

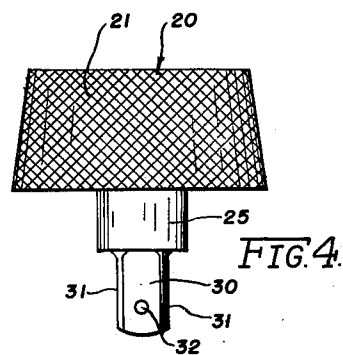
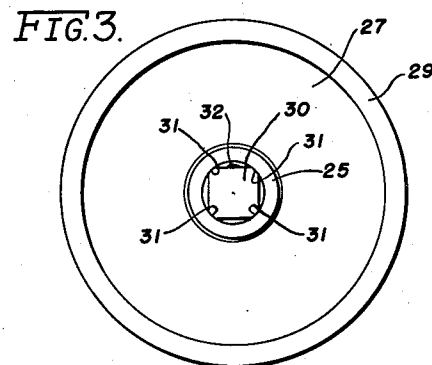
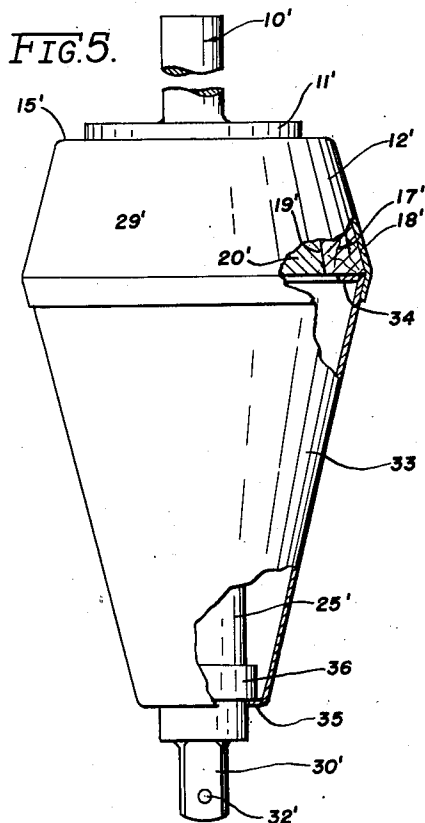
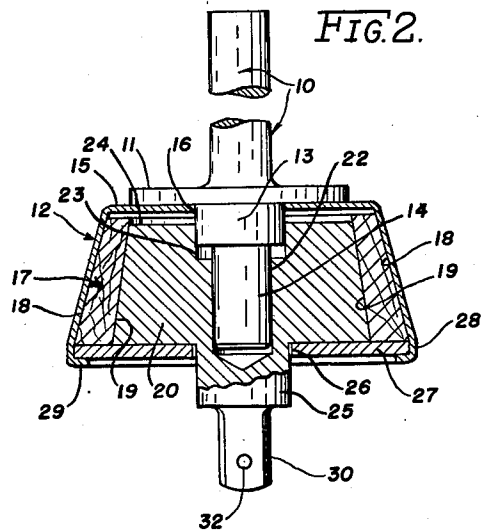
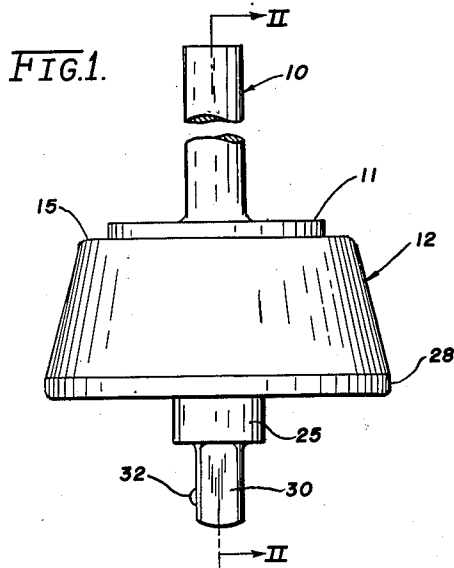
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DRIVER COUPLER ATTACHMENT

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DRIVER COUPLER ATTACHMENT

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10 Claims. (Cl. 192-66)

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This invention relates to driver couplers and more particularly to power driver coupler attachments, although certain features thereof may be employed with equal advantages for other purposes.

