No. 870,151. PATENTED NOV. 5, 1907.

R. ABELL.

TOOL.

APPLICATION FILED OCT. 19, 1906.

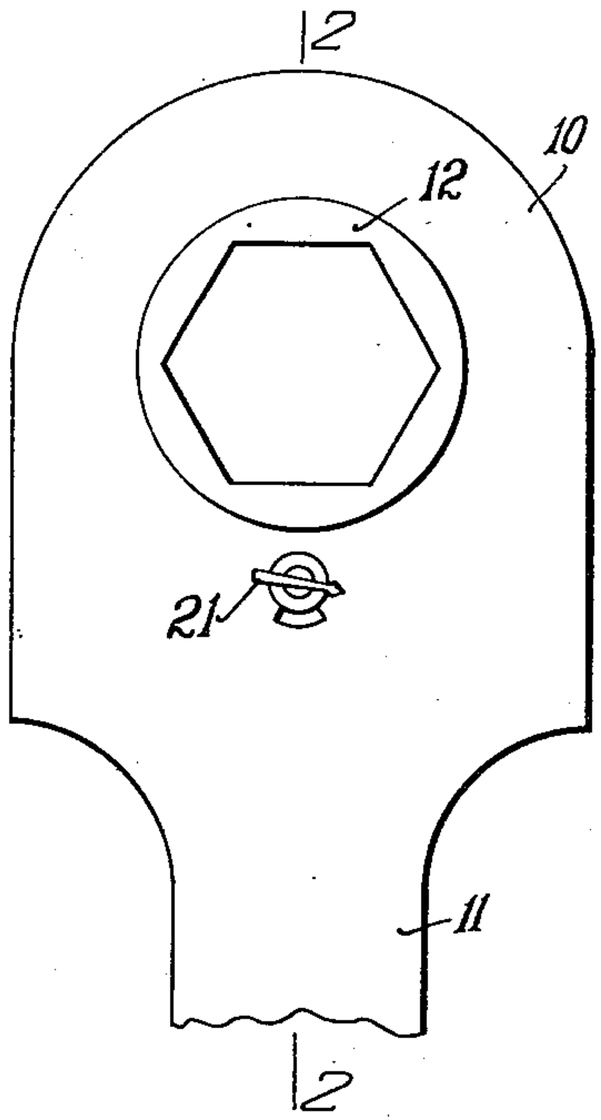

FIG. 1.

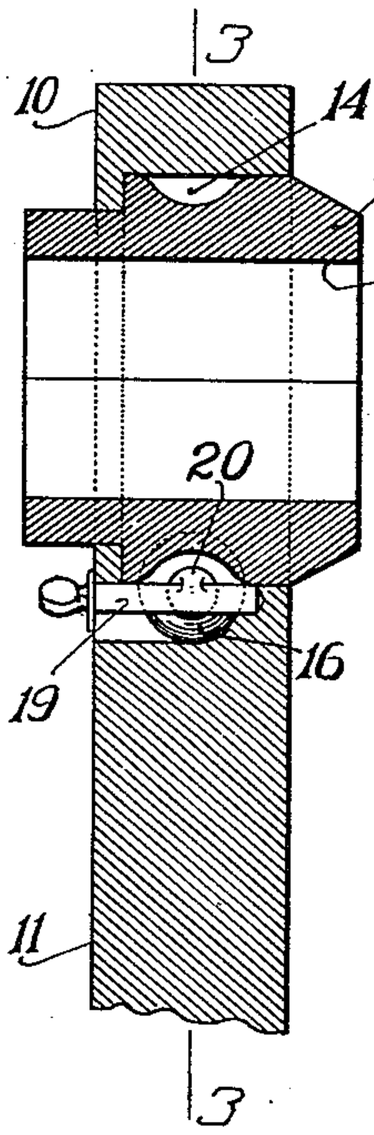

FIG. 2.

