June 4, 1957 J. H. PHILLIPS 2,794,622

HOLDER FOR SELF-DRILLING EXPANSION SHELLS AND THE LIKE

Filed July 8, 1953

Fig. 1

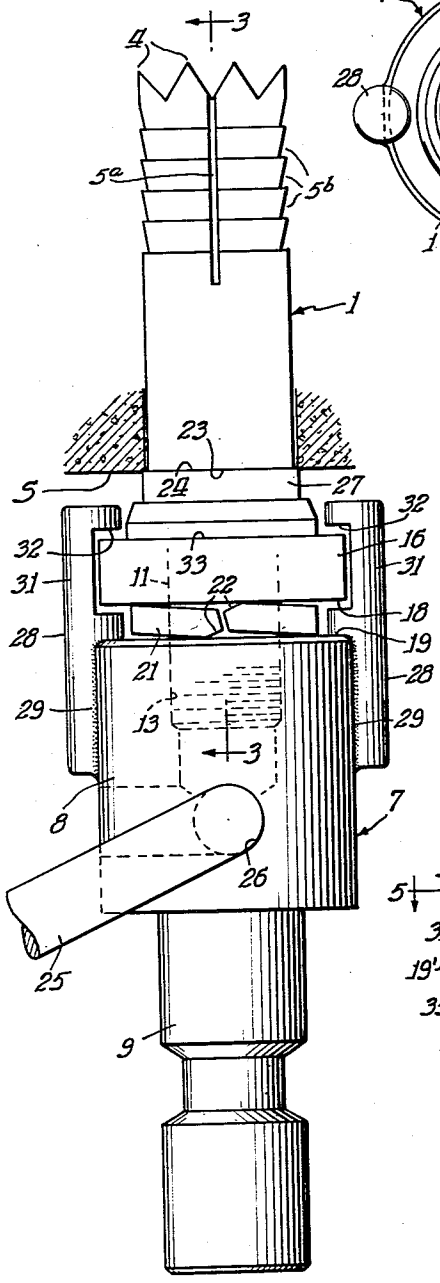


Fig. 2

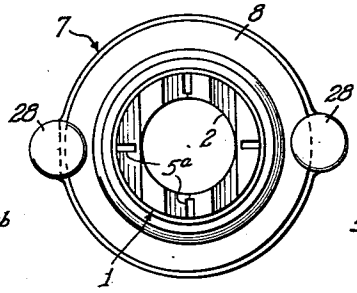


Fig. 3

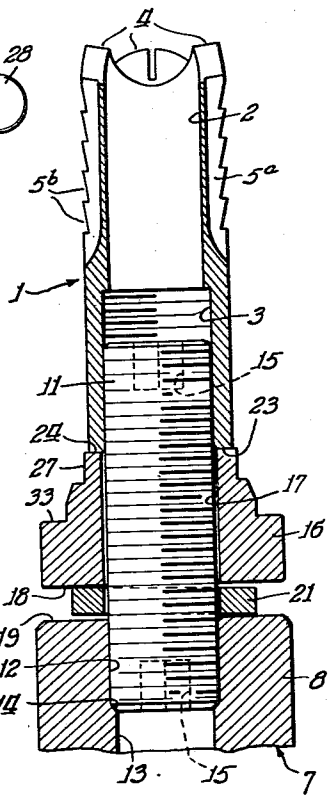


Fig. 5

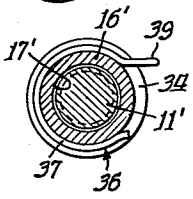


Fig. 4

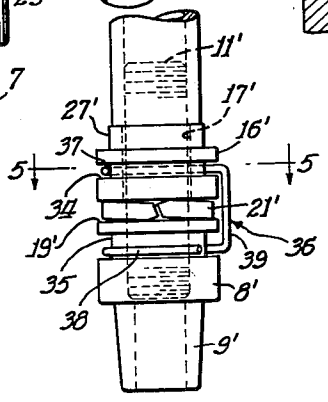
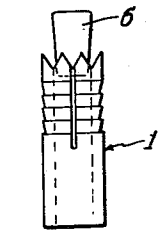