It contemplates more especially the provision of a simple and improved driver coupler attachment that can be utilized in conjunction with portable or fixed machine tools such as drill presses, portable speed drills, and flexible shafts for the purpose of turning wrench sockets, screw drivers, and similar fastening tools that cooperate with nuts, screw heads, and other conventional fasteners.

Numerous types of driver couplers have heretofore been proposed and many of these have been of the built-in type which are self-contained in power instrumentalities. The present invention concerns itself with a driver coupler attachment that can be optionally used in conjunction with standard machine tools such as drill presses, portable speed drivers and similar power instrumentalities to hasten assembly and dismantling operations by tightening or loosening fasteners, such as nuts, screws, and the like, comprising the retainers of machine parts in assembled association.

One object of the present invention is to simplify the construction and improve the operation of devices of the character mentioned.

Another object is to provide a more simplified and effective driver coupler of the cone-type principle which can be effectively used as an attachment in conjunction with machine tools serving as a driving medium.

Still another object is to provide a cone-type clutch attachment having friction elements of different material characteristics to effectively clutch and de-clutch fastener turning instrumentalities.

A further object is to provide a plurality of cone-shaped elements of different frictional coefficients as clutching and de-clutching elements between driver and driven elements.

A still further object is to provide a frusto-conical casing with complemental elements with different frictional coefficients to serve as clutching and de-clutching elements respective to providing relatively longitudinal displacement.

Still a further object is to provide a frusto-conical driver casing with a plurality of complemental elements possessing different relative frictional coefficients therewith to effectively clutch and de-clutch a driven element in a self-containing unit respective to providing relative axial displacement therebetween in one direction or another.

Other objects and advantages will appear from the following description of an illustrative embodiment of the present invention.

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In the drawings:

Figure 1 is a front view in elevation of a device embodying features of the present invention.

Figure 2 is a sectional view in elevation taken substantially along line II-II of Figure 1 with the frictional elements in declutched relation and without sufficient frictional reaction therebetween to sustain a turning load.

Figure 3 is a bottom plan view of the device shown in Figures 1 and 2.

Figure 4 is a front view in elevation of a component driven frictional element shown in assembled association in Figure 2.

Figure 5 is a front view in elevation of a modified embodiment of the device shown in Figure 1, parts thereof being broken away and shown in sections to clarify the illustrations.

The structure selected for illustration is not intended to serve as a limitation upon the scope or teachings of the invention, but is merely illustrative thereof. There may be considerable variations and adaptations of all or part of the teachings depending upon the dictates of commercial practice.

The present embodiment comprises a driving shank 10 which is adapted to be engaged by an adjustable chuck of a machine tool such as a machine drill press or portable high speed drill (not shown) for the purpose of imparting rotation thereto. The shank 10 is provided with an enlarged peripheral flange 11 intermediate the ends thereof for the purpose of effecting the attachment of the driver shank 10 to a casing 12 by resort to rivets or welding attaching expedients depending upon the dictates of commercial practice. The shank 10 has a peripheral shoulder 13 formed integral therewith beneath the circular flange 11, and the shoulder 13 is appreciably smaller in diameter than the flange 11 and somewhat larger in diameter than the driver shank 10. The shoulder 13 terminates in a driver shank extension 14 which, in this instance, is of the same diameter as the shank 10 to serve as a pilot therefor.

