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2,953,049

FASTENER DELIVERY, HOLDING AND DRIVING DEVICE

Filed May 23, 1958

2 Sheets-Sheet 1

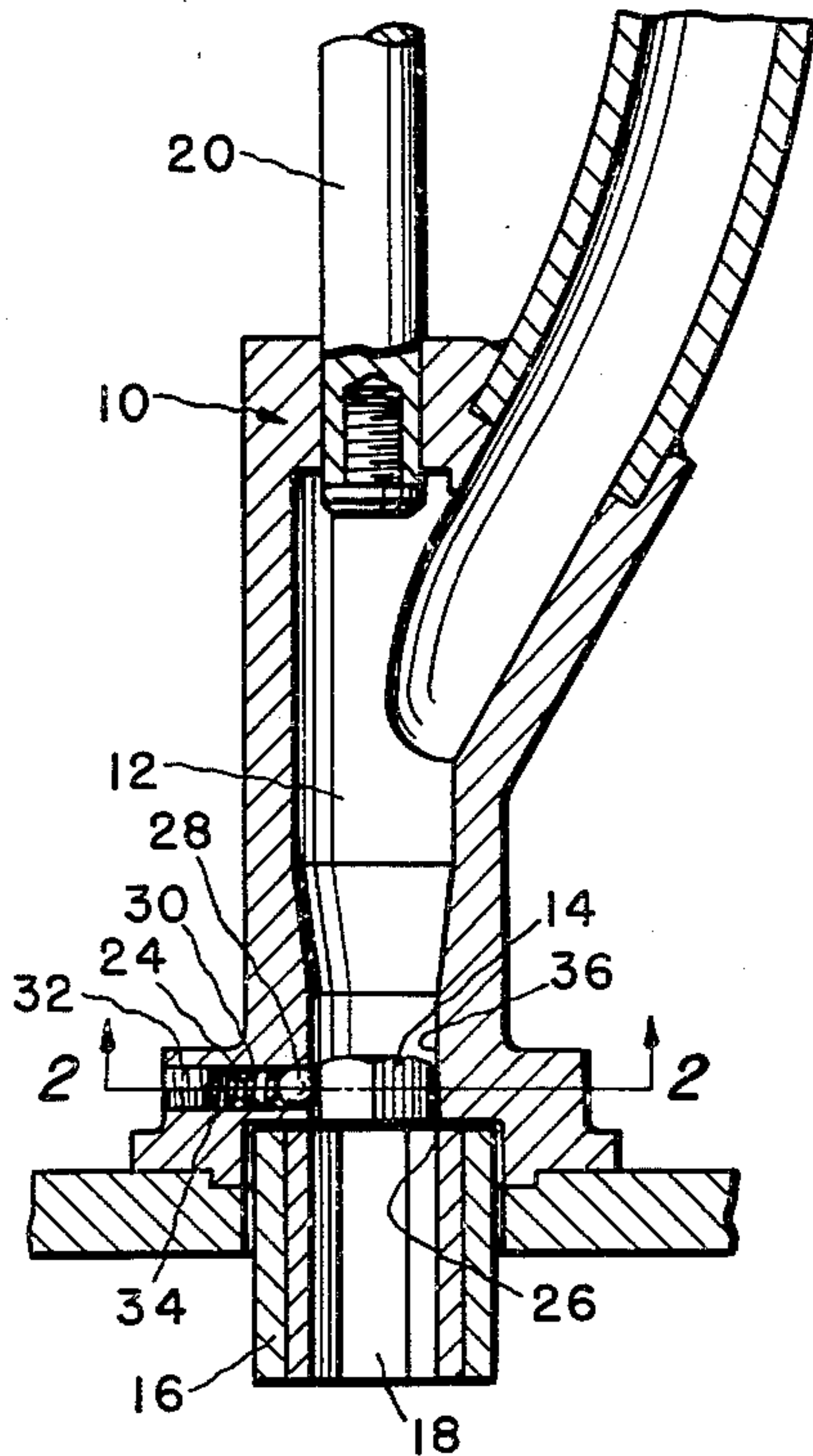


FIG. 1

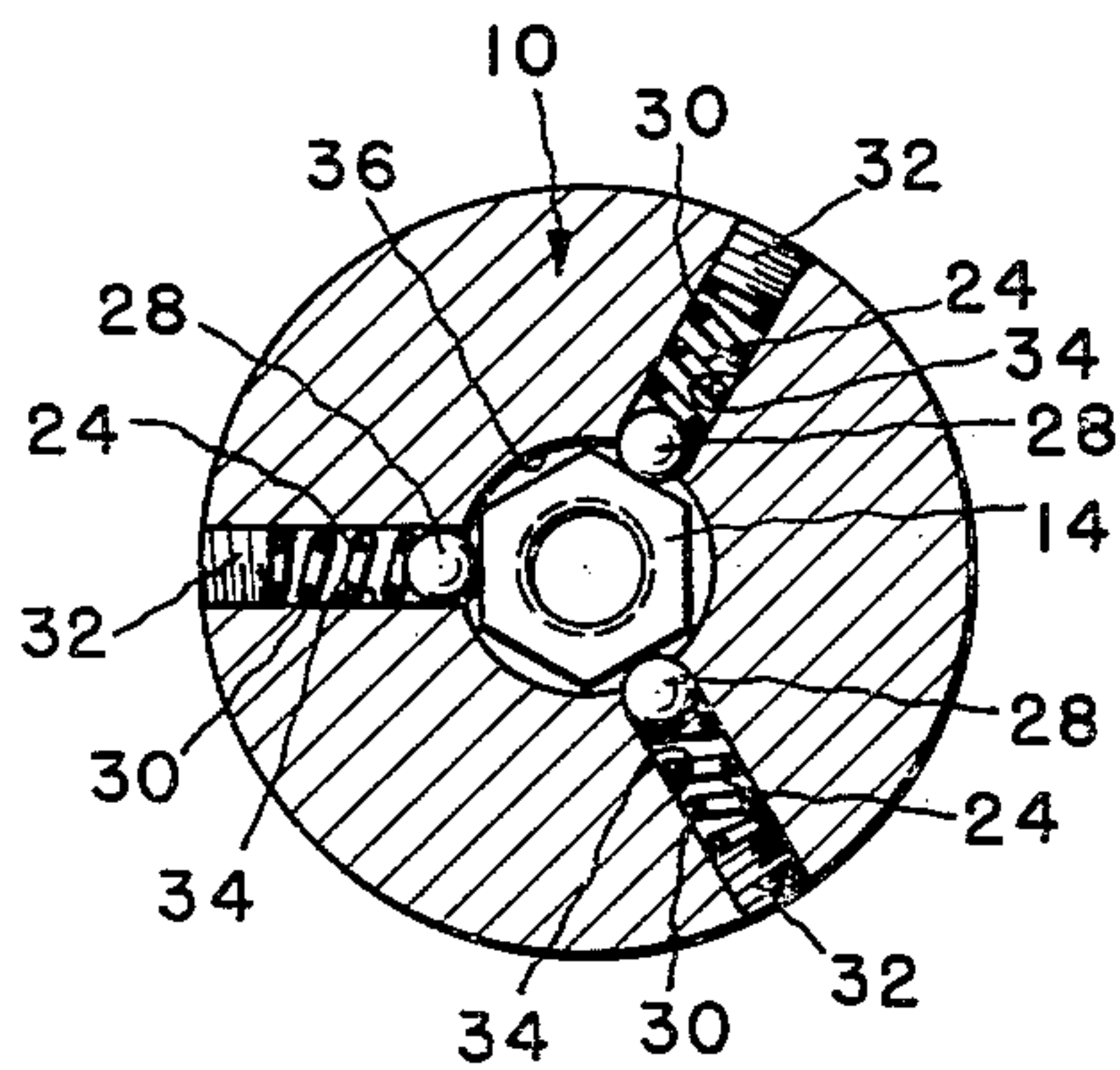


FIG. 2

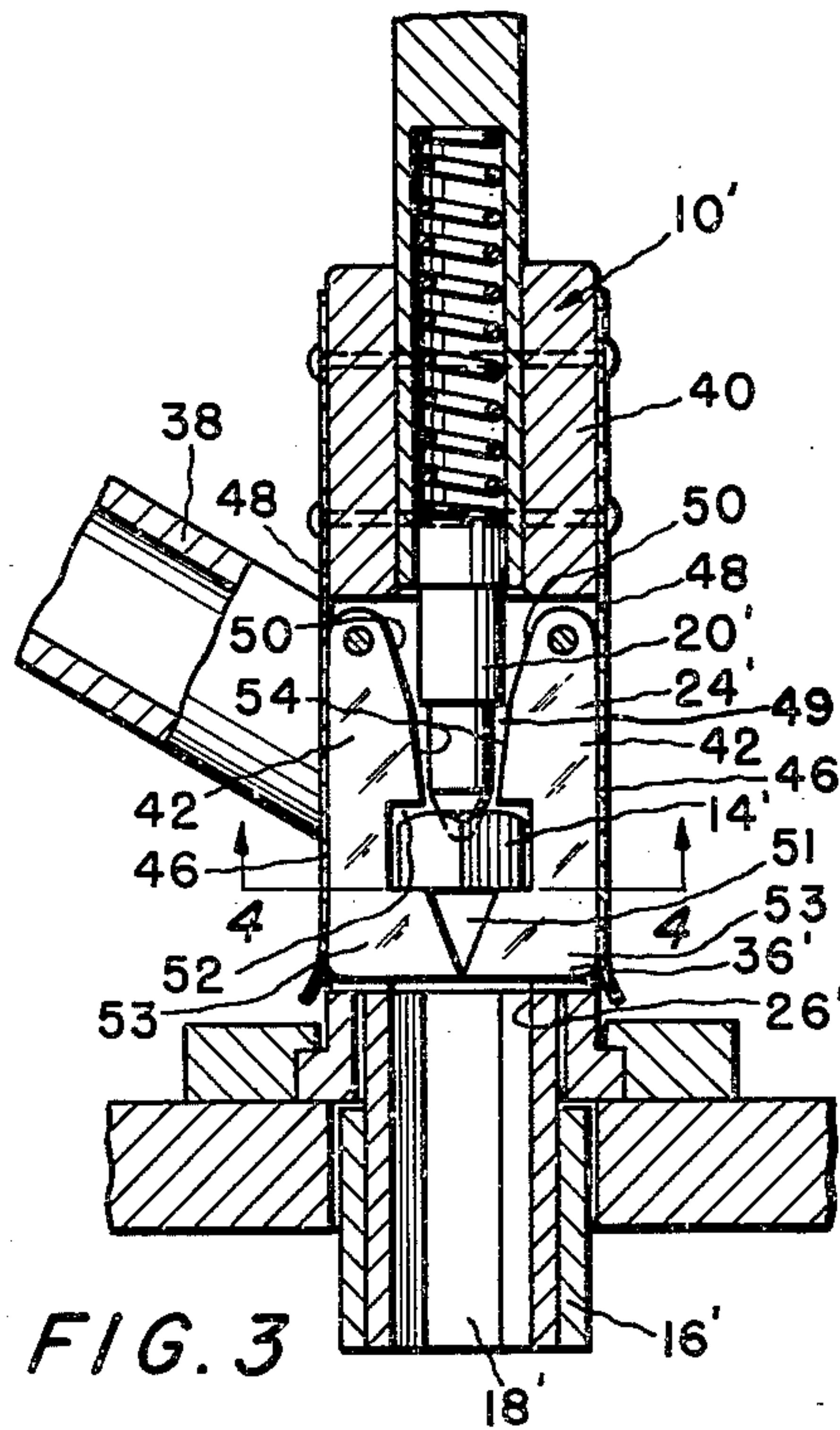


FIG. 3

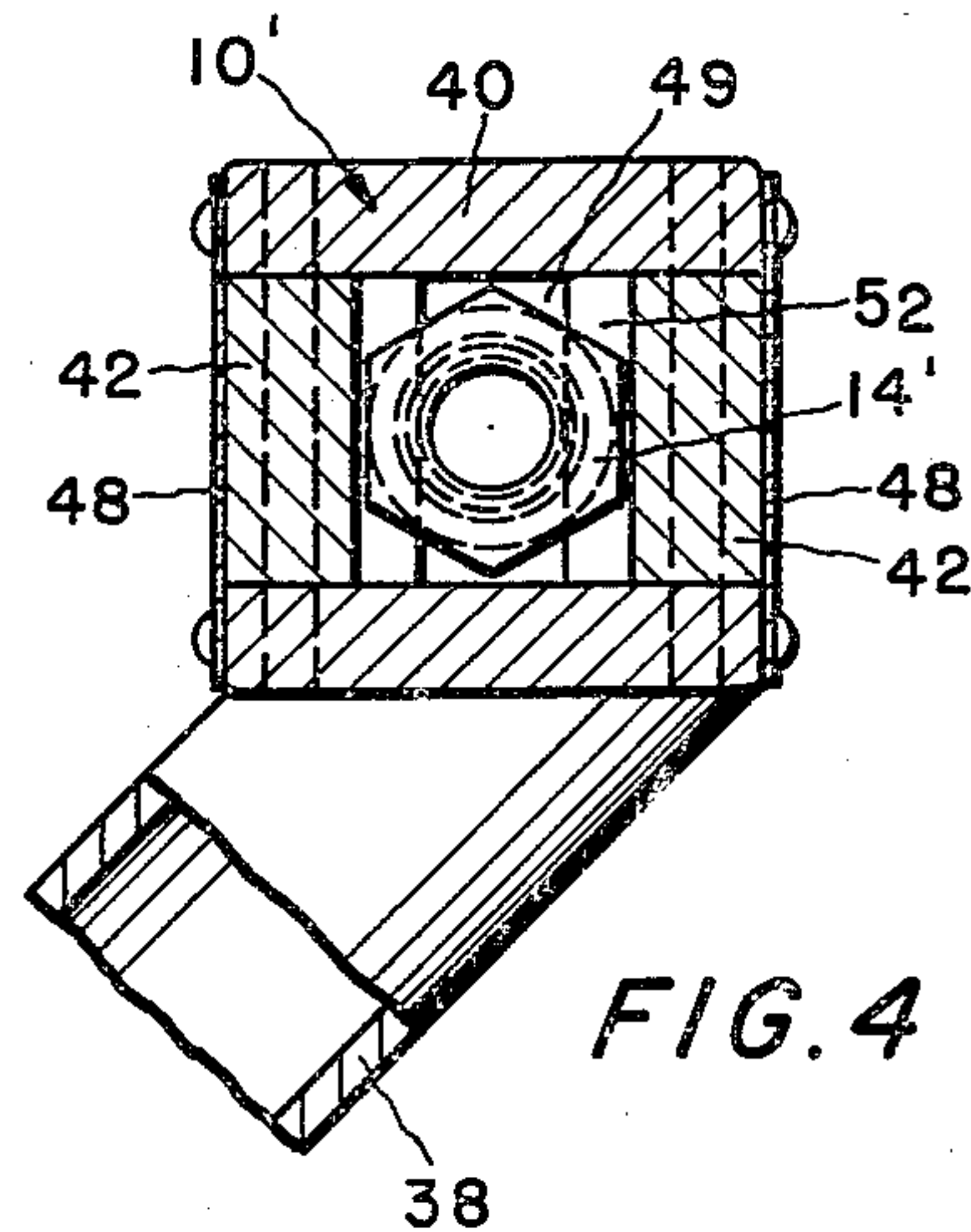


FIG. 4

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2 Sheets-Sheet 2

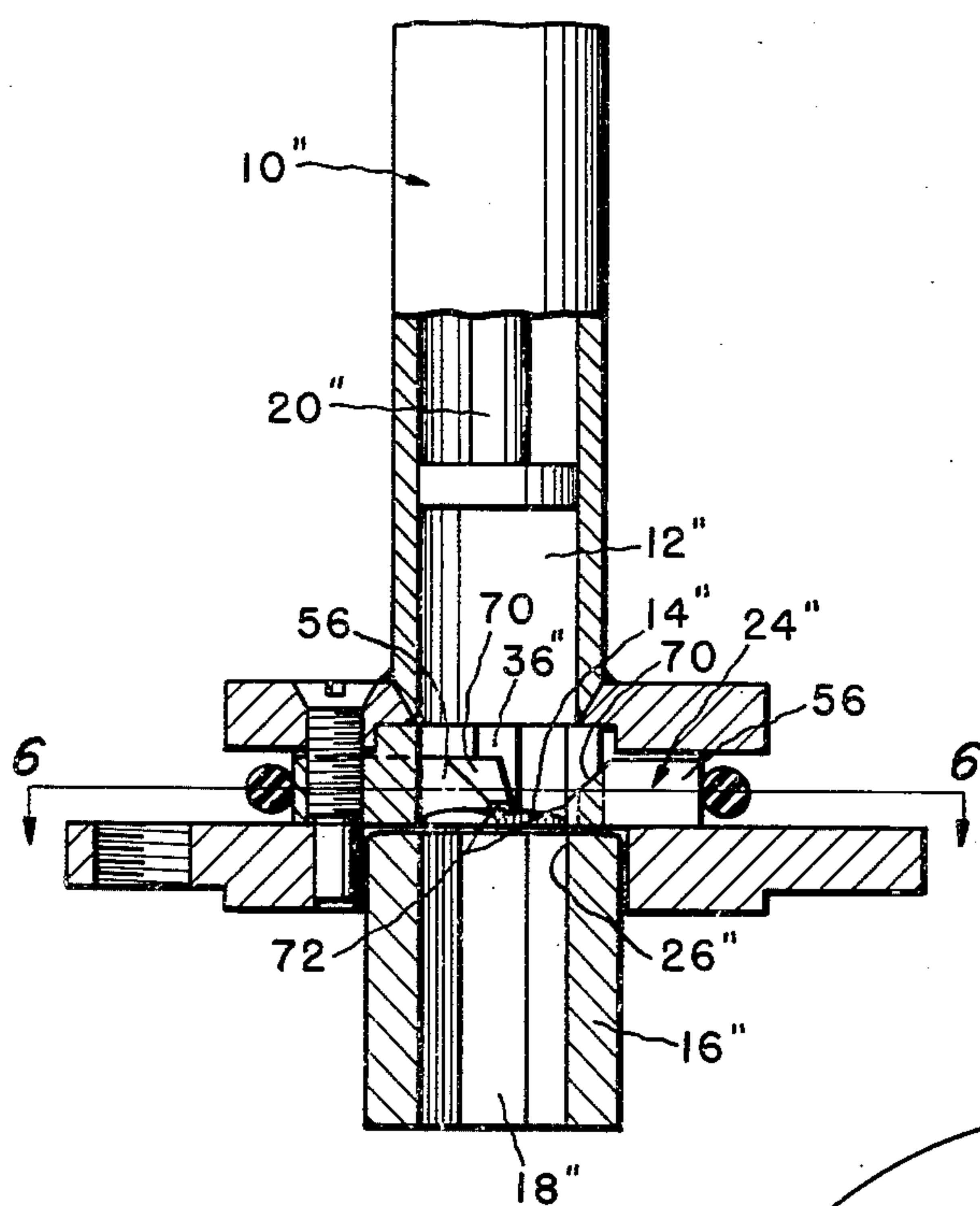


FIG. 5

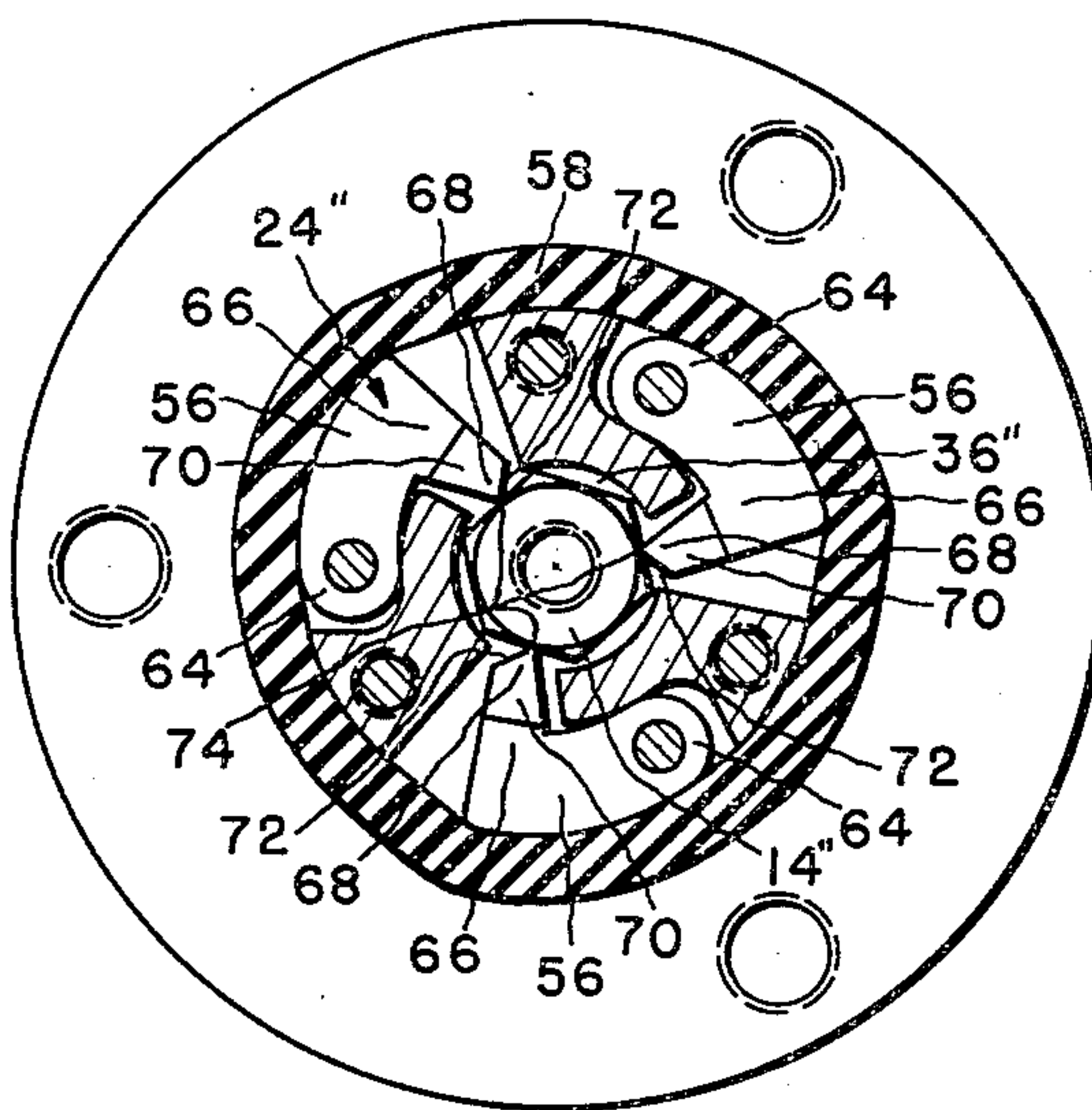


FIG. 6

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1

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FASTENER DELIVERY, HOLDING AND DRIVING DEVICE

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9 Claims. (Cl. 81—54)

