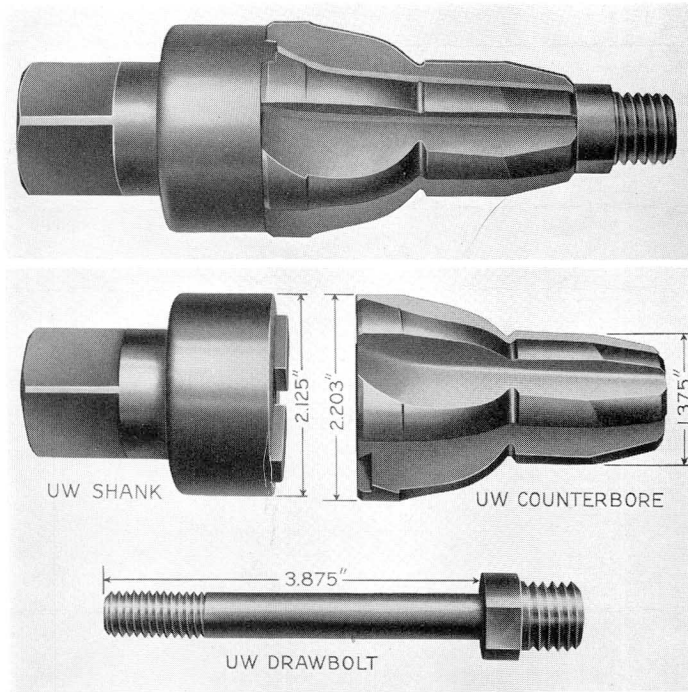
PLATE THICKNESS	SLEEVE	UW	URW	FW	FRW	U	WR	CAP MK MK-S
		Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
	1/2"	27	27	13	12	27	26	12
	9/16"	27	29	15	13	27	28	15
	5/8"	27	30	15	15	27	30	20
	11/16"	27	30	15	15	27	30	25
	3/4"	27	30	15	15	27	30	30
	13/16"	27	30	15	15	27	30	30
	7/8"	27	30	15	15	27	30	30
	15/16"	27	30	15	15	27	30	30
	1"	27	30	15	15	27	30	30

Designations Of Tools Used In the Installation Of the Various F.B.C. Welded Assemblages

	SLEEVE								CAP
	UW For New Installations or When Replacing Rigid Bolts	UW When Replacing Threaded Sleeves	URW For New Installations or When Replacing Rigid Bolts	URW When Replacing Threaded Sleeves	FW	FRW	WR	U	MK MK-S
Counterboring Reamer	UW	UW-T	URW	URW-T	FW	FRW	UW	UW	ARW
Riveting Plug	UW	UW	URW	URW	FW	FRW			
Riveting Sleeve								U	
Sheet Cleaner	UW	UW	UW	UW			UW	UW	
Bolt Driver	D	D	K	K	D	K		D	K
Ratchet Wrench	A	A	R	R	A	R			
Retapping Tap	UW	UW	URW	URW	UW	URW			
Facing Tool									MK
Sleeve Applicator	One Style Used for All Sleeves. Furnished in various Lengths. No. 1—16". No. 2—24". No. 3—32". No. 4—40".								
KN Nut Driver	One Style Used for all Crown Stay Assemblages								
Guide Bars	Furnished in 10" and 15" Lengths, or Longer if Desired								

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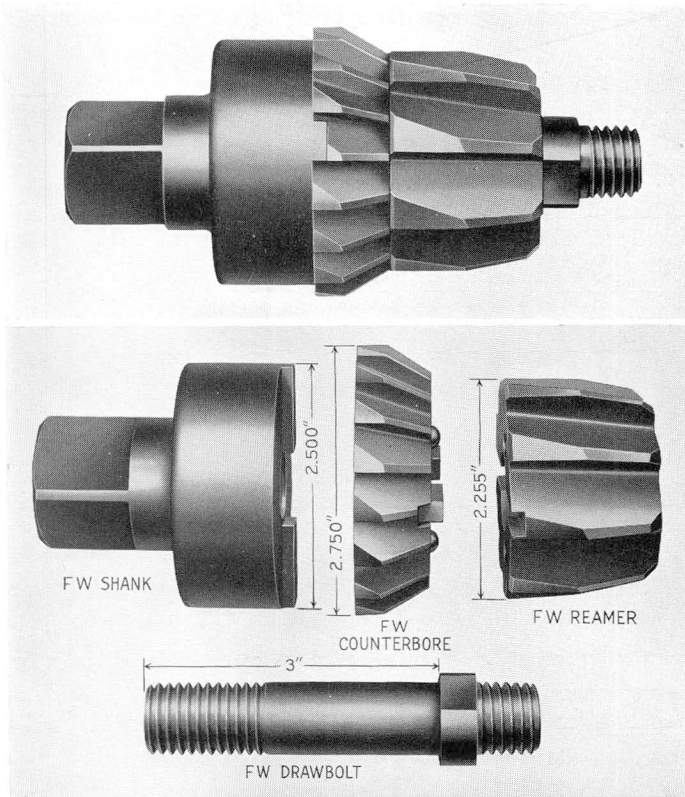
INSTALLATION TOOLS



Counterboring Reamer UW, used in counterboring the wrapper sheet for new installations of Flannery Welded Sleeves UW, U, US and WR.

When replacing Threaded Sleeves with the above noted Welded Sleeves, use Counterboring Reamer UW-T, illustrated on Page 54.

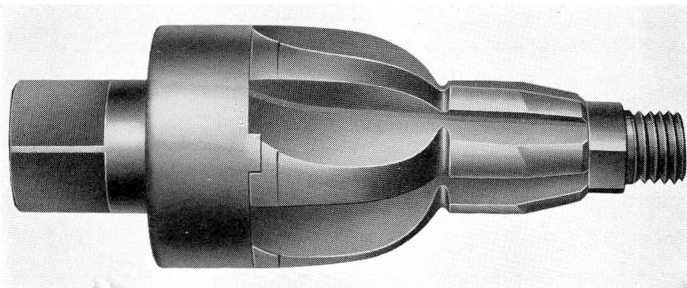
Parts for Counterboring Reamer UW are available to your order. When requisitioning same, kindly designate the part desired by the letters and name noted herewith.



Counterboring Reamer FW, used in counterboring the wrapper sheet for installations of Flannery Flush Welded Sleeves FW.

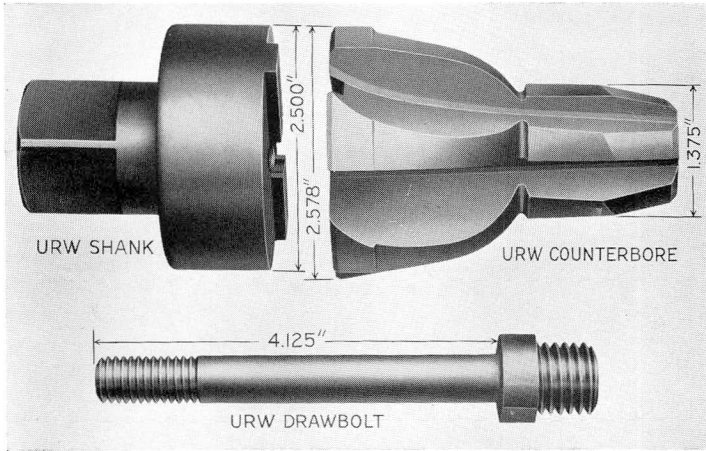
Parts for Counterboring Reamer FW are available to your order. When requisitioning same, kindly designate the part desired by the letters and names noted herewith.

INSTALLATION TOOLS

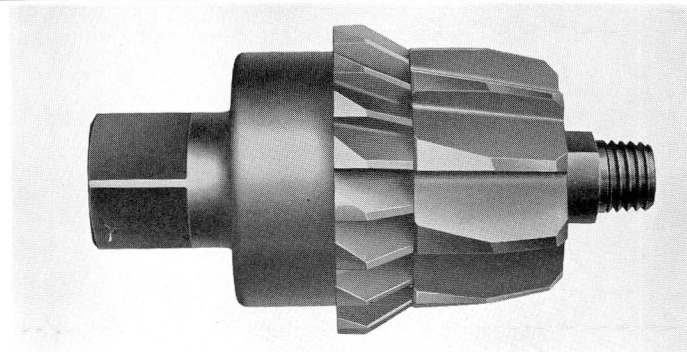


Counterboring Reamer URW, used in counterboring the wrapper sheet for new installations of Flannery Welded Sleeves URW.

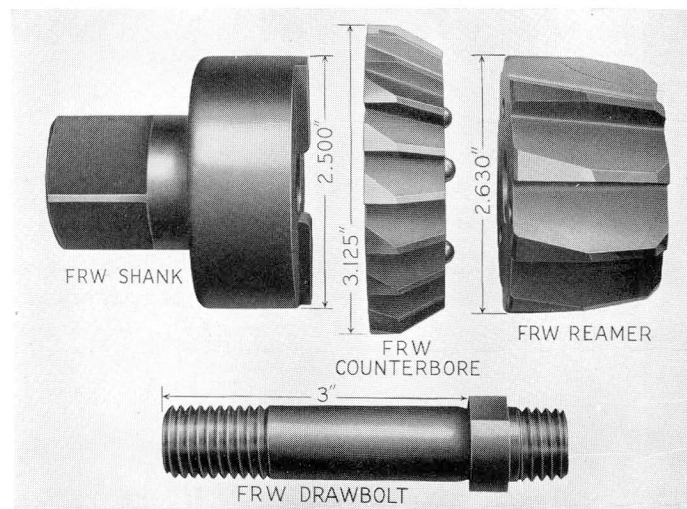
When replacing Threaded Sleeves with Welded Sleeves URW, use Counterboring Reamer URW-T, illustrated on the bottom of the next page.



Parts for Counterboring Reamer URW are available to your order. When requisitioning same, kindly designate the part desired by the letters and names noted herewith.