The casing 12 is, in this instance, of frusto-conical configuration to provide an upper end circular wall 15 which has an axial aperture 16 for the reception of the shank shoulder 13 therethrough and to receive the circular flange 11 over the end wall 15 for rigid, welded or other suitable attachment thereto for rotation of the casing 12 with the driver shank 10. The frusto-conical casing receives a complemental annular ring 17, in this instance of maple or other material, having an effective frictional coefficient therewith to provide an exterior shape thereon which conforms to and loosely fits in the frusto-conical casing 12 and permits slippage without damage to the coating surfaces. It should be

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observed that the wood annular ring 17 of maple or its equivalent presents a quiet operating, wear resisting, quiet friction engaging, and a practically non-scorching friction element having many advantages over metal to metal contact. To this end, the exterior peripheral surface of the annular wood ring 17 has a corresponding tapered friction surface 18 which effects contact with the interior and correspondingly tapered wall of the casing 12. So that the annular ring 17 can be loosely or tightly associated with the wall of the frusto-conical casing 12, it is of somewhat lesser depth than the casing 12 to permit axial displacement therein to effect the tight frictional engagement therewith or to recede sufficiently therefrom to provide some clearance therewith. This will depend upon whether or not the casing 12 is displaced toward or away from the complementary annular ring 17 therein as will appear more fully hereinafter.

The annular wood ring 17 has, in this instance, an enlarged terminal frusto-conical bore 19 which is of somewhat less inclination than the exterior frusto-conical surface 18 thereof to receive a complementary driven element 20 preferably though not essentially made from metal to serve as a complement thereof. This variation in inclination of the coacting surfaces 18-19 provides for ready slippage by reason of the differing friction reacting coefficients imposed thereof responsive to axial thrust or pressure. The frusto-conical driven element is of lesser depth than the annular ring 17 to provide end clearance for loose or tight engagement with its interior frusto-conical bore 19 depending upon its position of axial displacement relative to the annular ring 17.

To the end of providing the proper frictional engagement between the frusto-conical surface 18 and the annular ring 17, the exterior frusto-conical surface 21 of the driven element is knurled or otherwise roughened to provide the desired coefficient of friction with the interior bore 19 of the annular ring 17. The driven element 20 is axially guided and displaced relative to the driver shank 10 by providing therein an axial bore 22 of somewhat larger diameter than the shank extension 14, and the bore 22 which opens upwardly is provided with a countersunk recess 23 communicating with the upper end surface 24 thereof to serve as a complement of the shank shoulder 13, thereby providing true aligned axial displacement between the shank extension 13-14 and the driven element 20 through its axial countersunk bores 22-23.

The driven element 20 terminates in an axial depending cylindrical boss 25 which projects through a somewhat larger axial aperture 26 provided in a confining end plate 27 which is sized to fit in the terminal cylindrical rim 28 constituting the lower end of the divergently inclined frusto-conical casing 12. The end plate 27 is retained in assembled association with the casing 12 by swaging, spinning or otherwise turning the flanged peripheral edge 29 thereof to maintain the component elements such as the annular ring 17 and the driven friction element 20 in assembled association with the casing 12. There is end clearance between each of these elements to enable their axial displacement in tight frictional relative engagement or permit such looseness therebetween as to permit the driving shank 10 to rotate with or relative to the driven element 20 and its exterior projecting boss 25.

To the end of driving a suitable fastener en-

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gaging element such as a wrench socket or screw driver, the driven element has its exterior boss 25 terminate in a reduced shank 30 which is preferably though not essentially of square cross-section of chamfered corner edges 31 which is of squared construction to detachably receive the counterpart of the fastener turning element therewith. To this end, the driven shank 30 has a spring impelled ball detent 32 of standard or approved construction provided in the wall thereof to frictionally retain the wrench socket, screw driver or other suitable turning implement thereon for ready attachment and detachment. It will be observed, therefore, that with this arrangement of parts, mere axial displacement toward or relative to the driven element 20 with the fastening instrumentality attached to the shank 30 thereof and in operative engagement with the fastener to be turned, a frictional reaction will be set up between the elements 12, 17 and 20 to effect full turning movement between the driver shank 10 and the driven shank 30 to power rotate the attached turning implement thereof.