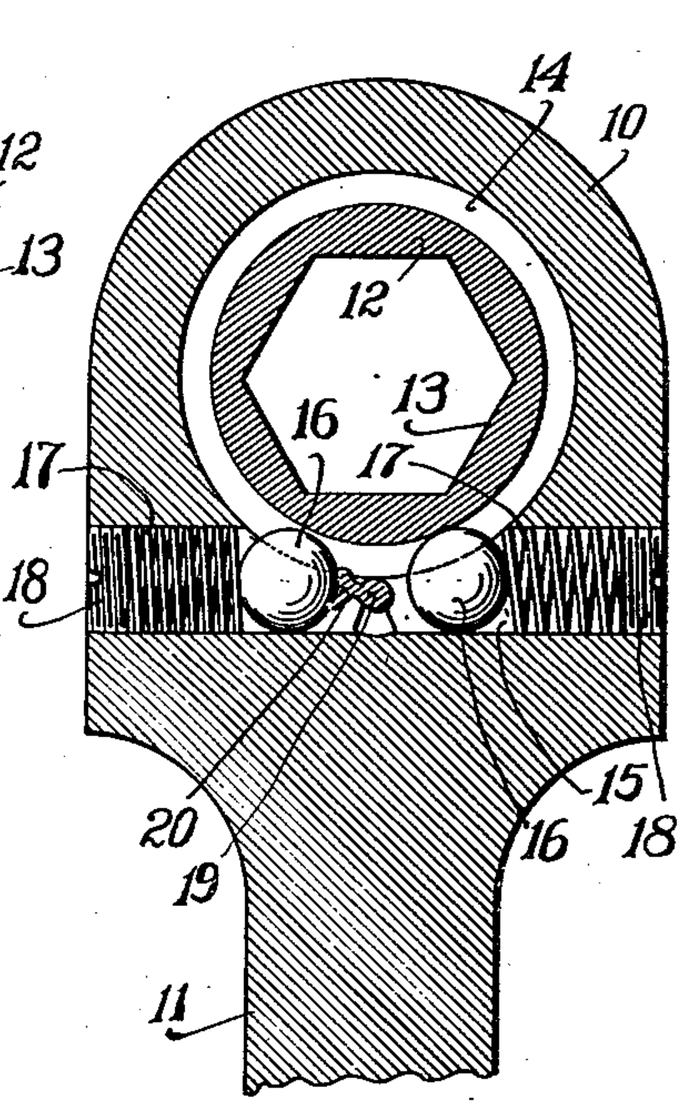

FIG. 3.

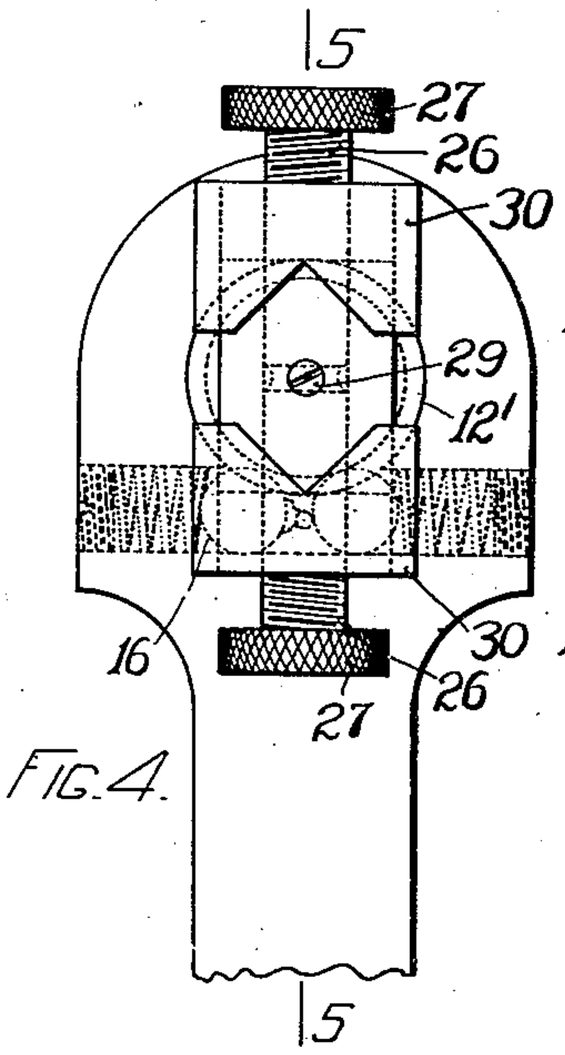

FIG. 4.