This invention relates to a fastening device for tightening fasteners, such as nuts, bolts and the like, to a work piece and more particularly to a fastening device that includes a rotating feed through socket.

One object of this invention is to insure that a fastener will enter the feed through socket in proper alignment with the socket conformation presented to the fastener.

Further objects will become obvious from the following description and drawings in which

Figure 1 is a longitudinal view, partly in section, showing one form of the invention,

Fig. 2 is a cross-sectional view of Figure 1 taken along the line 2—2 looking in the direction of the arrows,

Fig. 3 is a longitudinal view, partly in section, showing a second form of the invention,

Fig. 4 is a cross-sectional view of Fig. 3 taken along the line 4—4 looking in the direction of the arrows,

Fig. 5 is a longitudinal view, partly in section, showing a third form of the invention, and

Fig. 6 is a cross-sectional view of Fig. 5 taken along the line 6—6 looking in the direction of the arrows.

Referring to the drawings and first to Figure 1, a stationary chute 10 conveys a fastener, in this instance a nut 14, from a source (not shown) through a delivery chute 11, and a passageway 12 in the chute 10 to a rotating feed through socket 16. The nut 14 is then urged from the chute passageway 12 through a bore 18 in the socket 16 into contact with a work piece by any suitable means, such as a plunger 20 which extends into the chute passageway 12 and is actuated