The moment the driver shank 10 is caused to recede from the driven element 20, the co-acting frictional frusto-conical surfaces of the members 12, 17 and 20 will become spaced from each other to an extent sufficient to effect de-clutching between the driver shank 10 and the driven shank 30 to permit the former to rotate relative to the latter. Even an unnoticeably small receding movement will provide declutching in that sustained axial downward pressure is required for maintaining a frictional driving reaction between the elements 12-17-20. This permits the ready controlled clutching and de-clutching between the driver shank 10 and the driven shank 30 depending upon the will of the attendant by merely moving one toward or from the other in the course of turning operations. For that matter, should the fastening expedient be turned to its most secure position in relation to its work without the attendant causing the shank 10 to recede from the shank 30, there will be permitted slippage between the frictional co-acting surfaces 12-18-19 without any appreciable wear by reason of the differing surface inclinations on the frusto-conical surfaces 18-19 of the members 12, 17 and 20. This will preclude any rupture in the clutching device or defect in the work being assembled with the fastener turned therewith.

In the modified embodiment shown in Figure 5, the same driving elements 10', 11', 12', 17', and 20' are embodied therein with the exception that the driven element 20' has a much longer depending boss 25' to permit greater visibility by the attendant of the driven shank 30'. This can be accomplished by utilizing the same casing 12' as shown in the previous embodiment with or without a lower casing extension 33 which merely encloses the depending boss extension 25'. With the use of the depending and enclosing casing extension 33, the peripheral retainer flange 29' of the casing 12' is inclined to conform with the upper sides and configuration of the casing extension 33 which has an inwardly deflected peripheral flange 34 which serves to retain the annular friction ring 17' in position much the same as the retainer plate 27 serves the purpose in the previously described embodiment.

The lower end of the casing 33 terminates in an inwardly deflecting flange 35 which abuts

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against a peripheral shoulder 36 provided on the boss extension 35' proximate to the lower extremity thereof which merges with the driven shank 30'. As in the previous embodiment, the driven shank 30' has a spring impelled ball detent 32' for the frictional attachment of the turning implement such as a wrench socket or screw driver thereon. A simple, durable, and very effective clutching and de-clutching coupler attachment has been provided for optional use in conjunction with machine tools such as drill presses, portable high speed drivers and the like.

While I have illustrated and described a preferred embodiment of this invention, it must be understood that the invention is capable of considerable variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

I claim:

1. In a self-contained driver attachment unit of the character described, the combination with a driver casing, of an annular member in said casing, said annular member being complementary to the interior of said casing for permitted frictional reaction therewith, said annular member having axial movement within said casing for normal inoperative gravity displacement therefrom and for frictional operative connection therewith responsive to downward displacement of said casing relative thereto, and a driven member journaled in said casing for operative frictional connection with said annular member.

2. In a self-contained driver attachment unit of the character described, the combination with a frusto-conical driver casing, of an annular member in said casing, said annular member being complementary to the frusto-conical interior of said casing for permitted frictional reaction therewith, said annular member having axial movement within said casing for normal inoperative gravity displacement therefrom and for frictional operative connection therewith responsive to downward displacement of said casing relative thereto, and a driven member journaled in said casing for operative frictional connection with said annular member.

3. In a self-contained driver attachment unit of the character described, the combination with a driver casing, of a sectional member in said casing, said sectional member being complementary to the interior of said casing for permitted frictional reaction therewith, said sectional member having axial movement within said casing for normal inoperative gravity displacement therefrom and for frictional operative connection therewith responsive to downward displacement of said casing relative thereto, said sectional member comprising a pair of interfitting elements having different coefficients of friction with each other and said casing, and a driven shaft fixed to one of said interfitting elements journaled in said casing for operative frictional connection through said sectional member.

4. In a self-contained driver attachment unit of the character described, the combination with a frusto-conical driver casing, of a sectional member in said casing, said sectional member being complementary to the frusto-conical interior of said casing for permitted frictional reaction therewith, said sectional member having

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axial movement within said casing for normal inoperative gravity displacement therefrom and for frictional operative connection therewith responsive to downward displacement of said casing relative thereto, said sectional member comprising a pair of interfitting elements having different coefficients of friction with each other and said casing, and a driven shaft fixed to one of said interfitting elements journaled in said casing for operative frictional connection through said sectional member.