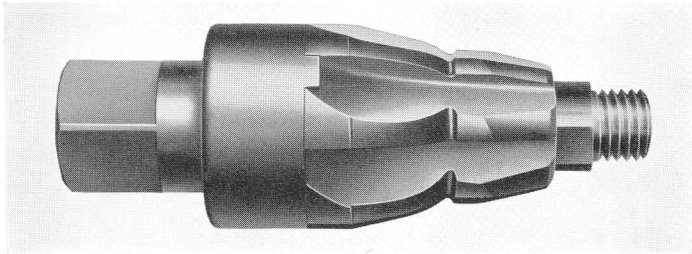


Counterboring Reamer FRW, used in counterboring the wrapper sheet for installations of Flannery Flush Welded Sleeves FRW.

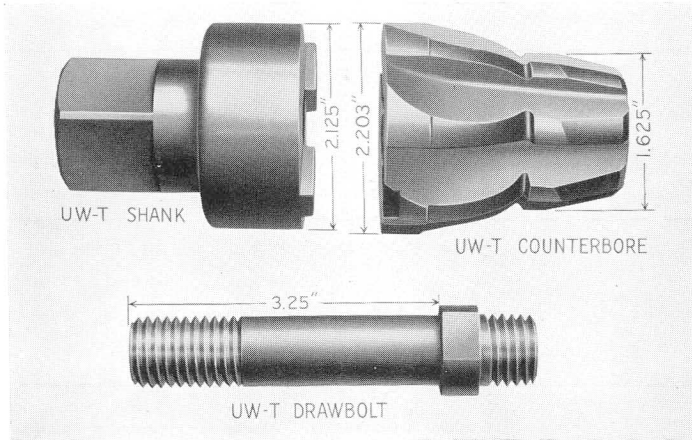


Parts for Counterboring Reamer FRW are available to your order. When requisitioning same, kindly designate the part desired by the letters and names noted herewith.

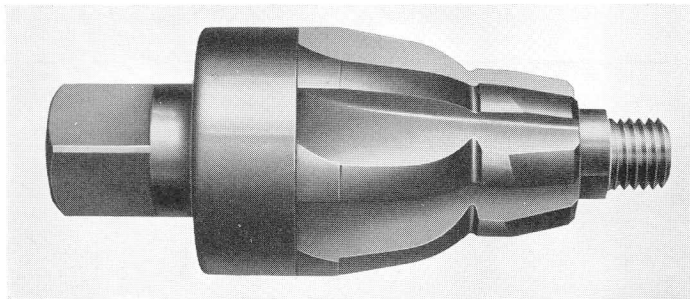
INSTALLATION TOOLS



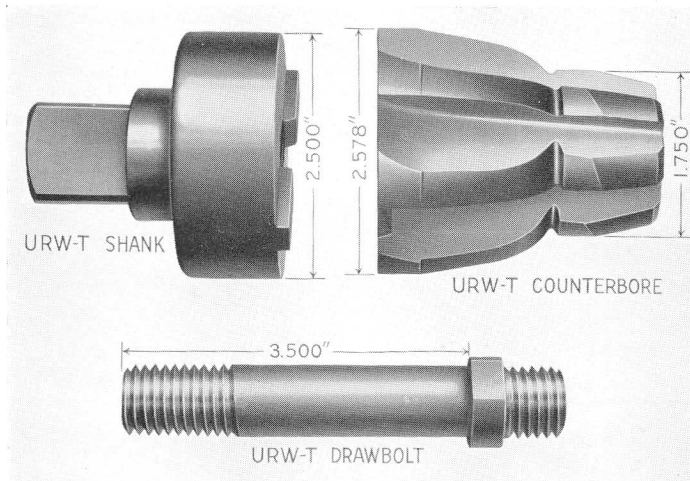
Counterboring Reamer UW-T, used in counterboring the wrapper sheet when replacing Threaded Sleeves D, E, F, G, H, ER, FR, FA, FB and FC, with Flannery Welded Sleeves UW, U, US, and WR.



Parts for Counterboring Reamer UW-T are available to your order. When requisitioning same, kindly designate the part desired by the letters and names noted herewith.

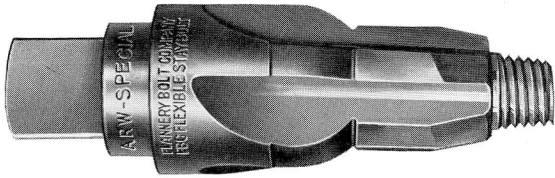


Counterboring Reamer URW-T, used in counterboring the wrapper sheet when replacing Threaded Sleeves HK, JK, LK and KK, with Flannery Welded Sleeves URW.

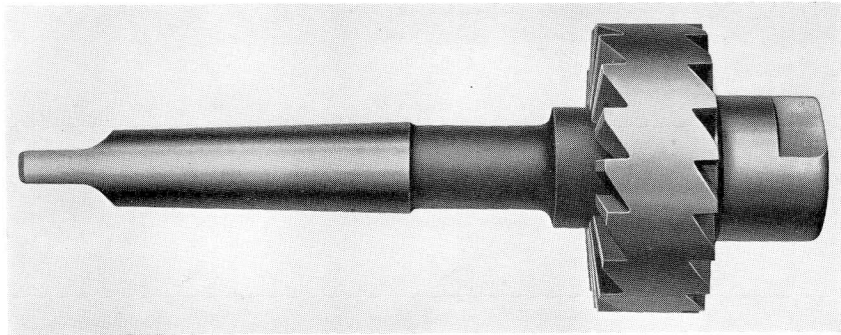


Parts for Counterboring Reamer URW-T are available to your order. When requisitioning same, kindly designate the part desired by the letters and names noted herewith.

INSTALLATION TOOLS

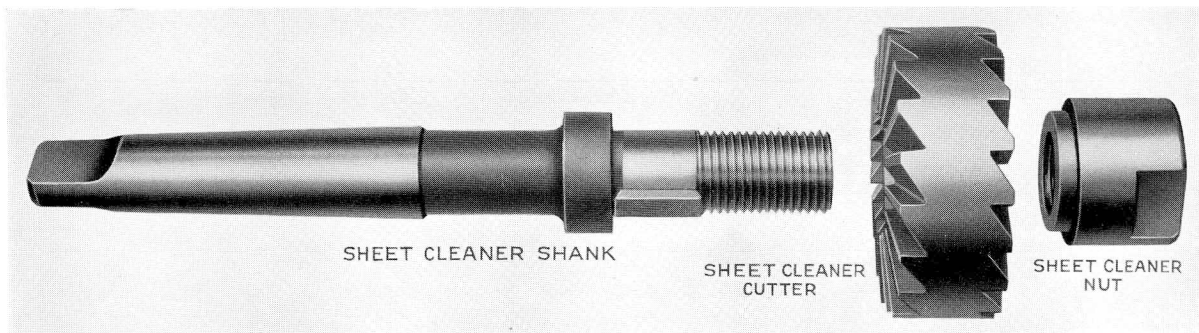


Counterboring Reamer ARW, used in counterboring the wrapper sheet for installations of K head flexible bolts when Caps MK or MK-S are used.



Sheet Cleaner used for cleaning metal surrounding holes in the wrapper plate prior to welding on of Flannery Welded Sleeves. The tool is furnished with No. 3 Morse taper shank. See illustration of sheet cleaning on Page 49.

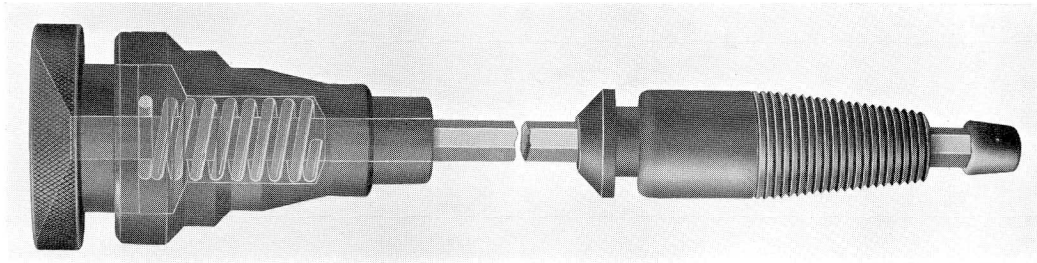
Note: This sheet cleaner is not used for installation of Caps MK and MK-S. See Page 47 for Facing Tool MK.



Parts for the Sheet Cleaner are available to your order. When requisitioning same, kindly designate the part desired by the names noted herewith.

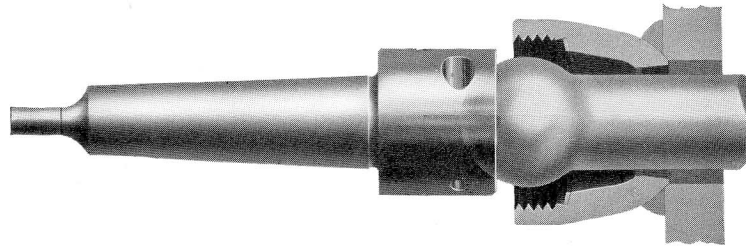
FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

> INSTALLATION TOOLS <

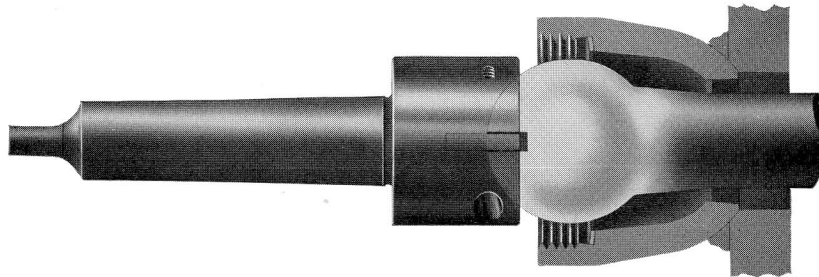


Sleeve Applicator is used for holding welded sleeves in correct alignment while they are being welded to the wrapper plate.