by any suitable means. The bore 18 extends through the socket 16 and has at least a portion thereof with a conformation adapted to positively engage the nut 14 to have it rotate with the socket 16. Therefore, when the rotating nut 14 is brought into contact with the work piece, it is tightened to said piece. In this instance in order to have the nut 14 and the socket 16 rotate together the bore conformation of the socket 16 is of the same general cross-section as the nut 14 but of slightly greater diameter.

To insure that the nut 14 will be properly fed into said bore portion adapted to positively engage the nut 14 a holding means 24 holds the nut 14 until the bore entrance portion 26 will allow the nut 14 to pass through the bore 18 without binding at such entrance of said bore. In the particular form of the invention shown what would be a likely occurrence without the means 24 is that a corner of the nut 14 being fed into the socket 16 would come in contact with a flat of the bore conformation, thereby preventing the passage of said nut 14 through the bore 18. To prevent this from happening the means 24 holds the nut 14 so that the socket 16 rotates relative to the nut 14 until the nut flats line up with the corresponding bore flats at which time the plunger 20 constantly urging the nut 14 into the socket 16 will move it thereinto.

Figs. 1 and 2 show the holding means 24 as a simple

2

ball arrangement comprising balls 28 which releasably engage the nut 14. This means 24 also include springs 30 which constantly urge the balls 28 toward the chute passageway 12 and set screws 32 to adjust the compression on the springs 30. These holding elements 28, 30 and 32 are housed in transverse bores 34 extending through the chute walls at the chute end 36 adjacent the socket entrance 26. The bore ends opening to the chute passageway 12 are tapered to prevent the balls 28 from dropping into said passageway 12. The balls 28 are spring presented into the path of the nut 14 to releasably hold the nut 14 so that the socket 16 rotates relative to said nut 14 as it is being fed through the chute end 36 by the plunger 20. When the socket 16 presents a bore conformation that will allow said nut 14 to pass therethrough the plunger 20 moves the nut 14 into the socket entrance 26.