5. In a self-contained driver attachment unit of the character described, the combination with a frusto-conical driver casing, of a sectional member in said casing, said sectional member being complementary to the frusto-conical interior of said casing for permitted frictional reaction therewith, said sectional member having axial movement within said casing for normal inoperative gravity displacement therefrom and for frictional operative connection therewith responsive to downward displacement of said casing relative thereto, said sectional member comprising a pair of interfitting elements having different coefficients of friction with each other and said casing, said interfitting elements having relative axial movement with each other and said casing, and a driven shaft fixed to one of said interfitting elements journaled in said casing for operative frictional connection through said casing through said sectional member.

6. In a self-contained driver attachment unit of the character described, the combination with a frusto-conical driver casing, of a sectional member in said casing, said sectional member being complementary to the frusto-conical interior of said casing for permitted frictional reaction therewith, said sectional member having axial movement within said casing for normal inoperative gravity displacement therefrom and for frictional operative connection therewith responsive to downward displacement of said casing relative thereto, said sectional member comprising a pair of interfitting elements having different coefficients of friction with each other and said casing, said interfitting elements having relative axial movement with each other and said casing, frusto-conical exterior peripheral surfaces of different relative angularity on said interfitting members, and a driven shaft fixed to one of said interfitting elements journaled in said casing for operative connection with said casing for operative frictional connection through said sectional member.

7. In a self-contained driver attachment unit of the character described, the combination with a frusto-conical driver casing, of a sectional member in said casing, said sectional member being complementary to the frusto-conical interior of said casing for permitted frictional reaction therewith, said sectional member having axial movement within said casing for normal inoperative gravity displacement therefrom and for frictional operative connection therewith responsive to downward displacement of said casing relative thereto, said sectional member comprising a pair of interfitting elements having different coefficients of friction with each other and said casing, said interfitting elements having relative axial movement with each other and said casing, frusto-conical exterior peripheral surfaces of different relative angularity on said interfitting members, the exterior peripheral angularity of the outer interfitting element conforming to the interior of said casing to render

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both of said interfitting members complementary thereto as a unit, and a driven shaft fixed to one of said interfitting elements journaled in said casing for operative frictional connection through said sectional member.

8. In a self-contained driver attachment unit of the character mentioned, the combination with a frusto-conical casing, of a driver shaft axial extending from the smaller end of said frusto-conical casing, an annular frusto-conical friction element loosely fitted in said casing for axial displacement relative thereto to effect or preclude frictional engagement therewith, a driven frusto-conical member complementary to said first named friction element for axial displacement relative thereto to effect or preclude frictional engagement therewith, and a driven shaft axial fixed to said last named driven frusto-conical member to rotate in unison with said casing responsive to the axial urge of said driver shaft toward said driven shaft.

9. In a self-contained driver attachment unit of the character mentioned, the combination with a frusto-conical casing, of a driver shaft axial extending from the smaller end of said frusto-conical casing, an annular frusto-conical friction element loosely fitted in said casing for axial displacement relative thereto to effect or preclude frictional engagement therewith, a driven frusto-conical member complementary to said first named friction element for axial displacement relative thereto to effect or preclude frictional engagement therewith, said frusto-conical friction element and driven member having different coefficients of friction, and a driven shaft axial fixed to said last named driven frusto-conical member to rotate in unison with said casing responsive to the axial urge of said driver shaft toward said driven shaft.

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10. In a self-contained driver attachment unit of the character mentioned, the combination with a frusto-conical casing, of a driver shaft axial extending from the smaller end of said frusto-conical casing, an annular frusto-conical friction element loosely fitted in said casing for axial displacement relative thereto to effect or preclude frictional engagement therewith, a driven frusto-conical member complementary to said first named friction element for axial displacement relative thereto to effect or preclude frictional engagement therewith, said frusto-conical friction element and driven member having different coefficients of friction, the conicalness of said casing and friction element being different than the conicalness of said friction element and driven element, and a driven shaft axial fixed to said last named driven frusto-conical member to rotate in unison with said casing responsive to the axial urge of said driver shaft toward said driven shaft.

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