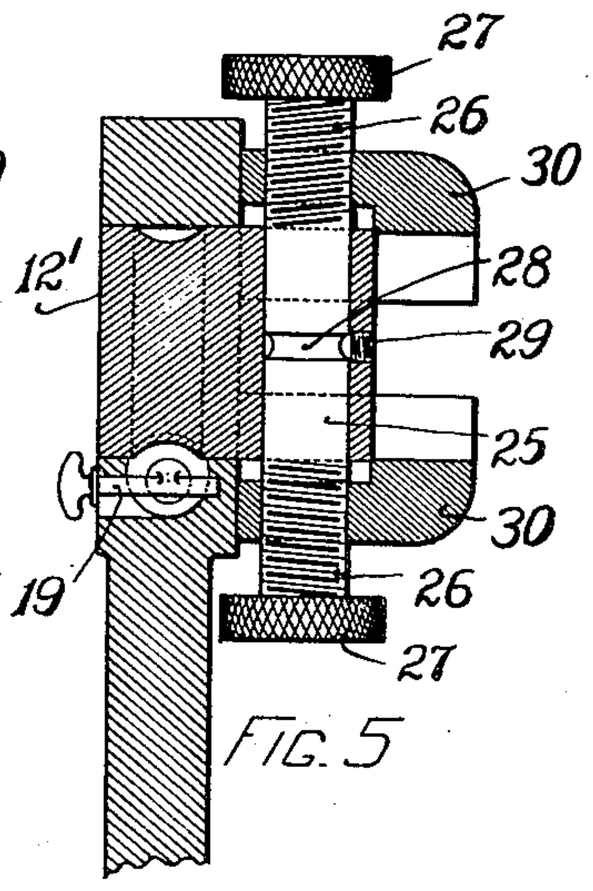

FIG. 5.

WITNESSES

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ROLLIN ABELL, OF BOSTON, MASSACHUSETTS, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-THIRD TO SOLOMON A. CAMPBELL AND ONE-THIRD TO EDWARD T. KIMBALL, BOTH OF BOSTON, MASSACHUSETTS.

TOOL.

No. 870,151. Specification of Letters Patent. Patented Nov. 5, 1907.

Application filed October 19, 1906. Serial No. 339,644.

To all whom it may concern:

Be it known that I, ROLLIN ABELL, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Tools, of which the following is a specification.

This invention relates to improvements in tools.

In particular, it relates to tools intended to transform an alternating forward and backward action into a rotatory action in continuous direction. It is here shown as it may be embodied in a wrench, in which the jaws of the wrench are not set in a fixed and rigid relation with respect to the handle of the wrench, but in which the handle may be placed in any desired or convenient angular position about the axis of the turning. After being turned from that relation the handle may be returned to the same position, or to any other convenient position to effect a further rotation, by a simple motion without removing the jaws, and will instantly seize the nut or other object which is to be turned.

The drawings show several forms in which the invention may be embodied.

Figure 1 shows the head of a wrench embodying the invention. Fig. 2 shows the same sectioned on the line 2—2 of Fig. 1. Fig. 3 shows the same sectioned on the line 3—3 of Fig. 2. Fig. 4 shows a different wrench head embodying the invention. Fig. 5 shows a section of the same on line 5—5 of Fig. 4.

The object of the invention is to simplify the construction and increase the strength and utility of tools of this class, and at the same time to reduce the cost of manufacture. Tools of this class have heretofore been proposed in which one or more cylindrical rollers have been employed to form a friction clutch, the rollers being situated in separate pockets. The construction of these pockets accurately, so that all rollers shall come into action together, is a matter of considerable nicety. In the present invention all pockets in the rotating part are eliminated, and a simple annular groove is provided in their place. It has also been necessary in prior devices to provide some special means for preventing sidewise displacement of the barrel. In the present device all such means are eliminated and the said groove serves that purpose, in coöperation with a spherical-shaped member hereinafter described, which takes the place of the cylindrical rolls heretofore used. This sphere is seated loosely in the stock in a straight round hole formed therein in the same plane as the groove on the barrel and intersecting the groove nearly tangentially. A contracting throat is thus formed where the hole and groove intersect. The sphere is normally pushed gently toward and into this throat by a spring, and is thus in frictional contact with both barrel and stock. When one of these is rotated in the proper direction the sphere is thereby rolled into tighter frictional contact until it frictionally binds the barrel and stock together; when the barrel is rotated in the other direction it is rolled away from the throat against the spring and exerts no binding effect upon the parts.