Figs. 3 and 4 show another form of the invention including the chute 10', the rotatable socket 16', the plunger 20' and the holding means 24' which are functionally the same as the corresponding elements 10, 16, 20 and 24 in Fig. 1 and Fig. 2.

Structurally, unlike the corresponding element in Fig. 1 and Fig. 2, the chute 10' includes a chute stem 38 which conveys the nuts 14' to a chute head 40. This head 40 has a central bore which houses the plunger 20' and the holding means 24', and has one end 36' in communication with the entrance 26' of the rotatable socket 16'.

In this form of the invention to assure the passage of the nut 14' through the bore 18' the holding means 24' includes a pair of arms 42 pivotally attached at their rear ends to the head 40, and a pair of leaf springs 48 attached to the rear of the head 40 constantly urging the arms 42 inwardly by pressing against their outer surfaces 46. The inner surfaces 50 of the arms 42 define cam surfaces 54 located at the rear end portion of the arms 42 which are angularly displaced with respect to each other to form a tapered opening 49 wider at the rear than at the front. The arm inner surfaces 50 further define a recess 52 for containing a nut 14' conveyed to the head 40 and into which the smaller end of the tapered passage 49 opens and a pair of jaws 53 having surfaces angularly displaced with respect to each other forming a tapered opening 51 wider at the rear end portion than at the front portion. These jaws 53 define the front end portion of the recess 52 and are located adjacent the socket entrance 26'. After a nut 14' is conveyed to the recess 52 the plunger 20' is actuated by any suitable means and moves through the tapered opening 49 acting as a cam by imparting outward motion to the arms 42 as it comes in contact with the cam surfaces 54 on the arms 42. This outward movement sufficiently increases the width of the recess 52 and the jaw tapered opening 51 so that the nut 14' contained in the recess 52 will move into the jaws 53. The nut 14' is then held by the jaws 53 until the cross-sectional conformation of the nut 14' is aligned with a bore conformation that will allow the nut 14' to pass through the bore 18'. When the nut 14' and bore conformation are so aligned the plunger 20' will move the nut 14' through the socket 16' into contact with the work piece, whereby because of its rotation the nut 14' is fastened to the work piece.

In a third form of the invention shown in Figs. 5 and 6 the holding means 24'' is especially adapted for thin fasteners like nut 14''. This means 24'' includes three arc shaped arms 56 placed about the passage 12'' of the chute 10'' which are pivotally attached at one end 64 to the chute end 36'' adjacent the socket entrance 26''. The opposite end 66 of each arm 56 defines projection 68 which is spring pressed into the path of the nut 14'' by a spring type O ring 58 encircling the arm 56.

The rearward surfaces 70 of the projections 68 are in-

clined rearwardly from the inner ends 72 of said projections 68 with respect to the longitudinal axis of the socket bore 18'' to define cam surfaces. The projection inner end surfaces 72 are tapered to form edges 74 which are substantially parallel to the longitudinal axis of said bore 18''. When the nut 14'' is being moved from the chute end 36'' into the socket entrance 26'' by the plunger 20'' said nut 14'' first comes in contact with the cam surfaces 70 moving the arms 56 in an outward direction until the tapered surfaces 72 present an opening sufficient in size to releasably hold the nut 14''. The leading edges 74 hold the nut 14'' so that there is relative rotation between the nut 14'' and the socket 16'' until the socket conformation presented to the nut 14'' is such that the passage of the nut 14'' through the socket 16'' is assured.

Briefly reviewing the overall operation of the unit by using the form of the invention as shown in Figs. 1 and 2, the nut 14 is conveyed to the bore 18 of the rotating feed through socket 16 by the stationary chute 10. The bore 18 of the socket 16 extends therethrough being adapted for the passage of the nut 14 and having a conformation of the same general cross section as the nut 14 but of slightly greater diameter so that the nut 14 rotates with the socket 16. To prevent the nut 14 from hanging up at the socket entrance 26 the holding means 24 engages the nut 14 holding it until the nut flats line up with the corresponding bore flats at which time the plunger 20 will move it into the bore 18. The plunger 20 then moves the nut 14 through socket 16 into contact with the work piece and since the nut 14 is rotating it will be tightened on said work piece.