The **Sleeve Applicator**, standard for all Flannery Welded Sleeves, is supplied in four lengths, as follows: **No. 1—16"**, **No. 2—24"**, **No. 3—32"**, **No. 4—40"**. Always order by number.



Bolt Driver D, used in applying Flannery D Head type flexible bolts. Furnished with No. 3 Morse taper shank. See spare Bolt Driver Blade illustrated below.



Bolt Driver K, used in applying Flannery K Head type flexible bolts. Furnished with No. 3 Morse taper shank. See spare Bolt Driver Blade illustrated below.



Bolt Driver Blade D

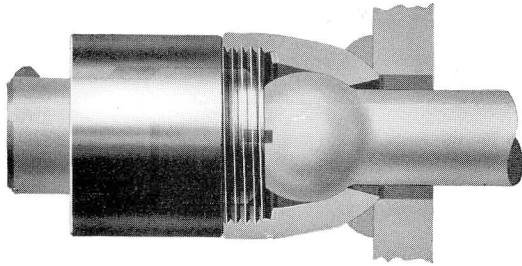


Bolt Driver Blade K

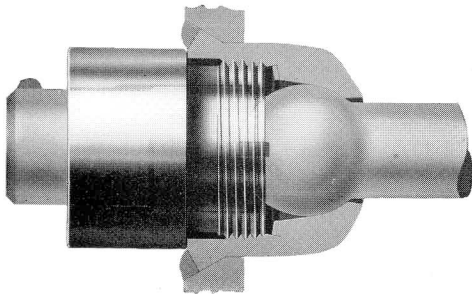
Extra **Bolt Driver Blades** can be supplied to your order. When requisitioning same, be sure to specify whether D or K Blade is required.

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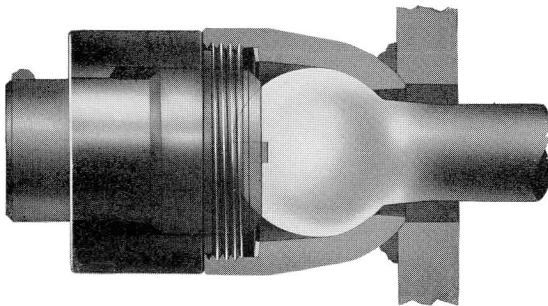
> **INSTALLATION TOOLS** <



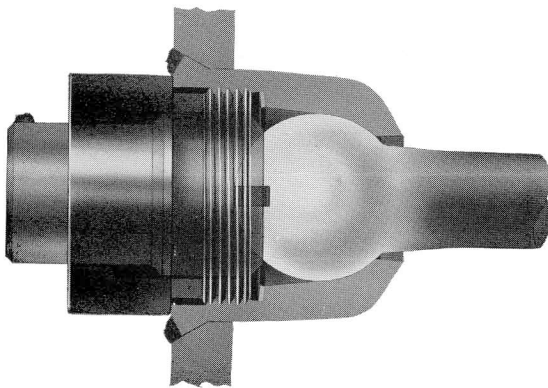
Riveting Plug UW, for Flannery Welded Sleeve UW.



Riveting Plug FW, for Flannery Flush Welded Sleeve FW.

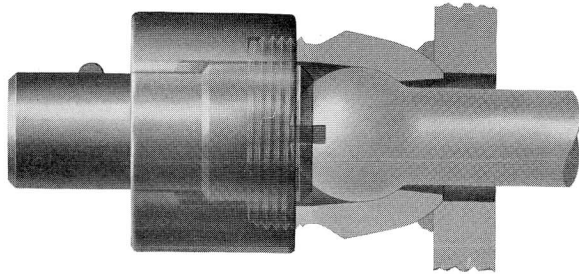


Riveting Plug URW, for Flannery Welded Sleeve URW.

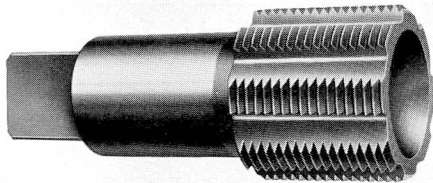


Riveting Plug FRW, for Flannery Flush Welded Sleeve FRW.

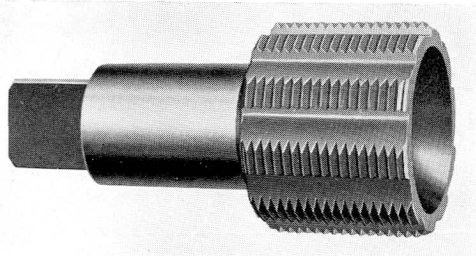
> **INSTALLATION TOOLS** <



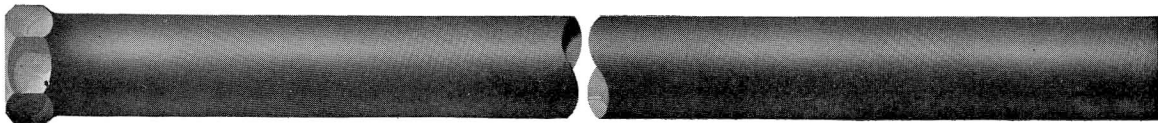
Riveting Sleeve U, for Flannery Welded Sleeve U.



Hand Retapping Tap UW for sleeves UW and FW. This tool is used for cleaning out and sizing up threads in the sleeves in case same have become damaged during installation.

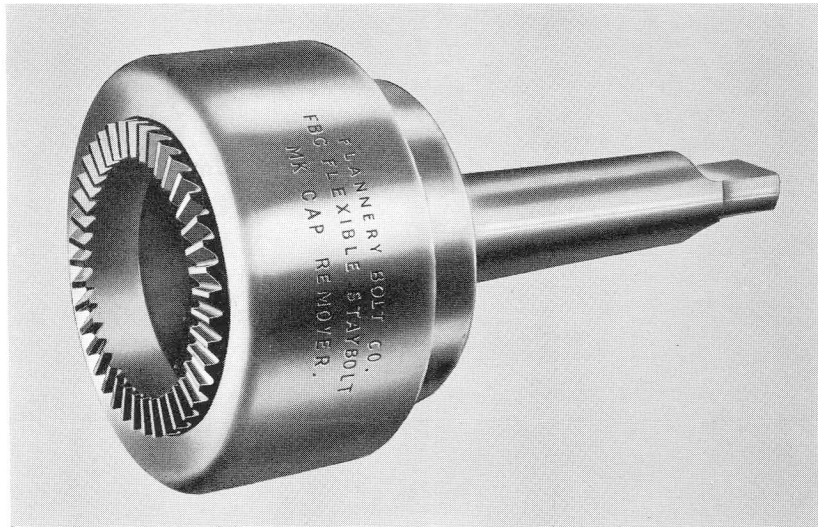


Hand Retapping Tap URW is similar to the above but intended for use in URW and FRW Sleeves.

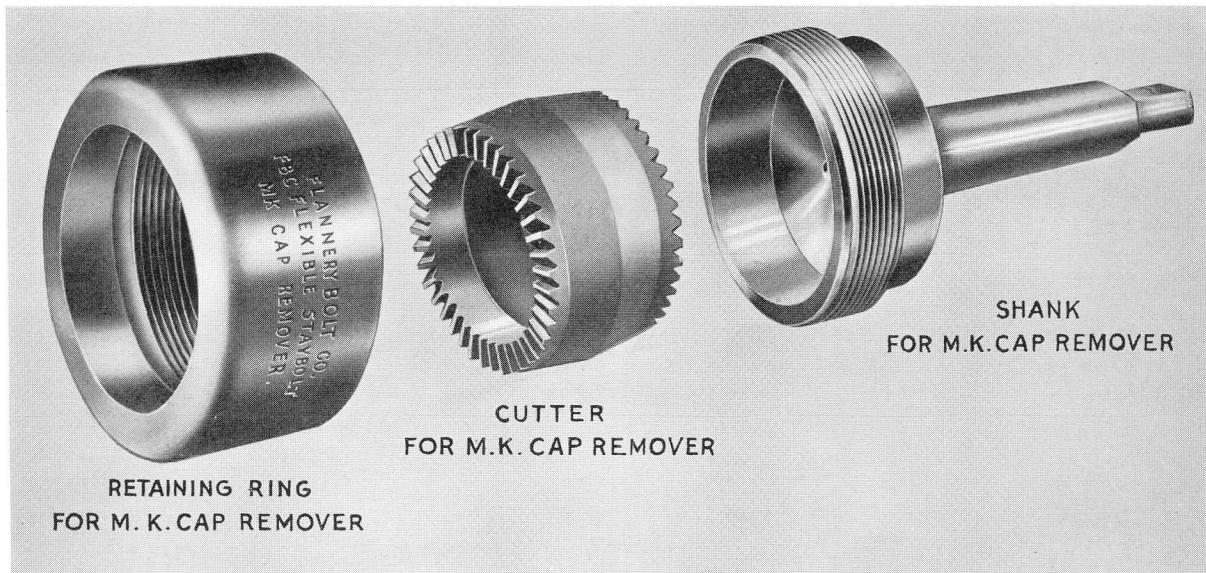


Guide Bars for Counterboring Reamers are furnished in either 10" or 15" lengths, or longer if required— $1\frac{1}{16}$ " diameter on shank end. Specify length desired when ordering.

> CAP REMOVER FOR MK AND MK-S CAPS <



The Cap Remover illustrated above is a strong, rugged tool, which is recommended for use in removing MK and MK-S Caps when it is necessary to replace staybolts.



Separate parts of the Cap Remover are shown above. A No. 4 Morse Taper is provided on the shank. The Cutter is made from High Speed Steel, carefully heat-treated, and has the advantage of being reversible.

When ordering separate parts use the designation shown beneath each part.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

> CROWN STAY TAPS <

TAPER HEAD CROWN STAY TAPS

Supplied with US, V or Whitworth Threads, with tapers of $1\frac{1}{2}$ " in 12", or 2" in 12".