Other features of the invention are described hereinafter.

Referring to the drawings: 10 represents the head of a wrench, which as here represented is integral with the handle 11, the stock being in the form of a flat bar in which a barrel 12 is set rotatably. The socket 13 in the barrel may be of any desired shape or size. An annular groove 14 is formed in the periphery of this barrel. A hole 15 pierces the stock of the wrench in the same plane with the groove and communicates therewith, as clearly shown in Fig. 3. This hole is preferably of circular bore, into which a ball 16 fits loosely, projecting also into said groove; and the groove is formed so that in cross section it has the shape of an arc of a circle of the same size as the ball 16 and the bore of the hole 15. The hole is bored so that the barrel does not cut open the full diameter of the hole; and the diameter of the barrel 12 at the bottom of the groove 14 is such that it projects slightly into the bore of the hole 15. This forms a contracting throat into which the ball is yieldingly pressed by a spring 17, seated against a screw plug 18. As the hole containing the ball is perpendicular to the direction of the axis of the barrel 12, the engagement of the ball simultaneously with the groove and with the side walls of the hole 15 prevents the barrel 12 from slipping out of the hole in which it is journaled.

The description thus far is applicable to one side of the wrench head, as represented, for example, on the right hand half of Fig. 3. Precisely similar arrangements may be made on the other half, the hole 15 passing entirely through the wrench head and containing two balls, as represented in Fig. 3, one on either side of the center, each fitting the bore of the hole and engaging in the groove 14. An attachment may be provided for throwing one of the balls out of contact with the barrel, and this is represented by a key 19, having interiorly a cam 20 in position to engage either one of the balls 16 and force it outward a short distance, against its spring 17, as represented at the left in Fig. 3; and this key is set pivotally in the wrench head, and on its outer portion has a button or handle 21, by which it may be turned; and this button is preferably formed in the shape of an arrow or in other suitable form to indicate the direction in which the parts within

will engage and cause rotation in the manner hereinafter described. The face of the cam 20 is preferably cup-shaped upon an arc fitting the ball, so that when turned to the position shown in Fig. 3 the spring pushes the ball into the cup face of the cam, and thus holds the same on a dead center and latches it there, leaving the wrench permanently adjusted in this manner until the operator sets it otherwise by turning the button 21. The key may be set either in the position shown in Fig. 3; or the exactly opposite position in which the other ball 16 is retracted, and the ball shown retracted is in contact with the barrel 12; or a position intermediate between these two, in which both balls are in contact with the barrel.

The wrench may be operated in either of these positions. When in the first position, as represented in Fig. 3, a movement of the handle to the right about the axis of the socket 13 causes the ball 16 on the right hand side, which is in contact with the barrel 12 where the ball fits into the groove 14, to roll to the left; but the contracting diameter of the space to the left, owing to the intersection of the barrel with the hole 15, prevents its passage in that direction, and causes the ball to become engaged firmly by frictional contact between the barrel and the wrench head; and when in this position the friction between the ball and the parts with which it is in contact prevents the ball from rotating *in situ*, so that a clutch is formed between the barrel and the wrench head in which the ball is the active member and is in a state of compression between the barrel and wrench head. The compression occurs along a line which constitutes substantially a complete circle around the ball. Material advantages follow from this arrangement. The spherical shape of the member under compression, combined with the application of the thrust in circular line surrounding the sphere, renders the ball practically indestructible under any stress that may be applied in practice; and the circular line of its bearing upon the barrel and upon the wrench head prevents the ball from making a dent in either of them as if there were merely a point contact, thus decreasing the operative efficiency of the wrench by marring either surface. It is understood, of course, that a hardened steel ball is employed and that the adjacent surfaces of the wrench head and barrel are hardened.

