

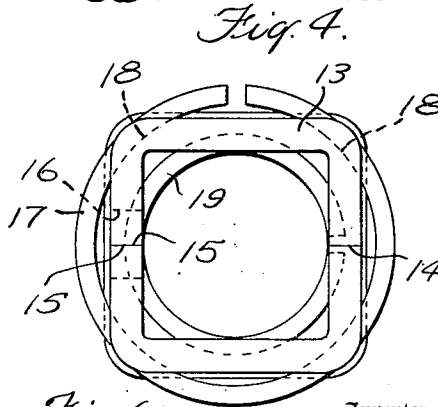
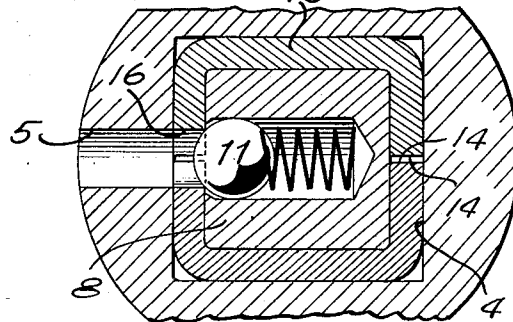
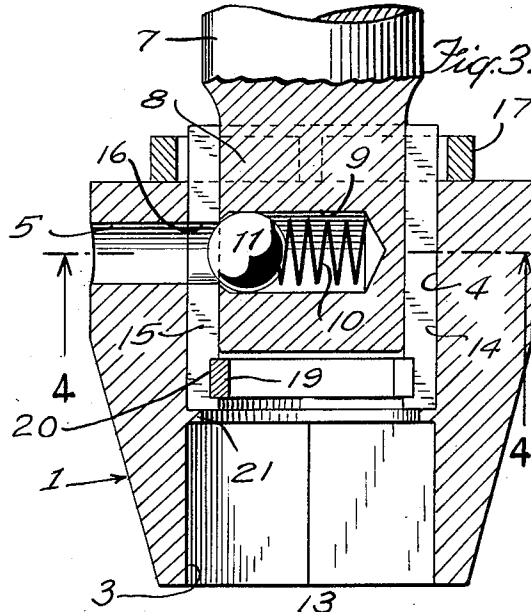
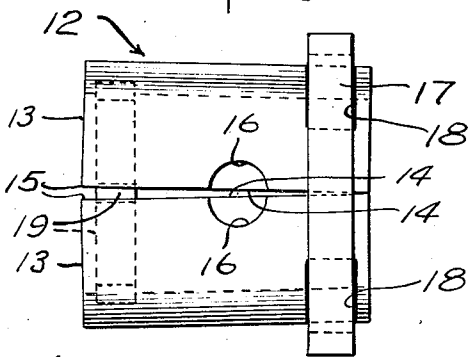
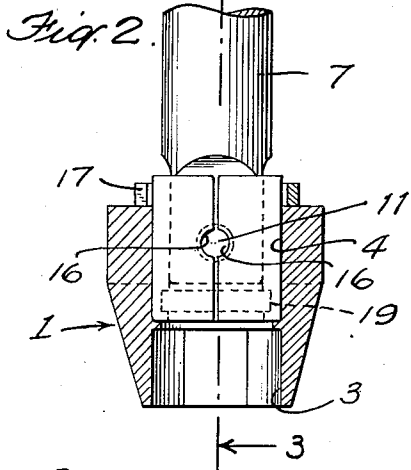
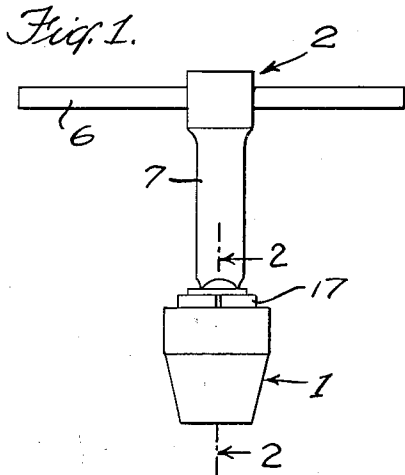
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STEM-AND-SOCKET TOOL DRIVE AND ADAPTER THEREFOR

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STEM-AND-SOCKET TOOL DRIVE AND
ADAPTER THEREFOR

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6 Claims. (Cl. 287—119)

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This invention relates to stem-and-socket drives for tools, and particularly to adapters for enabling a stem of one size to be operatively connected with a socket designed for a stem of larger size.

It is conventional practice to provide a set of tool heads, such as a series of socket wrench heads, differing from one another in that each is provided in one end with a work engaging socket designed to fit bolt heads and nuts of a distinctive size, but resembling one another in that each is provided in the opposite end with a driving socket, the driving sockets being all of the same size. The similar driving sockets are all adapted to receive and fit upon similiary polygonal stems of different drive members such as spinner handles, ratchet drives, etc. Different sets of tool heads have drive sockets of different sizes, and for each such set, according to conventional practice, a complete set of drives must be provided, each having a stem of proper size to cooperate with the socket size which is characteristic of the tool set.