Fig. 6



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United States Patent Office

2,794,622

Patented June 4, 1957

2,794,622

HOLDER FOR SELF-DRILLING EXPANSION SHELLS AND THE LIKE

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Application July 8, 1953, Serial No. 366,833

6 Claims. (Cl. 255—61)

The invention relates generally to a tool holder for drilling members and the like, and more particularly to a holder especially adapted for supporting self-drilling expansion shells and the like.

In the past, holders have been designed for use with expansion shells, the latter normally being provided with a conical-shaped end adapted to engage the particular holder, whereby the mounted expansion shell protrudes from the masonry surface. Expansion shells for flush mountings have also been designed which have incorporated a tapered end by means of which the shell may be supported in the holder, such shell being so designed that after mounting in the masonry the tapered end may be broken off, whereby the mounted portion of the shell is substantially wholly positioned in the masonry. However, up to the present time a suitable holder for expansion shells which are to be installed flush with the surface of the mounting structure has not been available for use with power tools, such as pneumatic or electric hammers and the like.

The present invention has therefore among its objects the production of a holder for self-drilling expansion shells and similar articles by means of which the shell may be driven in flush with the surface of the masonry by means of the usual power tools.

Another object of the invention is the production of such a holder embodying novel means for applying compression forces to the supported end of the expansion shell or other tool mounted thereon, whereby such shell or tool is firmly secured to the holder, permitting the latter and the shell to be freely rotated during usage without separation of the shell and holder, and which at the same time may be readily separated when desired.

A further object of the invention is the production of such a holder embodying resilient means operative to absorb or reduce the transmission of shock stresses between the expansion shell or tool and the holder body.

A further object of the invention is the production of a holder structure having the above features and advantages which is relatively simple in construction, comparatively inexpensive to manufacture and which is very durable and efficient in use.

A further object of the invention is the production of such a holder which may be readily constructed to permit its employment in any of the standard power devices such as pneumatic and electric hammers employed in masonry, drilling operations and the like.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts:

Fig. 1 is a side elevation of a holder embodying the present invention with a self-drilling expansion shell mounted thereon;

Fig. 2 is a top plan view of the structure illustrated in Fig. 1;

Fig. 3 is a longitudinal or axial sectional view taken approximately on the line 3—3 of Fig. 1;

Fig. 4 is a side elevational view similar to Fig. 1 of a holder embodying the present invention, particularly adapted for use with the smaller sizes of expansion shells and the like;

Fig. 5 is a transverse sectional view taken approximately on the line 5—5 of Fig. 4;

Fig. 6 is a side elevational view of an expansion shell and expanding wedge of the type which may be employed with the holders illustrated.

As heretofore mentioned, the present invention is of particular use in connection with self-drilling expansion shells, the latter being so designed that the drilling operations may be performed thereby, following which the shell is expanded and thus securely fastened and the hole drilled therewith. As illustrated in Figs. 1, 3 and 6, the expansion shell **1** is generally cylindrical in shape and provided with an axially extending bore **2** therethrough, one end of the bore **2** being internally threaded as indicated at **3** and the opposite end provided with suitable cutting teeth **4**. The toothed end of the shell is provided with a plurality of longitudinally expanding grooves *5a* which do not extend entirely through the shell side wall and are operative to retain the shell segments defined thereby in integral relation during the drilling operation, following which the shell is removed from the hole drilled and a tapered wedge **6** inserted in the top end thereof. The shell is then driven into the opening drilled and following seating of the free end of the tapered plug **6** in the bottom of the hole, such plug will expand the adjacent end of the shell, fracturing the cutting material at the bases of the grooves **5**, whereby the shell is firmly locked or anchored in the hole. If desired annular grooves *5b* may also be provided similar to the grooves formed on present types of shells. Following mounting of the shell, screws or other objects may be threaded into the threaded portion **3** of the shell and supported thereby. During the drilling operations the shell is rotated to vary the position of the cutting teeth **4** with respect to the material being cut and insure the drilling of a suitable hole.

