J. M. BODENE.

FRICTION DRIVEN CHUCK.

APPLICATION FILED APR. 20, 1916.

1,196,839.

Patented Sept. 5, 1916.

Fig. 1.

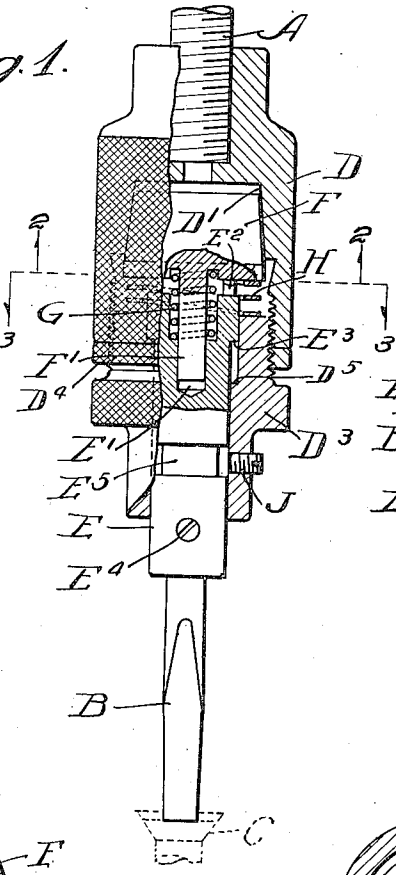


Fig. 5.

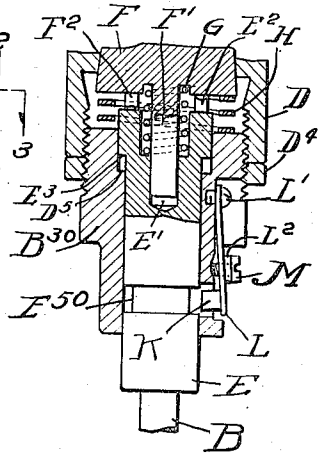


Fig. 6.

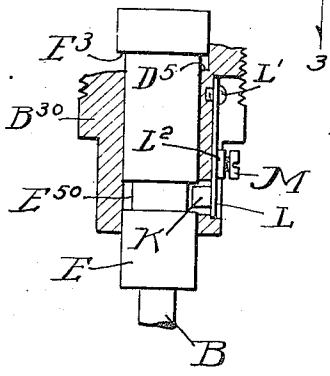


Fig. 2.

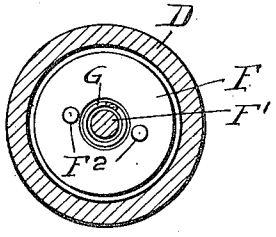


Fig. 3.

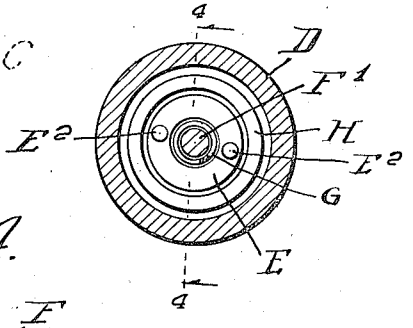
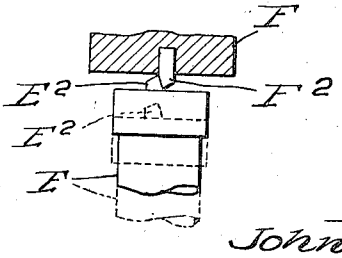


Fig. 4.



Witnesses:

Inventor:
John M. Bodene
by Burton & Burton
his Attys.

UNITED STATES PATENT OFFICE.

JOHN M. BODENE, OF CHICAGO, ILLINOIS, ASSIGNOR TO CHICAGO FLEXIBLE SHAFT COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

FRICTION-DRIVEN CHUCK.

1,196,839. Specification of Letters Patent. Patented Sept. 5, 1916.

Application filed April 20, 1916. Serial No. 92,366.

To all whom it may concern:

Be it known that I, JOHN M. BODENE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Friction-Driven Chucks, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

This invention relates to a power-driven chuck designed for operating a screw driver, socket wrench or other tool having analogous conditions of use.

The invention consists in the features and elements described and shown in the drawings, as indicated by the claims.

In the drawings:—Figure 1 is a side elevation partly in section illustrating a chuck embodying this invention. Fig. 2 is a transverse section taken as indicated at line, 2—2, on Fig. 1. Fig. 3 is a transverse section taken as indicated at line, 3—3, on Fig. 1. Fig. 4 is a detail section taken as indicated at line, 4—4, on Fig. 3. Fig. 5 is a partial vertical section similar to the corresponding sectional portion of Fig. 1 and illustrating a modified construction. Fig. 6 is a detail vertical section showing another position of the parts illustrated in Fig. 5.

The chuck which is the subject of this invention is designed to be power-driven from a shaft whose terminal portion, is indicated at A on Fig. 1, and which may be continuously rotated. The screw driver, B, which is operated through the chuck is shown in engagement with the head of a screw indicated in dotted lines at C. Briefly the chuck consists of two portions, namely, a two-part shell, D, which may be termed the driving member, and the tool holder, E, which is the ultimate driven member and is shown concentrically mounted in the shell, D.