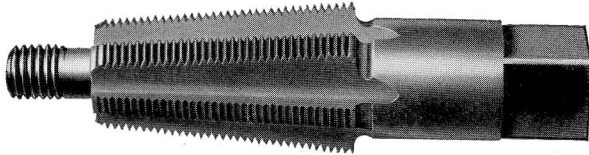
Tap No. 6 (taper $1\frac{1}{2}$ " in 12") for use with our standard Taper Head Crown Stays 1" to $1\frac{1}{4}$ ". For larger sized bolts use Tap No. 7.

Tap No. 7 (taper $1\frac{1}{2}$ " in 12") for use with our standard Taper Head Crown Stays $1\frac{1}{4}$ " and over.

Tap No. 8 (taper 2" in 12") for use with our standard Taper Head Crown Stays 1" to $1\frac{1}{4}$ ". For larger sized bolts use Tap No. 9.

Tap No. 9 (taper 2" in 12") for use with our standard Taper Head Crown Stays $1\frac{1}{4}$ " and over.

When ordering, specify Tap number and form of thread desired.



BUTTON HEAD CROWN STAY TAPS

Supplied with US, V or Whitworth Threads, with taper of $\frac{3}{4}$ " in 12" only.

Tap No. 1 for use with our standard Button Head Crown Stays 1" and $1\frac{1}{16}$ ". For larger sized bolts, use one of the following Taps.

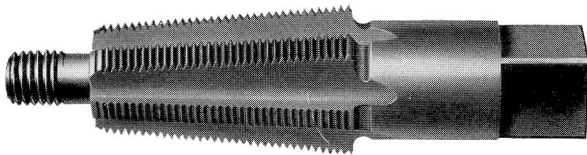
Tap No. 2 for use with our standard Button Head Crown Stays $1\frac{1}{8}$ " and $1\frac{3}{16}$ ". For larger sized bolts, use one of the following Taps.

Tap No. 3 for use with our standard Button Head Crown Stays $1\frac{1}{4}$ " and $1\frac{5}{16}$ ". For larger sized bolts, use one of the following Taps.

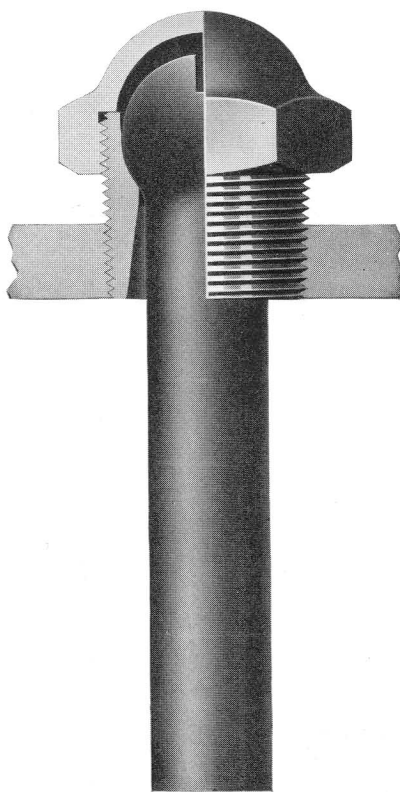
Tap No. 4 for use with our standard Button Head Crown Stays $1\frac{3}{8}$ " and $1\frac{7}{16}$ ". For larger sized bolts, use the next sized Tap.

Tap No. 5 for use with our standard Button Head Crown Stays $1\frac{1}{2}$ ".

When ordering specify Tap number and form of thread desired.

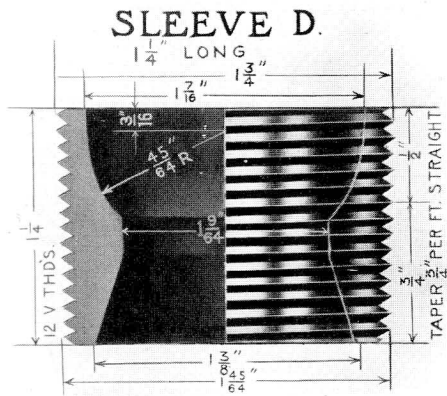


THREE-PIECE THREADED ASSEMBLY



FLANNERY BOLT COMPANY
Bridgeville, Pennsylvania

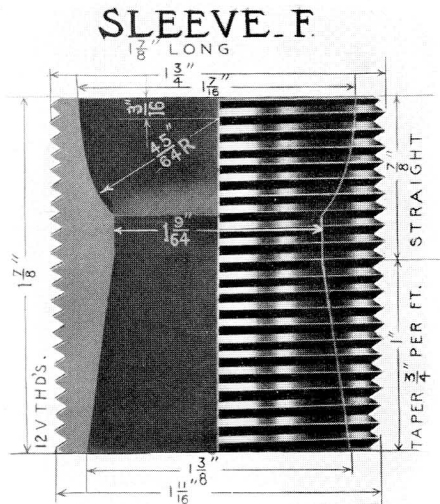
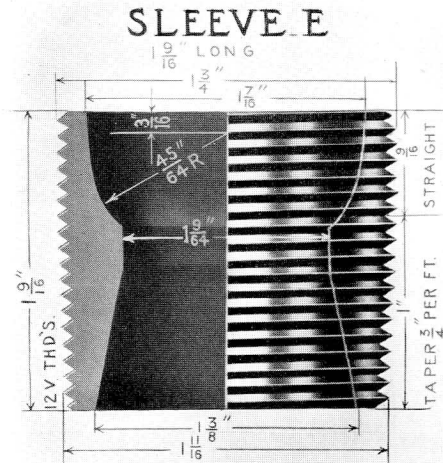
THREADED TYPE SLEEVES



Sleeve D is the shortest sleeve we make, being $1\frac{1}{4}$ " long, suitable for plates up to $\frac{5}{8}$ " thickness, when sleeves are not installed on angles.

Note: The diameter of the small end of taper in sleeve D is $\frac{1}{64}$ " larger than that of the E, F, G or H sleeve, thus requiring special tapping of holes for the D sleeve, while all the other sleeves mentioned take the same tapping. For this reason many of our customers do not use the D sleeve for thin plates unless the sleeve will satisfactorily accommodate the complete back head and throat sheet installation, thus overcoming any liability of tapping holes for D sleeves where other sleeves are intended. In general practice, sleeves E, F, G and H are the accepted standards to cover installations for water space stays and riveted end radials.

Sleeve E is $1\frac{9}{16}$ " in length, suitable for plates up to $\frac{3}{4}$ " thickness. This sleeve may be used on all installations where the angle does not exceed 10° and the plate is of medium thickness.

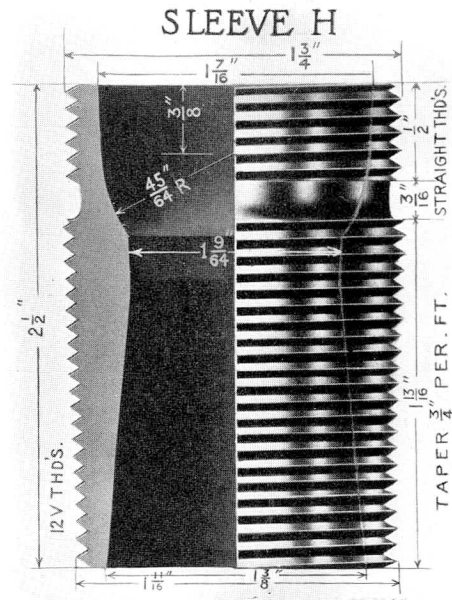
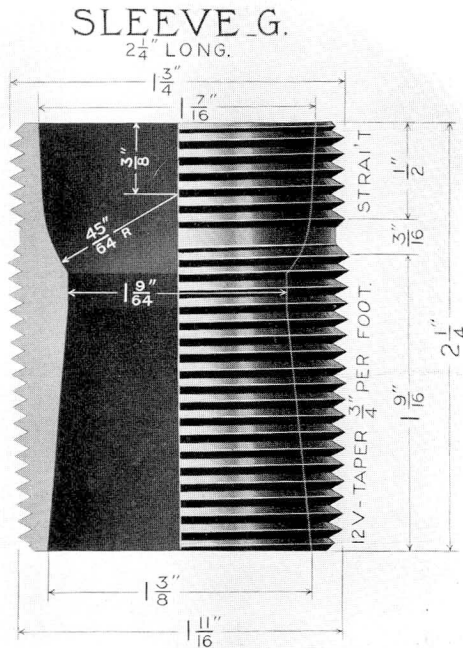


Sleeve F is $1\frac{7}{8}$ " long and is suitable for plate up to 1" in thickness. It is used for throat sheet installations where angles do not exceed 15 degrees on moderate thickness of plate.

Sleeves D, E and F take the D, DJ, DK, DL or DM type bolts, and the standard Cap D.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

THREADED TYPE SLEEVES

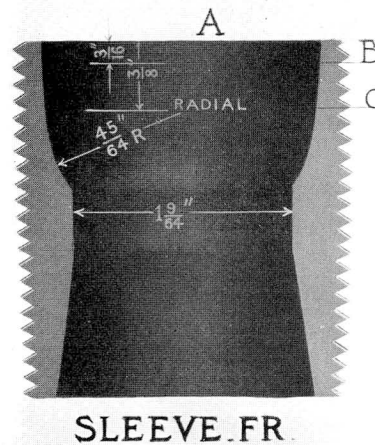


Sleeve G, $2\frac{1}{4}$ " in length, is designed for radial use with the riveted end staybolts, D head types, as shown on pages 26 and 27, and is suitable for plates of $\frac{5}{8}$ " thickness, for angles up to $20\frac{1}{2}$ degrees, and for thicker plates and angles according to the tables on page 69.

Sleeve H, $2\frac{1}{2}$ " in length, is designed for radial use with the riveted end staybolts, D head types, as shown on pages 26 and 27, and is adapted to cover angles and thicknesses of plates in accordance with table on page 69.