The present invention contemplates the use of a holder embodying a threaded stem adapted to engage the threaded portion of the shell and secured in operative position on the stem by suitable means having resilient portions or elements adapted to operatively engage the adjacent end face of the shell, firmly securing the shell on the stem and at the same time provide a cushioning action between the shell and the holder structure.

Referring to Figs. 1, 2 and 3, the reference numeral **7** indicates generally a holder comprising a body member **8** of generally cylindrical shape having a tool engaging shank **9** extending axially outward from one end of the body **8**. The shank **9** may be of various sizes and shapes for engagement with any particular type of power tool with which it is to be utilized, the shank **9** as illustrated being merely one type of shank commonly employed in certain makes of power hammers and the like.

Extending axially from the opposite end of the body member **8** is a threaded stem **11** of a diameter to operatively engage the threaded portion **3** of the particular size of shell with which it is to be employed, the stem **11** in the embodiment of the invention illustrated being constructed in the form of a separate completely threaded member secured to the body member **8** by internal threads **12** in the bore **13** to the body member as clearly covered in my co-pending application, Serial No,

366,834, filed July 8, 1953. As illustrated in Fig. 3, the threads **12** of the body member **8** terminate at **14** intermediate the ends of the latter so that the stem **11** may be engaged at its inner end with an unthreaded portion of the bore **13** and securely locked thereby to the body member. To facilitate the assembly of the body member **8** and stem **11**, the latter may be provided at its outer end or at both ends with recesses **15** for engagement with a suitable tool, as for example, an Allen hex wrench.

Positioned on the stem **11** is a sleeve or collar **16** which is provided with a bore **17** of greater diameter than the maximum diameter of the threaded stem **11**, whereby the collar **16** may freely move axially along the stem **11**. Interposed between the inner face **18** of the collar **16** and the adjacent end face **19** of the body member **8** is a resilient expansion member **21**, the latter being generally similar in shape to a lock washer but, as illustrated in Fig. 1, having its ends suitably formed as indicated at **22** to substantially eliminate any locking action comparable to the common split type lock washer.

To facilitate rotation of the holder and thus with it the shell, the body member **8** may be provided with a suitable handle **25**, only a portion of which is illustrated in Fig. 1. The handle **25**, for example, may be in the form of a U-shaped bail having its free ends terminating in aligned oppositely directed portions adapted to be positioned in opposite ends of a bore **26** extending through the body portion **8**.

In use the expansion shell **1** is mounted on the stem **11** and tightened down by hand as far as it will go, the adjacent end face **23** of the shell engaging the outer end face **24** of the collar **16**. The shell **1** may then be positioned on the surface of the object to be drilled at the desired point and the pneumatic hammer or other power tool actuated. As pressure is applied in the drilling direction, the holder may be rotated by means of the handle **25** to rotate the stem **11** in the proper direction, causing the latter to advance in the bore **2** of the shell as the latter is held in position by its engagement with the surface to be drilled. As this operation is performed the shell **3** will be drawn into tight engagement with the collar **16**, partially compressing the relatively stiff, resilient member **21**, whereby the shell and holder are securely fastened together and the holder may then be rotated in either direction with the shell rotating therewith.

If necessary during the drilling operation, the shell may be removed from the hole and cutting chips which have accumulated in the bore **2** removed therefrom, and upon completion of the hole a suitable wedge member **6** (Fig. 6) is inserted in the toothed end of the shell, following which the assembly is reinserted in the drill hole and the shell driven in flush by means of the pneumatic or other hammer, thereby expanding the wedge **6** and securely anchoring the shell in the hole. After the shell has been anchored the body member **8** may be rotated by means of the handle **25** in a direction to unscrew the stem **11** thereof from the threaded portion **3** of the bore **2** to disconnect the holder from the shell, the action of the resilient element **21** eliminating wedging and jamming and thus readily permitting disengagement of the shell from the holder.