I have found, however, that it is feasible through the employment of a novel adapter which I have contrived to use drive stems of one size with drive sockets of a larger size, thereby avoiding a duplication of drives which has heretofore been thought necessary. It is important, of course, when a drive has been associated with a tool head that the parts shall remain associated with one another without any special attention of the user until a substitution is desired. It is similarly important where an adapter is used that the adapter shall be capable of being detachably locked to the drive stem and of being frictionally retained in the drive socket until a substitution is desired.

It is a primary object of the present invention to provide through an adapter an operative combination of a tool head and drive which were not designed nor intended for direct use with one another.

It is a further primary object of the present invention to provide an adapter capable of operatively combining a tool head and drive which were not designed nor intended for direct use with one another.

It is still another object of the invention to provide an adapter of the kind referred to which can be readily locked upon and removed from a drive stem, and which will frictionally cling to a drive socket but will always remain with the stem in preference to the socket when the stem-and-socket are forced apart.

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Other objects and advantages will hereinafter appear.

In the drawing forming part of this specification,

5 Figure 1 is a view in elevation of a complete tool and drive combination in which an illustrative novel adapter embodying features of the present invention is employed;

10 Figure 2 is a fragmentary sectional view, taken upon the line 2—2 of Figure 1, looking in the direction of the arrows, the view being upon a substantially larger scale than Figure 1;

15 Figure 3 is a fragmentary sectional view, taken upon the line 3—3 of Figure 2, looking in the direction of the arrows;

Figure 4 is a transverse sectional view, taken upon the line 4—4 of Figure 3, looking in the direction of the arrows;

Figure 5 is a side view of the adapter; and

20 Figure 6 is an end view of the adapter observed from the right hand end of Figure 5.

The combination tool of Figures 1 to 4 comprises a wrench head 1 and a drive 2. The wrench head 1 is formed with a work engaging socket 3 in its outer end and a drive socket 4 in its inner end. The work engaging socket 3 may be of any approved conventional construction, and since it is of fixed dimensions it is adapted to engage bolt heads and nuts only of a particular size for which it is designed. The drive socket 4 is of polygonal construction, being square in the illustrative tool head. The tool head 1 is designed and intended to receive a drive stem (not shown) of a size appropriate to fit the socket, and it is formed with a side bore 5 for interlocking with a spring operated plunger carried in such a drive stem.

The drive 2 comprises a spinner handle 6 and a stem 7 secured to the handle. This spinner drive is only chosen as illustrative of a considerable variety of drives which are conventionally provided. The stem 7 terminates in a polygonal end portion 8, this portion of the stem being square in the illustrative structure. The stem portion 8 is designed and intended to be received within a drive socket similar to the drive socket 4 but of smaller dimensions than the illustrative drive socket so that the parts may be directly connected in interfitting relation. The stem portion 8 is formed with a transverse bore 9 in which a compression coil spring 10 is lodged. The spring 10 bears against and forces outward a plunger ball 11. Outward movement of the plunger is limited by reason of the fact that the mouth of the bore is deformed to contract the

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bore after the spring and ball have been placed in the bore. In the conventional construction where the stem portion 8 would fit the socket 4 the ball 11 would cooperate with the bore 5 to releasably lock the stem-and-socket together. In the present construction, however, because the stem 8 was designed to cooperate with a smaller socket than the socket 4 the ball 11 does not engage the bore 5.

The tool head 1 and the drive 2 are joined to one another through the novel adapter 12 which is disclosed by itself in Figures 5 and 6 and in association with the other parts in Figures 1 to 4. The adapter comprises a pair of complementary sleeve members 13 which may be aptly described as parti-polygonal since each of them forms half a square. The members 13 have confronting straight edges 14 and confronting straight edges 15, the latter edges being formed with complementary notches 16 for cooperating with the plunger ball 11 of the stem portion 8. At one end the composite sleeve formed by the members 13 is surrounded by a resilient split ring 17, the ring being lodged in grooves 18 which are formed exteriorly at the corners of the sleeve members. At the opposite end of the sleeve members a resilient split ring 19 is lodged within the composite sleeve structure, the ring being fitted into grooves 20 formed in the internal faces of the sleeve members.

The grooves 18 in which the split ring 17 is lodged are located inward a short distance from the extremity of the composite sleeve structure so that the ring 17 not only holds the adjacent ends of the sleeve members 13 normally in engagement with one another but also limits separation of the opposite ends of the sleeve members from one another so as to assure that the ring 19 will not be accidentally dislodged from the grooves 20.