These sleeves are recessed $\frac{3}{16}$ " deeper for the bolt head seat than the regular D, E and F sleeves to allow for upward movement of the bolt during firebox expansion and for whatever adjustment is thought necessary before riveting over the bolt.

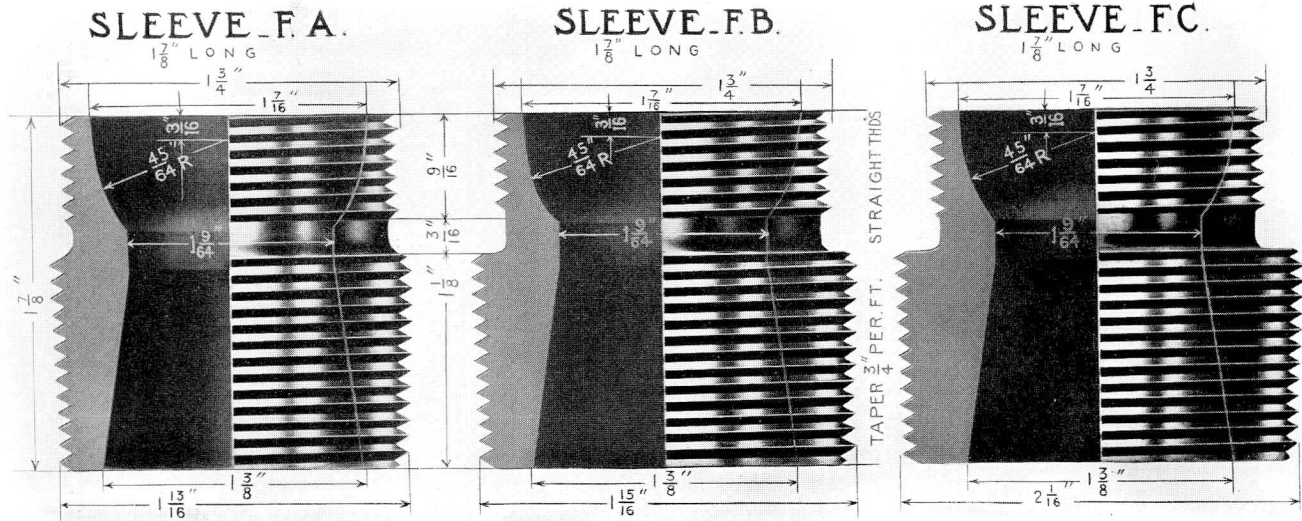
Sleeves ER or FR—These sleeves correspond with Sleeves E and F except that the seat for the bolt head is recessed deeper to better meet the requirements of radial stays.



Sleeves G, H, ER and FR take the several diameters of D, DJ, DK, DL or DM type bolts, and Standard Cap D

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

THREADED TYPE SLEEVES

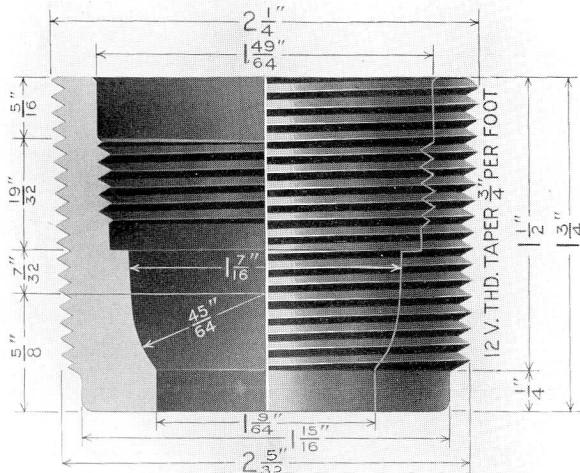


REPLACING SLEEVES

Special sleeves used to replace our standard sleeves where it is found necessary to enlarge the hole in the outer sheet.

All three sleeves are $1\frac{7}{8}$ " in length, the small end of the taper varying $\frac{1}{8}$ " in diameter on each sleeve. Flexible Staybolts, Styles D, DJ, DK, DL or DM, together with Cap D, complete the assemblage.

FLUSH SLEEVE



Sleeve SM

Sleeve SM is used where projecting sleeves and caps interfere with other fittings.

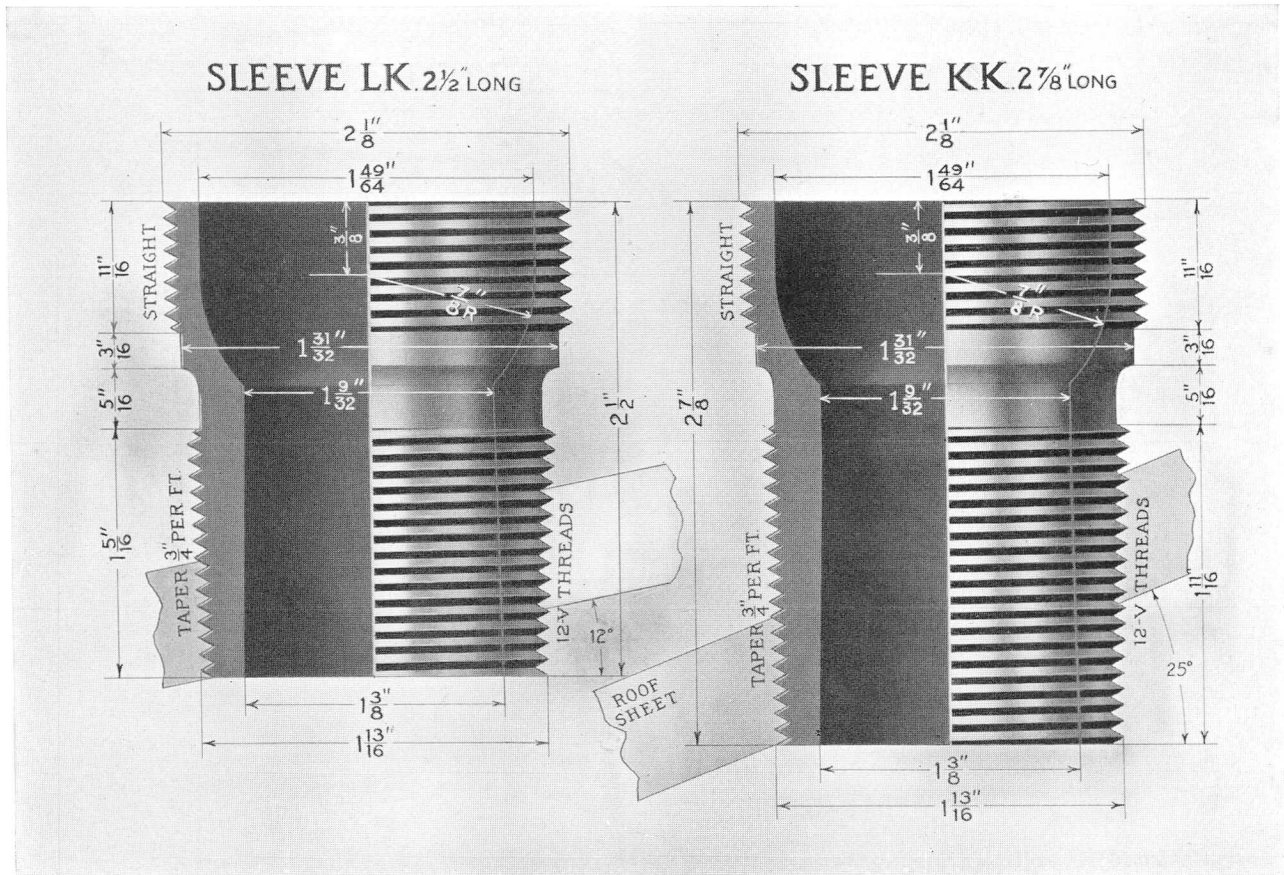
The SM Sleeve takes Cap SM and Flexible Bolts styles D, DJ, DK, DL or DM.

Sleeve SN (Not illustrated)

Where flat surfaces are required on the crown sheet, use Sleeve SN which is $2\frac{1}{2}$ " high, $2\frac{25}{64}$ " in diameter at the small end, tapering $\frac{3}{4}$ " in 12". Cap SN and any of the K head type flexible bolts, or taper or button head crown bolts in combination with the Round Nut, complete the assemblage.

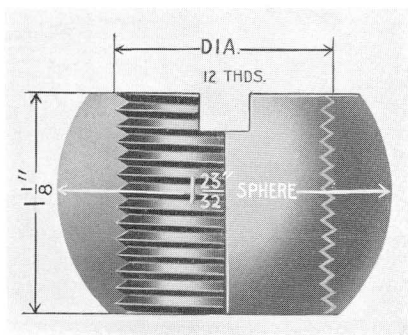
FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

THREADED TYPE SLEEVES



The above two sleeves are similar in all respects to the HK and JK Sleeves, with the exception that the diameter of the small end of the sleeve is $\frac{1}{8}$ " larger, thus affording a stronger section in the plate connection.

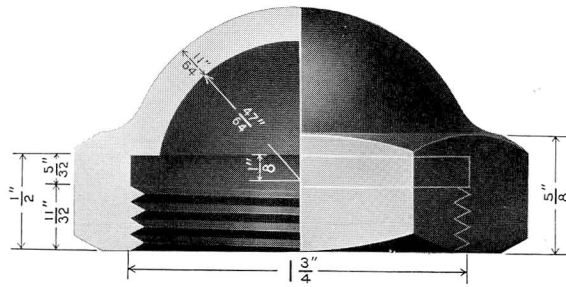
ROUND NUT



Standard Round Nuts KN are furnished with V, US or Whitworth Threads, 12 per inch. Specify diameter and form of thread desired when ordering.