As illustrated in Figs. 1 and 2, the portion **27** of the collar **16** adjacent the end face **24** thereof is preferably of approximately the same or slightly larger diameter than the shell **1** with which it is to be employed, permitting the shell to be driven flush with the surface S of the object in which it is mounted or even slightly below such surface, the diameter of the portion **27** being of such size that it will not damage the adjacent portion of the object drilled.

If desired means may be provided for retaining the collar **16** in operative position on the stem **11**, such means in the embodiment illustrated in Figs. 1 and 2 comprising a pair of longitudinally or axially extending members **28** rigidly secured to the body member **8** as indicated

at **29**, with the free ends **31** being positioned adjacent the periphery of the collar **16**, and terminating adjacent their outer ends in radially extending inwardly directed shoulders **32** which overlie the annular shoulder **33** of the collar **16**. Thus the shoulders **32** may engage the shoulder **33** and limit the axial movement of the collar **16** outwardly on the stem **11**, thereby preventing separation of the collar and the resilient member **21** from the remainder of the holder structure, the members **28**, however, being so constructed that adequate movement of the collar to achieve the desired results is permitted.

The construction illustrated in Figs. 4 and 5 is generally similar to that heretofore described and the operation of the two forms is the same. The construction in Fig. 4, however, is particularly adapted for use with shells in the smaller size ranges and provides a very simple, inexpensive but highly efficient structure. In this embodiment of the invention, the body member **8'** may be provided with a tapered shank **9'** of a size to be received in smaller types of tool chucks designed therefor, and is provided at its opposite end with a threaded stem **11'** generally similar to the stem **11**. The collar **16'** is likewise provided with a bore **17'** of slightly larger diameter than the maximum diameter of the stem **11** and is also provided with a portion **27'** corresponding to the portion **27** of the collar **16**. Interposed between the collar **16'** and the end face **19'** of the body member **8'** is a resilient expansion member **21'** constructed in the same manner as the member **21**.

In this embodiment of the invention, the collar **16'** is provided with an annular groove **34** and the body member **8'** is provided with a similar annular groove **35**. Operatively connecting the body member **8'** and collar **16'** is a connecting link or member **36**, shown in the embodiment of the invention illustrated as being formed from suitable wire stock or the like, provided with two semi-circular shaped portions **37** and **38** connected together by an intermediate portion **39**, the diameter of the portions **37** and **38** being of a size to be positioned in the respective grooves **34** and **35**, whereby the member **36** will effectively retain the collar, body member and resilient member **21'** in assembled relation. As illustrated in Fig. 4, one of the grooves, such as the groove **35**, is of sufficient axial width to permit axial movement of the portion **38** thereof and thus the collar **16'** to provide adequate engagement and compression of the resilient element **21'** to achieve the desired results. It will be apparent that this embodiment of the invention is exceedingly simple in construction and inexpensive to manufacture.

It will be noted from the above description that the use of resilient members **21** or **21'** and axially movable collars **16** and **16'** results in the application of frictional forces to the end face **23** of the shell, whereby the same is securely connected to the holder for all drilling purposes, but at the same time permits the holder to be readily disconnected from the shell without undue tendency to stick or jam. Also as there will be some play between the threads in the bore **3** and those on the stem **11**, thereby permitting a small amount of axial movement of the shell relative to the stem, the resilient member **21** provides a cushioning action between the shell and the holder, reducing the shock stresses therebetween and prolonging the life and utility of the structure.