Besides holding the adapter parts together in assembled relation as described the external split ring 17 serves as a contractor to press the sleeve members 13 toward one another and into frictional engagement with the stem portion 8. The adapter 12 is so applied to the stem 8 that the inner edges of the confronting faces 15 of the sleeve members 13 are caused to engage the ball 11. As the adapter is slid along the stem portion 8 the ball 11 passes into the notches 16 whereupon it springs outward substantially to fill the notches and to lock the adapter detachably onto the stem. When the adapter has been locked on the stem it is ready to receive a tool head, such as the tool head 1. A tool head 1 is accordingly selected and forced onto the adapter from the end at which the internal spring 19 is located. The socket 4 of the tool head presses the sleeve members 13 toward one another slightly, compressing the spring 19. The resiliency of the spring 19 causes the sleeve members 13 frictionally to engage and cling to the walls of the socket 4.

Insertion of the square stem portion 8 into the adapter is limited by engagement of one end of the adapter with a shoulder formed on the stem at the inner end of the square portion. In some conventional tool heads the socket 4 is formed with a shoulder 21 by which insertion of the adapter into the socket would be limited. In other structures this shouldered part is omitted, however, and in such a case the external ring 17 serves in addition to its other functions as a stop for limiting insertion of the adapter in the socket of the tool head.

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It will be apparent that the notches 16 and the plunger ball 11 provide an interlock between the adapter and the stem portion 8 which is more secure than the mere frictional hold of the adapter upon the internal walls of the socket 4. While the frictional force is sufficient to guard against the accidental dropping off of the tool head from the adapter, the structure has the desirable characteristic that the adapter, when the tool head and stem are forced apart, invariably remains with the stem in preference to the tool head. This is a desirable feature because the adapter when withdrawn from the socket is fully accessible on the stem and can be conveniently and firmly gripped for pulling it off of the stem. Should the adapter remain instead with the socket, it would be largely buried and concealed within the socket and would afford little accessible material for use in seizing it and pulling it out of the socket.

I have described what I believe to be the best embodiment of my invention. I do not wish, however, to be confined to the embodiment shown, but what I desire to cover by Letters Patent is set forth in the appended claims.

I claim:

1. An adapter for stem-and-socket tool drives comprising, in combination, a pair of complementary parti-polygonal sleeve members, an expander lodged in one end of the composite sleeve structure for forcing the sleeve members apart and into firm frictional engagement with a surrounding socket member when such a socket member is applied, and a contractor surrounding the opposite end of the composite sleeve structure for pressing the sleeve members together for gripping an inserted stem.

2. An adapter for stem-and-socket tool drives comprising, in combination, a pair of complementary parti-polygonal sleeve members, an expander lodged in one end of the composite sleeve structure for forcing the sleeve members apart and into firm frictional engagement with a surrounding socket member when such a socket member is applied, and a contractor surrounding the opposite end of the composite sleeve structure for pressing the sleeve members together for gripping an inserted stem, the sleeve members having complementary notches formed in confronting edges thereof for receiving a spring projected member of the stem.

3. An adapter for stem-and-socket tool drives comprising, in combination, a pair of complementary parti-polygonal sleeve members, an expander spring lodged in one end of the composite sleeve structure for pressing the sleeve members apart and into firm frictional engagement with a surrounding socket member when a socket member is applied, and a spring contractor surrounding the opposite end of the composite sleeve structure for pressing the sleeve members together for gripping an inserted stem.

4. An adapter for stem-and-socket tool drives comprising, in combination, a pair of complementary parti-polygonal sleeve members having grooves formed at one end in their external corner portions and grooves formed at the opposite end in opposed internal faces, an external resilient split ring lodged in the first-mentioned grooves for holding the sleeve members in assembled relation and urging them toward one another, and an internal resilient split ring lodged in the latter grooves for pressing the sleeve members apart.

5. An adapter for stem-and-socket tool drives

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comprising, in combination, a pair of complementary parti-polygonal sleeve members having grooves formed at one end in their external corner portions and grooves formed at the opposite end in opposed internal faces, an external resilient split ring lodged in the first-mentioned grooves for holding the sleeve members in assembled relation and urging them toward one another, and an internal resilient split ring lodged in the latter grooves for pressing the sleeve members apart, the external ring being located inward a short distance from the extremity of the composite sleeve at the end upon which it is mounted and being stiff enough to limit the range of separation of the sleeve members at the opposite end so that the internal ring cannot be accidentally dislodged from the internal grooves.

6. In a stem-and-socket tool drive, in combination, a stem having a transverse bore therein, the bore being of contracted cross-section at its mouth, a spring in the bore, a plunger thrust outward by the spring but limited in its outward movement by the contraction of the mouth of the bore to project only a short distance beyond a

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face of the stem, an adapter sleeve comprising a pair of complementary parti-polygonal sleeve members, an expander lodged in one end of the composite sleeve structure for forcing the sleeve members apart and into firm frictional engagement with a surrounding socket member when such a socket member is applied, and a spring contractor surrounding the opposite end of the composite sleeve structure, pressing the sleeve members together, the sleeve members having complementary notches formed in edges thereof for receiving the protruding end of the spring-pressed plunger which is carried by the stem, to releasably lock the adapter sleeve on the stem.

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