When the handle is turned in the opposite direction the ball is rolled away from the contracting throat, the spring yielding a little, and the handle turns freely to the left without engaging the barrel. Thus, the stock engages the barrel forcefully whenever the handle is swung to the right; turns freely without engaging the same whenever the handle is swung to the left; and will engage again at whatever position the left motion is stopped and motion to the right begun. If the key be adjusted to the opposite position from that shown in Fig. 3 the opposite will be true of engagement of the stock with the barrel. If the key be turned to an intermediate position, engaging neither of the balls, the parts will engage when turned in either direction, the ball on the right engaging when the handle is turned toward the right, the ball on the left running free; and the ball on the left engaging when the handle is turned toward the left, the ball on the right running free.

Figs. 4 and 5 show a wrench with adjustable socket. In this figure the barrel is marked 12′ and projects toward one side of the wrench, in which a bolt 25 is journaled, having screws at each end 26 threaded in opposite directions and having at each end a knurled head 27. An annular groove 28 in the center of the bolt is engaged by a lug or set screw 29. In ordinary use the screw fits loosely within the groove, thus preventing the bolt from slipping out in either direction; but if desired it can be screwed firmly against the bolt, in which case the jaws will be locked and cannot be loosened by a chance rubbing against one of the nuts 27. Jaws 30 are mounted on the bolt, one being located so as to engage the screw portion at each end of the bolt. Turning of the screw in one direction moves the jaws together, and turning it in the opposite direction moves them apart; while the operation of the wrench handle upon the barrel on which the bolt and jaws are mounted is the same as previously described.

I claim:

1. A tool, comprising a stock; a barrel, having its body portion journaled therein and having its end formed as a face of the tool; there being within the journal an annular groove in one part and a groove in the same plane therewith in the other part intersecting it nearly tangentially; and a rolling member located partly in each groove at the intersection.

2. The combination of a stock having a cylindrical opening with a barrel having a cylindrical body journaled therein; there being in the journal an annular groove in one part, and in the other part a groove in the same plane intersecting it nearly tangentially; with a rolling member located partly in each groove and forced yieldingly toward their intersection.

3. The combination of a stock; a barrel journaled therein and having an annular groove within its journaled surface; there being a hole in the stock intersecting the groove nearly tangentially; a ball located partly in the hole and partly in the groove; and a spring pushing it toward their intersection.

4. The combination of a stock; a barrel journaled therein; there being a groove in each part in its journaled surface, intersecting nearly tangentially, one being annular; with a rolling member located partly in each groove and forced yieldingly toward their intersection; the sides of one groove being formed to inclose the rolling member loosely therein.

5. The combination of a stock; a barrel rotatable and movable endwise therein; one of these having an annular groove and the other a groove in the same plane intersecting it nearly tangentially; with a rolling member located partly in each groove and forced yieldingly toward their intersection, thereby latching the parts and normally preventing endwise motion of the barrel.

6. The combination of a stock having a cylindrical opening, and having a cylindrical hole intersecting said opening nearly tangentially; a ball in the hole, projecting less than half its diameter therefrom into said opening; and a barrel rotatable in said cylindrical opening and having an annular groove in which the ball may engage.

7. A tool, comprising a stock portion; a barrel rotatable therein, having an annular groove externally; there being a hole in the stock in the same plane with the groove and intersecting it nearly tangentially; spherical members located on each side of the intersection, fitting into both hole and groove; and means to retract each spherical member therefrom independently.

8. A tool, comprising a stock portion; a barrel rotatable therein, having an annular groove externally; there being a hole in the stock in the same plane with the groove and

intersecting it nearly tangentially; spherical members located on each side of the intersection, fitting into both hole and groove; and a cam adjacent arranged to engage and retract either spherical member.

9. A tool, comprising a stock portion; a barrel rotatable therein. having an annular groove externally; there being a hole in the stock in the same plane with the groove and intersecting it nearly tangentially; spherical members located on each side of the intersection, fitting into both hole and groove; and a cam adjacent arranged to engage and retract either spherical member, said cam being mounted on a shaft projecting externally and having a handle and visible indicator externally to adjust and indicate the direction of action of the tool.

In testimony whereof I have affixed my signature, in presence of two witnesses.

ROLLIN ABELL.

Witnesses:
SOLOMON A. CAMPBELL,
EVERETT E. KENT.