The Round Nut KN provides perfect flexibility for crown stay work when used with stays of the taper head or button head types in combination with Threaded Type Sleeves HK, JK, KK or LK, or with F.B.C. Welded Sleeve WR or FRW. Furnished in diameters of 1" to 1 3/16" inclusive.

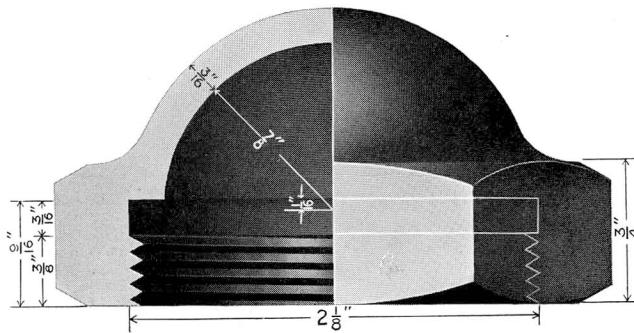
> CAPS FOR THREADED TYPE SLEEVES <



Cap D

Cap D, designed for use with threaded sleeves D, E, F, G, H, ER, FR, FA, FB, or FC.

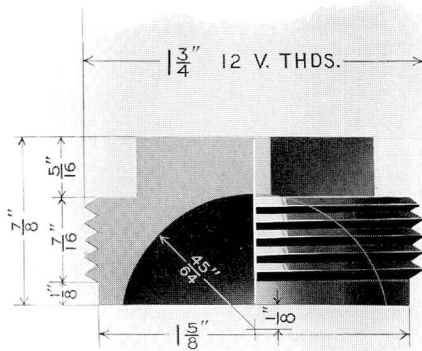
When ordering, specify whether wanted with or without inserted gasket.



Cap K

Cap K, designed for use with threaded sleeves HK, JK, KK or LK.

When ordering specify whether wanted with or without inserted gasket.



Cap SM

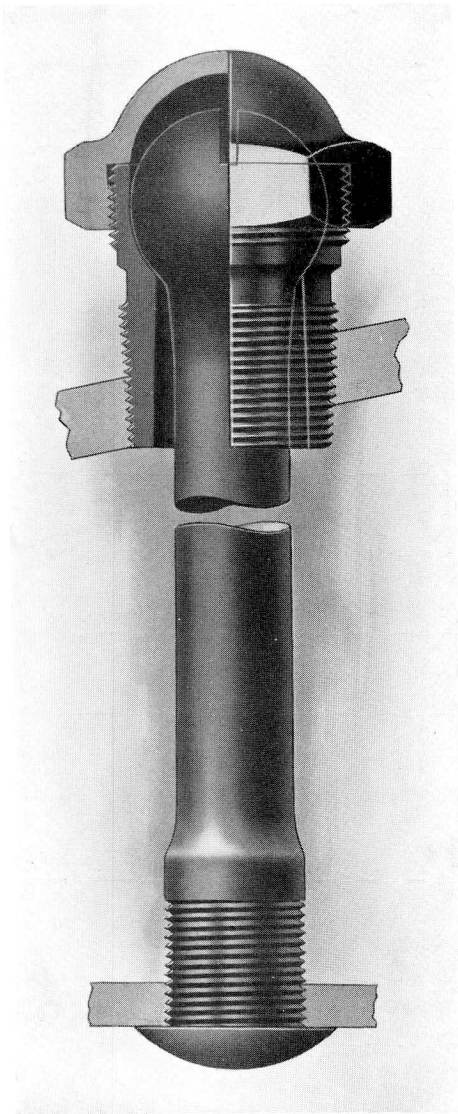
Cap SM, for use on Flush threaded type sleeve SM.

Cap SN (not shown), for flush sleeve SN is $1\frac{5}{16}$ " high and has an outside thread diameter of $2\frac{1}{16}$ ".

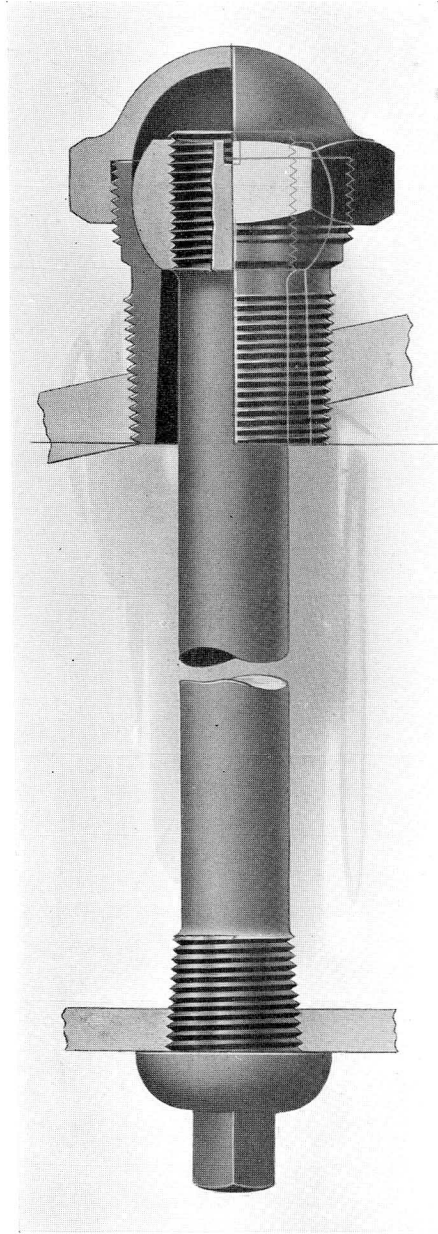
A thin mixture of cylinder oil and graphite applied to the threads of the cap before it is screwed to the sleeve, will insure its easy removal for the periodical staybolt inspection.



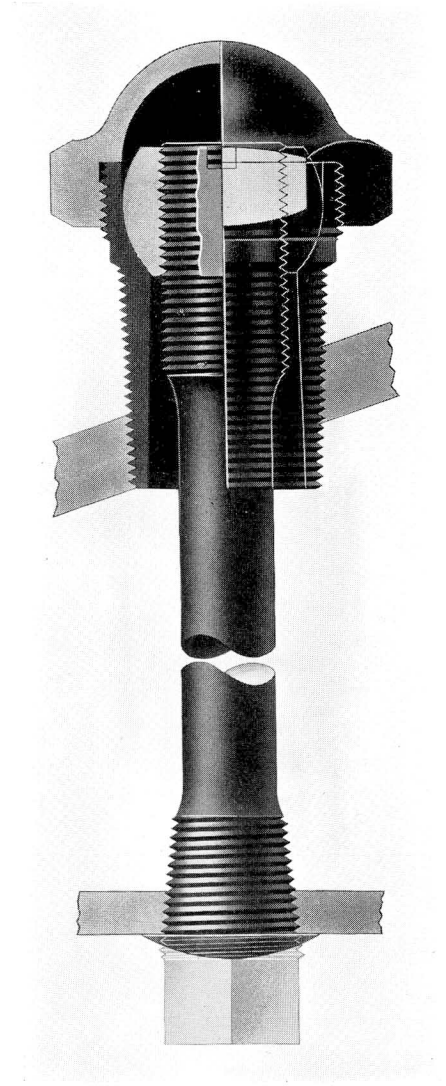
THREADED SLEEVE ASSEMBLAGES



KJ Bolt Assemblage Riveted End LK, KK, JK or HK Sleeves and K Caps



Round Nut Assemblage Button Head Stay LK, KK, JK or HK Sleeves, K Caps and Round Nuts



Round Nut Assemblage Taper Head Stay LK, KK, JK or HK Sleeves, K Caps and Round Nuts

Three types of assemblages for staying the crown sheet of the locomotive firebox are shown above. Of these the assemblage on the left, using the K head type of flexible staybolt is recommended.

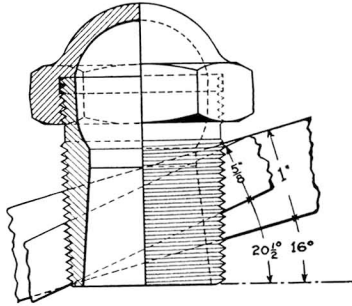
Taper or button head stays for assembling with the Round Nut, as illustrated, can be furnished for those who prefer these types. See pages 30 to 37 for crown stays.

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

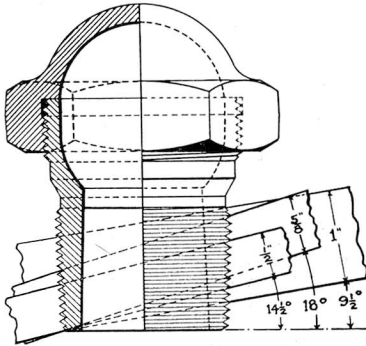
> THREADED ASSEMBLAGE ANGLES <

ANGLES NOT TO BE EXCEEDED THREADED TYPE SLEEVES

Table of Maximum Angles of Installation



"G" Sleeve



"LK" Sleeve

Sleeve		D	E, ER	F, FR	G	H	HK	JK	KK	LK
Length of Taper		3/4"	1"	1"	1 1/16"	1 3/16"	1 5/16"	1 11/16"	1 11/16"	1 5/16"
PLATE THICKNESS	1/2"	Deg. 5	Deg. 12	Deg. 15 1/2	Deg. 15 1/2	Deg. 15 1/2	Deg. 15 1/2	Deg. 15 1/2	Deg. 14 1/2	Deg. 14 1/2
	9/16"	3 1/2	10 1/2	18 1/2	18	18	18	18	16 1/4	16 1/4
	5/8"	2	9	17	20 1/2	20 1/2	20 1/2	20 1/2	18	18
	11/16"	...	7 1/2	15 1/2	23	23	20	23	19 3/4	18 1/4
	3/4"	...	6	14	23 1/2	23 1/2	18	23 1/2	21 1/2	16 1/2
	13/16"	...	4 1/2	12 1/2	22	26	16	25	23 3/4	14 3/4
	7/8"	...	3	11	20	26 1/2	14	23 1/2	22 1/4	13
	15/16"	...	...	9 1/2	18	25	12	22	20 3/4	11 1/4
	1"	...	...	8	16	23 1/2	10	20 1/2	19 1/4	9 1/2

Angles greater than those indicated in **HEAVY FACED FIGURES** will destroy the continuity of all threads in the sheet.