I claim:

1. A fastening device comprising a chute arranged to convey fasteners, a member rotatable relative to the chute, said member having a bore having an entrance adjacent to the chute and adapted to receive a fastener from the chute and having at least a portion thereof adapted to positively engage said fastener for rotation, means adjacent the entrance of the bore adapted to releasably engage said fastener as it is being discharged from the chute, and a second means arranged to urge said fastener in the direction of said member and into the bore.

2. A fastening device comprising a chute adapted to convey fasteners, a member rotatable relative to the chute, said member having a bore having an entrance adjacent to the chute and adapted to receive a fastener discharged from the chute and having at least a portion thereof adapted to positively engage such fastener for rotation said portion extending substantially to the entrance of the bore, means adapted to releasably engage the fastener, said means being positioned within said chute and adjacent said bore portion, and a second means arranged to urge said fastener in the direction of said member whereby such fastener is serially urged into and out of such engagement with the first means and into said bore portion.

3. A fastening device comprising a chute arranged to convey fasteners, a member rotatable relative to the chute, said member having a bore extending therethrough adapted to receive and rotate a fastener discharged from the chute, the bore having a minimum dimension that is less than a dimension of the fastener, means adapted to releasably engage the fastener, said means being positioned relative to said bore to engage the fastener immediately before the fastener enters said bore, and a second means arranged to urge the fastener out of such engagement and into said bore.

4. A holding device for fasteners conveyed through a frame having a passageway for such purposes, including a plurality of arms pivotally attached at the rear end thereof, spring means urging said arms toward said passageway, the inner surfaces of said arms having a portion thereof angularly displaced with respect to each other to

form a tapered opening defining cam surfaces, said inner surfaces further defining a recess forwardly of said cam surfaces constructed to contain a fastener conveyed thereto by said passageway in the frame, jaws on the arms arranged forwardly of the recess adapted to grip said fastener when removed from the recess, cam means for imparting motion to said cam surfaces to sufficiently increase the breadth of the recess to cause said fastener to be gripped by said jaws, a member rotatable relative to the frame and having a bore adapted to positively engage a fastener for rotation, and means arranged to urge the fastener out of engagement with the jaws and into the bore of the member.

5. A holding device for fasteners discharged from a frame having a passageway for such purposes, including a plurality of pivotable arms adapted to releasably engage a fastener discharged from the passageway, springs means urging an end of each arm toward said passageway, said end of each arm having a projection adapted to engage one of the fasteners, the rearward surface of said projection being inclined rearwardly from the inner end of said projection with respect to the longitudinal axis of said passageway, the inner end surfaces of said projection being tapered to form an edge being substantially parallel to the longitudinal axis of said passageway, a member rotatable relative to the frame and having a bore adapted to positively engage a fastener for rotation, and means arranged to urge the fastener out of engagement with the projections and into the bore of the member.

6. A fastening device comprising a chute to convey fasteners and a member rotatable relative to said chute, said member having a bore having an entrance adjacent to the chute and adapted to receive and engage a fastener for rotation, the bore having a minimum dimension which is less than the dimension of a fastener, at least one holding member adjacent to the entrance of the bore adapted to restrict said chute and releasably engage the fastener, a spring urging said holding member toward its restricting position, and means for urging the fastener past the holding member and into said bore.

7. The fastening device claimed in claim 6 in which said holding member is pivotally connected to the chute and includes a surface within said chute defining a recess for receiving said fastener and a cam surface disposed on either side of the recess, said means being adapted to engage the first cam surface and progressively displace said holding member as said means approaches said fastener, and said fastener engaged by said means is adapted to further progressively displace said holding member as such fastener approaches the bore.

8. A fastener delivery and driving device including a stationary member having a passage for the delivery of fasteners and a rotatable member, said rotatable member having a bore having an entrance adjacent to the chute and axially aligned with the passage and having at least a portion of the bore adapted to receive and engage a fastener for rotation and said portion extending substantially to the entrance of the bore, means carried by the stationary member for restricting said passage adjacent the entrance of said bore and releasably engaging the fastener, and driving means adapted to urge the fastener in the direction of said rotatable member out of the restricting means and into said bore.

9. The fastener delivery and driving device claimed in claim 8 in which said restricting means is adapted to hold said fastener against rotation when such fastener impositively engages the rotatable member and adapted to be moved away from its restricting position by rotation of the fastener when such fastener is received in and is held for rotation by said member.

5

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