It will also be noted from the above description that I have provided a holder having the above advantages which is relatively simple in construction, durable in use and very efficient for the purposes intended, and which is of particular use in drilling and installing flush type shells which heretofore could not be utilized with power equipment.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence, I do not wish to be understood as limiting myself

to the exact form, construction, arrangement and combination of parts herein shown and described, or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. In a holder for self-drilling expansion shells and the like, having a threaded mounting bore, the combination of a body member having a threaded stem extending from a face thereof, of a size to engage the threaded bore of such a drill member and a shank extending from the opposite end of said member for coupling with a power tool, a collar having a bore therein of a size to permit the free axial passage of said stem therethrough installed on the stem in freely rotatable relation to said body member, and means extending from said body member engageable with said collar for restricting axial movement of the latter in a direction away from said face of the body member while permitting free rotary movement of said collar relative to the body member.

2. In a holder for self-drilling expansion shells and the like, having a threaded mounting bore, the combination of a body member having a threaded stem extending from a face thereof, of a size to engage the threaded bore of such a drill member, a collar having a bore therein of a size to permit the free axial passage of said stem therethrough, said collar and said body member each having a peripheral groove therein, said grooves lying in respective parallel planes extending at right angles to the axis of said stem, and a connecting member, having end portions positioned in the respective grooves, operatively connecting the body member and collar, the groove in the latter being of a size to permit limited axial movement of the collar relative to the body member but prevent separation therebetween.

3. In a holder for self-drilling expansion shells and the like, having a threaded mounting bore, the combination of a body member having a threaded stem extending from a face thereof, of a size to engage the threaded bore of such a drill member, a collar having a bore therein of a size to permit the free axial passage of said stem therethrough, and a plurality of members carried by said body member, extending axially outward with respect to such face of the latter, said members terminating adjacent their outer ends in radially extending inwardly directed shoulders engageable with portions of said collar to restrict axial movement of the latter in an outward direction while permitting free rotation thereof relative to said stem.

4. In a holder structure for self-drilling expansion shells and the like, having a threaded bore, the combination of a body member, an axially aligned threaded stem extending outwardly from an end face of the body member, said stem being of a size to threadedly engage the bore of such a shell, a freely rotatable collar encircling said stem, having an end face adapted to frictionally engage the adjacent end face of such a shell, and resilient means, interposed between and frictionally engageable with such end face of the body member and said collar

operative to exert axial pressure on such body and said collar, the diameter of the latter adjacent the shell engaging end face thereof being equal to or slightly greater than the diameter of the shell to be used therewith to permit such a shell to completely enter the material being drilled, said collar and body member being inter-connected to limit separation therebetween axially along the stem while permitting free rotation of the collar on the stem.

5. A holder for self-drilling expansion shells having a threaded mounting bore comprising, a body member having a threaded stem extending from a face thereof adapted to be coupled with the shell in said bore, a collar member separably mounted on the stem between the shell and body member and freely movable axially along the stem, relatively stiff, resilient expansion means comprising a split ring normally helical in configuration and adapted to be axially compressed and the meeting ends being normally offset one from the other axially and having the axially outwardly facing corners of said ends provided with means preventing said corners from digging into said face and said collar, disposed on the stem between said face and collar which upon compression thereof by a force parallel to the axis of the shell will permit rotation of the shell and holder together without separation thereof and will permit such separation when the compression is absent.

6. A holder for a self-drilling expansion shell having a threaded mounting bore, comprising: a body member having a tool coupling shank end and a threaded stem extending from the face of the opposite end thereof adapted to be threaded into said mounting bore, a non-deformable collar member freely rotatable on the stem between the shell and said face and having a central passageway through which the stem is received of a diameter greater than the diameter of said stem so that the collar is freely movable axially along said stem, a connecting bracket member between said collar and body member restricting separation of the collar relative to the body member axially along the stem while permitting such free rotary movement of the collar, and a relatively stiff, resilient expansion ring installed on said stem between the collar and said face which is compressible by a force parallel to the axis of the shell to lock said collar and body members together so that they will rotate together without such separating movement therebetween, said expansion member capable of returning to a position releasing the collar and body member upon withdrawal of said compression force.

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