Angles greater than those shown in **LIGHT FACED FIGURES** for Sleeves D, E, F, G and H will not leave sufficient clearance for the Cap.

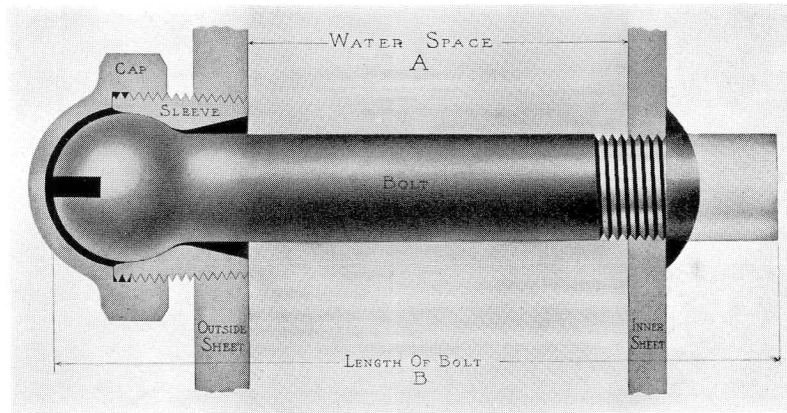
Angles greater than those shown in **LIGHT FACED FIGURES** for Sleeves HK, JK, KK and LK will not permit entry of the sleeve entirely through the sheet.

> DIA. OF SLEEVE—SMALL END OF TAPER <

SLEEVE	D	E	ER	F	FR	G	H	HK	JK	LK	KK	FA	FB	FC	SM	SN
Used for Water Space Stays....	1 45/64"	1 11/16"	....	1 11/16"	....	....	....	....	....	....	....	....	....	....	2 5/32"	....
Used for Radial Stays Riveted Bolts D Head Type.....	....	....	1 11/16"	....	1 11/16"	1 11/16"	1 11/16"	....	....	....	....	....	....	....	....	....
Used for Button-head Crown Stays or Riveted Bolts K Hd. Type	....	....	....	....	....	....	....	1 11/16"	1 11/16"	1 13/16"	1 13/16"	....	....	....	....	2 25/64"
Used for Replacing other Style Sleeves.....	....	....	....	....	....	....	....	....	....	....	....	1 13/16"	1 15/16"	2 1/16"	....	....
Style Cap to Use.	D	D	D	D	D	D	D	K	K	K	K	D	D	D	SM	SN

All Taper Threads are 3/4" Taper to the Foot—12 V Threads to the Inch

> RULE FOR OBTAINING BOLT LENGTHS <



Sectional View of the Threaded Sleeve Assemblage

$B = A + C$

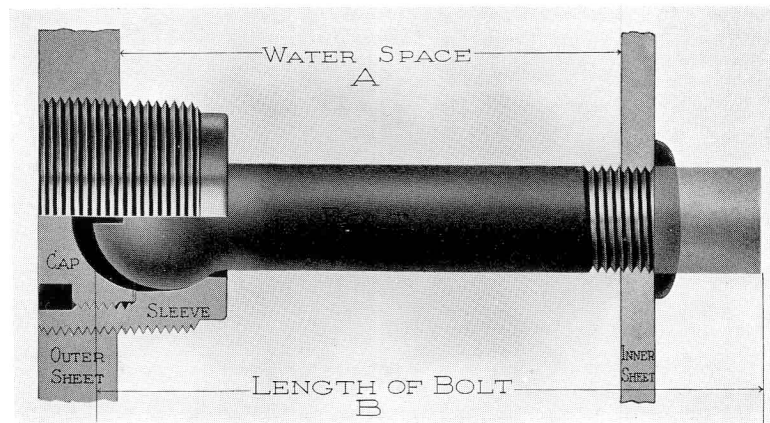
A=Width of water space. B=Bolt length to order C=Sleeve Constant

For Sleeve D, 1 $\frac{1}{4}$ " Long.....	The Value of C=3 $\frac{1}{4}$ "
For Sleeve E, 1 $\frac{9}{16}$ " Long.....	The Value of C=3 $\frac{1}{2}$ "
For Sleeve F, 1 $\frac{7}{8}$ " Long.....	The Value of C=4"
For Sleeves G and H, 2 $\frac{1}{4}$ " and 2 $\frac{1}{2}$ " Long.....	The Value of C=4 $\frac{1}{2}$ "
For Sleeves HK and LK, 2 $\frac{1}{2}$ " Long.....	The Value of C=4 $\frac{5}{8}$ "
For Sleeves JK and KK, 2 $\frac{7}{8}$ " Long.....	The Value of C=5"
For Sleeve SM.....	The Value of C=1 $\frac{3}{4}$ "
For Sleeve SN.....	The Value of C=1 $\frac{3}{4}$ "

Example: Having selected the Sleeve E, 1 $\frac{9}{16}$ " long, and the width of water space is 4", the length of bolt to order is obtained, as follows:

A=Water Space.....	4"
C=Constant for E Sleeve.....	3 $\frac{1}{2}$ "
B=Calculated length of bolt (See following notes).....	7 $\frac{1}{2}$ "

Note: When the bolt lengths run under the inch and half-inch measurements, order the length nearest to the additional inch or half-inch. When calculating water space widths use the next one-half inch longer measurement for Value A, since construction measurements seldom actually check with blue print measurements.



Sectional View of the Flush Threaded Sleeve Assemblage

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA



THREADED ASSEMBLAGE TOOLS



Designations for Tools used in installing the various Threaded Assemblages

		SLEEVE							
		D E E R F F R G H	FA	FB	FC	HK JK	KK LK	SM	SN
ROUGHING REAMER	Type	D	FA	FB	FC	D	FA	SM	SN
FINISHING REAMER	Type	D	FA	FB	FC	D	FA	SM	SN
STRAIGHT TAP	Type	D	FA	FB	FC	D	FA	SM	SN
TAPER TAP	Type	D	FA	FB	FC	D	FA	SM	SN
STUD NUT	Type	D	D	D	D	K	K	SM	SN
BOLT DRIVER	Type	D	D	D	D	K	K	D	K
RIVETING SLEEVE	Type	D	D	D	D	K	K	....	....
RIVETING PLUG	Type	....	....	....	....	....	....	SM	SN
HAND RETAPPING TAP	Type	....	....	....	....	....	....	SM	....
REFACER	Type	D	D	D	D	K	K	....	....
SOCKET WRENCH	Type	....	....	....	....	....	....	SM	SN

Guide Bars, manufactured to fit the above reamers and taps, are furnished in 10" and 15" lengths, or longer if desired— $1\frac{1}{16}$ " diameter on shank end. See Page 73.

INSTALLATION TOOLS

TOOLS FOR APPLYING THE THREADED FLEXIBLE ASSEMBLAGE

For satisfactory results we recommend only the tools manufactured by us.

Figure 1, on following page, illustrates the method of removing staybolts of the rigid type. Prick punch the center of old bolt or follow the tell-tale hole, when centered. Drill through outer sheet with large drill of such size as to allow for finishing with the roughing taper reamer shown in Figure 2.

High speed twist drills are used in many instances, although a flat high speed drill is used quite satisfactorily; the selection of drills however is left to the discretion of the customer or operator.

Stiff Guide Bars manufactured to fit the reamers and taps, as shown in Figures 2, 3 and 4, are furnished by us in ten and fifteen-inch lengths ($1\frac{1}{16}$ " diameter on shank end) and should in all cases be used to obtain proper alignment of tooling operations.

Figure 2 illustrates the **Roughing Taper Reamer**, used for quickly shaping the drilled hole to finished size for the bottom of thread of the taper tap.

If **Finishing Taper Reamers** are required, same will be furnished without nicked teeth, although a roughing taper reamer as shown, does not chatter and will make a good smooth hole.

Do not reverse the motion of the Air Drills when working the Reamers.

Figure 3 illustrates the **Straight Tap**, which is recommended by us for the first operation of tapping, in order to obtain better threads in the hole than by the use of the taper tap only. The straight tap is simply a roughing out tool for tapping the hole approximately to size. Its use for the first tapping leaves but a small amount of metal to be removed by the taper tap, inasmuch as the straight tap agrees in size with the diameter of the small end of the sleeve. Taper tapping in boiler plate is, at all times, difficult and it is almost impossible to produce clean, smooth threads by the use of the taper tap alone. Note the difference of diameters between sleeves on small end of taper so as to eliminate all chances of error in tapping. See page 69.

If the straight tap is used, be sure that the Taper Tap follows to size up the hole and mark or chalk same so as to be certain that each hole has full taper threads.

Figure 4 illustrates the **Taper Tap**, 12-V threads, $\frac{3}{4}$ " taper to the foot.

Figure 5 illustrates the **Stud Nut**, which is screwed over the end of the sleeve and is used to screw the sleeve tightly into the plate. A three foot wrench should be sufficient to warrant a steam tight fit.

Note: In tapping inner sheet through hole in outer sheet we advise the use of a bushing made to go over the sleeve to fit the tap shank and prevent the threads from cutting into the sleeve.

Figure 6 illustrates the **Bolt Driver**, which facilitates the operation of screwing the stay bolts into the inner sheet by engaging the slot in head of the bolt.

Figure 7 illustrates the **Riveting Sleeve**, which screws over the sleeve. This Riveting Sleeve is provided with loose plug to "hold on" by dolly bar. The end of the plug conforms to the shape of the bolt head so as to preserve same while riveting.

For additional tools, see pages 74 and 75, and tool table on page 71.

INSTALLATION TOOLS

TOOLS FOR APPLYING THE THREADED FLEXIBLE ASSEMBLAGES

Fig. 1

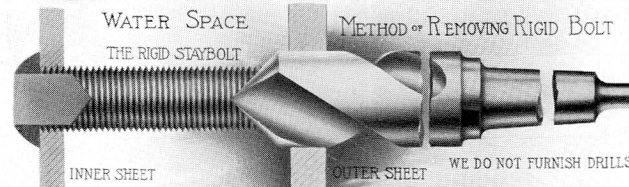


Fig. 2

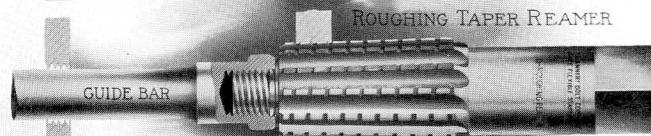


Fig. 3

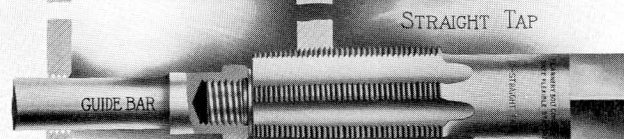


Fig. 4

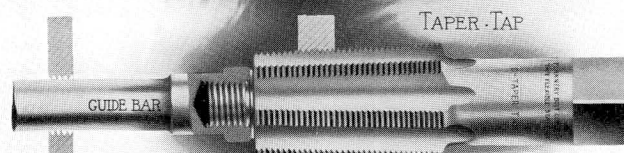


Fig. 5

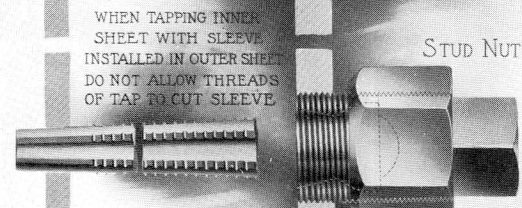


Fig. 6

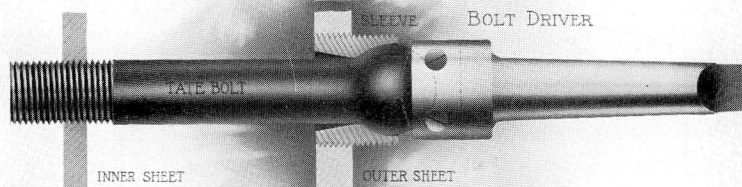
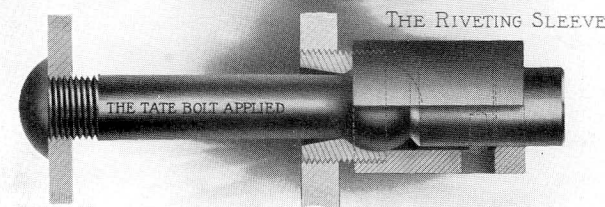


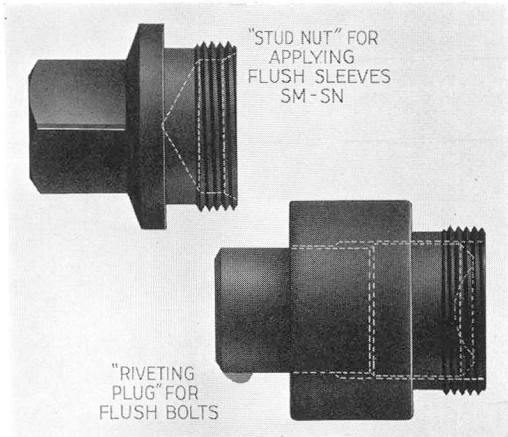
Fig. 7



When ordering Taps, Reamers, Stud Nuts and Riveting Sleeves specify the type of sleeve which you intend to install. When ordering Bolt Drivers, specify the type of bolt on which they will be used.

INSTALLATION TOOLS

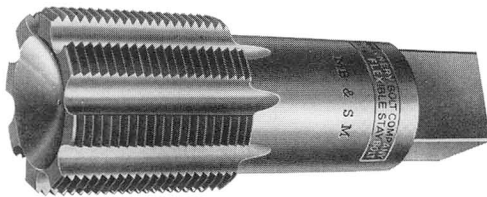
In addition to the Reamers, Taps and Bolt Drivers shown on opposite page, the following tools are furnished for application of the SM and SN assemblage.



Stud Nut and Riveting Plug for Flush Sleeves

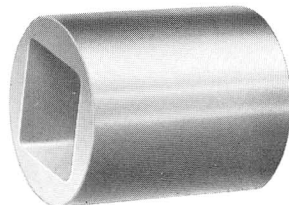
The Stud Nuts SM and SN are used to screw the sleeve into the boiler plate. Use Stud Nut SM for applying Flush Sleeve SM, and Stud Nut SN for applying Flush Sleeve SN.

The Riveting Plug is screwed into the flush sleeve after the bolt has been installed, and serves as a "holder on" to the dolly bar while riveting over the bolt end, the curved recess in the Plug protecting the curvature of the bolt head while riveting. Designate when ordering whether Riveting Plug SM for Sleeve SM, or Riveting Plug SN for Sleeve SN, is desired.



Retapping Tap SM

The Retapping Tap SM is made for cleaning out and sizing up threads in the Sleeve SM after the sleeve has been installed. The threads at times may become burred or damaged, or slightly compressed when applied tightly, resulting in difficulty in applying the Caps SM. This retapping corrects such conditions.

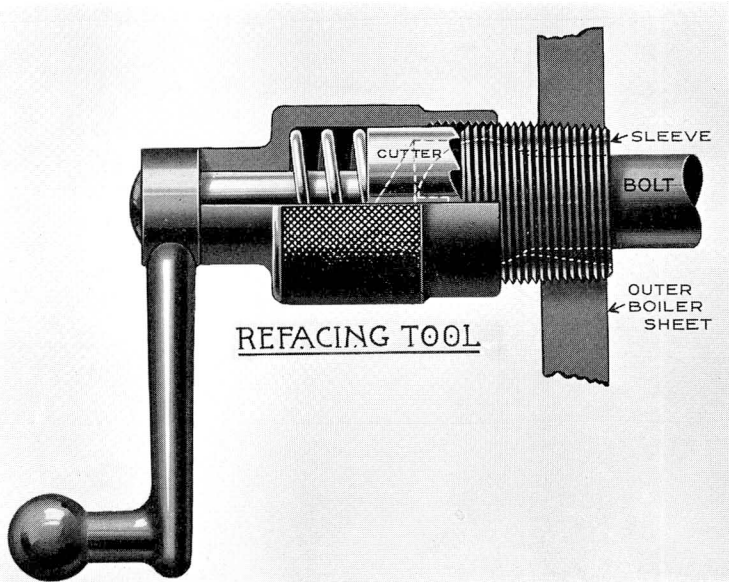


Socket Wrench SM

For applying the Cap SM to the Flush Sleeve, use a Socket Wrench made with the broached socket which we supply, illustrated at the left, and screw the cap up tightly against the copper gasket. Simply forge out a bent handle with end to fit the square socket, and pin through.

Order socket wrench SN for Cap SN.

INSTALLATION TOOLS

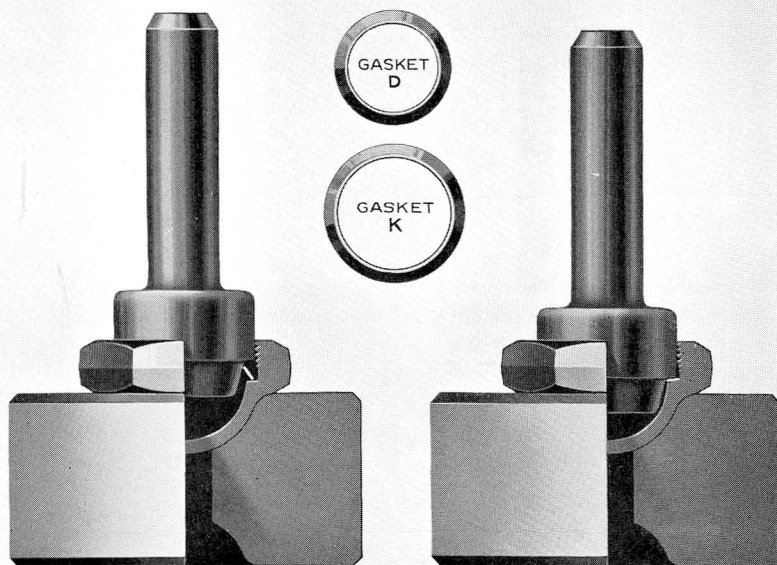


REFACING TOOL

Threaded Sleeves used in boiler shop practice are frequently knocked about and the cap seats become nicked with slight indentations, or may thus be damaged during application, and these nicks on the sleeve seat where the cap makes its bearing, at times cause leakage.

To obviate the necessity of taking sleeves out of boiler, we recommend the use of the refacing tool. This tool can be screwed over the cap end of the sleeve, bringing the cutter into contact with the sleeve face. To increase the cutter pressure, screw the body of the tool further onto the sleeve, at the same time turning the cutter by means of the crank. Use oil or grease for cutter face and when nicks are removed, determined by the feeling, release tension slightly, and one or two revolutions of cutter will leave a smooth bearing.

Used for Sleeves D, E, ER, F, FA, FB, FC, FR, G and H



GASKET PUNCH AND ANVIL

We are prepared to furnish D and K caps with gaskets inserted. If it is desired separate gaskets can be furnished for installation on the job. To facilitate such work, we have designed a set of Gasket Punches and anvil, which we illustrate herewith, showing the gasket inserted in cap and then forced down into position, so that it cannot drop out or become lost. This set of tools consists of punch for D and punch for K cap, and a combination anvil that can be used for either D or K cap.

Gasket Punch and Anvil

FLANNERY BOLT COMPANY — BRIDGEVILLE, PENNSYLVANIA