The shell, D, has a slightly tapered recess, D^1, with whose conical wall a correspondingly tapered cone, F, frictionally engages. The member, F, is not a complete cone, but only a short frustum thereof, and its larger base is formed with a central stem, F^1, which telescopes into a central bore, E^1, of the tool holder, E, and also serves to position a compression spring, G, coiled about it and reacting between the clutch member, F, and the tool holder, E, for longitudinally separating them. The purpose of this separation is to normally hold out of engagement the clutch teeth or pins, F^2 and E^2, carried respectively by the mutually opposing ends of the members, F and E. When said members are moved together along the direction of their common axis and in opposition to the spring, G, these pins engage as shown in Fig. 4 for transmitting rotary motion from the member, F, to the member, E. The initial frictional engagement between the conical surface of the member, F, and the tapered recess of the shell, D, is effected by a flat compression spring, H, reacting between the face of the member, F, and an adjustable sleeve, D^3, which is screwed into the lower end of the shell, D, and locked in adjustment by a lock nut, D^4.

When the chuck is used on an ordinary drill press or other boring machine, the driving shaft, A, represents the constantly rotating spindle of the machine and carries with it the rigidly associated shell, D. Such machines are provided with manual adjusting means, whereby the table which carries the work represented in the present case by the screw, C, is either movable toward and from the end of the spindle, A, or such spindle is movable toward and from the table, so that the two parts are relatively adjustable. It will be evident that so long as the work, that is, the screw, C, remains out of engagement with the screw driver blade, C, or such other tool as is carried in the holder, E, the said holder will hang loosely in the revolving sleeve, D^3, its shoulder E^5, engaging the shoulder, D^5, of said sleeve, and its driving pin, E^2, being thus held out of engagement with the driving pin, F^2, of the friction clutch member, F. This relation is suggested by the dotted outlines of the part, E, in Fig. 4. This being the case, the operator can easily hold the screw-driver blade, C, against rotation with his fingers, and by slowly lowering the spindle, A, (or elevating the work table, as the case may be), he may bring the blade, B, into engagement with the slot of the screw, C, without stopping the rotation of the spindle, A, and the attached shell, D, of the chuck. Then by moving the spindle, A, and the work, C, relatively still closer together and lightly bearing down upon his adjusting lever, or corresponding element, he will cause the spring, G, to be compressed, and will bring the pins, E^2, into engagement with the pins, F^2, thereby operatively con-

necting the holder, E, to the frusto-conical member, F.

It will be understood that the torque which will be transmitted through the frictional clutch composed of the elements, D^1 and F, will depend upon adjustment of the sleeve, D^3, which determines how forcibly the spring, H, reacts against the conical member, F. Thus the operator need not exert more pressure on the spindle, A, than enough to insure that the tool, B, is kept engaged with the head of the screw at C. The member, F, being frictionally engaged with the shell, D, will rotate therewith, thus serving to set the screw, C, but when the latter has been screwed "home" the resistance to its further rotation will cause a slippage between the member, F, and the shell, D, thus preventing injury to the screw or to the screw driver blade, B.

The screw driver blade, B, is of course removable from the holder, E, being non-rotatively engaged thereby in any suitable manner and being held in engaged position by means of a set screw shown at E^4. For setting square-headed or hexagon-headed screws a socket wrench may be substituted for the screw driver, B, but if it is desired to use the machine for drilling or tapping or other operations in which it is not desirable to have the holder, E, normally disengaged from the member, F, these parts may be locked in engagement by setting the screw, J, which is carried in the sleeve, D^3, into the groove, E^5, in the holder, E, when the parts are positioned as shown in Fig. 1, thus preventing the descent of the holder, E, or in other words, retaining the driving pins, E^2, in engagement with the driving pins, F^2, and holding the spring, G, compressed. It will be evident that so long as the parts, E and F, are prevented from separating in axial direction, the holder E, will not be free to rotate in the sleeve, D^3, except as it rotates with the part, F, and said part will only rotate with respect to the shell, D, and its sleeve, D^3, in case of slippage at the frictionally engaged surfaces of said parts.

Figs. 5 and 6 present a modification of the means for securing continuous engagement of the driving pins, E^2 and F^2, and this modification consists in a detent pin or plug, K, carried on the free end of a flat spring member, L, whose opposite end is secured in a suitable recess formed in the sleeve, B^{30}, which corresponds to the sleeve, B^3, of Fig. 1. Intermediate the pin, K, and the screw, L^1, which secures the spring, L, said spring is provided with a bushing, L^2, threaded to receive an adjusting screw, M, whose inner end impinges against the wall of the sleeve, B^{30}. As indicated at Fig. 5, the screw, M, when set through the spring, L, forces the pin, K, out of engagement with the groove, E^{50}, of the holder, E, but when the screw, M, is slightly withdrawn, as shown in Fig. 6, it permits the spring, L, to carry the pin, K, back into the groove, E^{50}, to perform the same function as the screw, J, of Fig. 1. The additional advantage of this modification, however, is that the adjusting screw, M, may be changed from the position shown in Fig. 5 to that shown in Fig. 6, regardless of the relative position of the groove, E^{50}, so that if at the time of such adjustment the holder, E, is in its lowest position with the groove, E^{50}, out of registration with the pin, K, that pin will be snapped into the groove, E^{50}, the first time the holder, E, is moved up to cause registration of the groove with the pin; as, for example, by bringing the tool carried in the holder, E, into engagement with the work upon which it is to operate. The pin, K, having once engaged the groove, E^{50}, it can only be released by readjusting the screw, M, to the position shown in Fig. 5.

I claim:—

1. A friction driven chuck comprising a driving element and a driven element frictionally engaged therewith, said driven element comprising two parts adapted for relative endwise adjustment and formed with mutually engageable abutments on their adjacent ends, and a spring positioned to react between said parts for holding said abutments out of engagement.

2. A friction driven chuck comprising a driving element and a driven element frictionally engaged therewith, said driven element comprising two parts disengageably connected by a positive clutch device, yielding means adapted for holding said positive clutch in disengaged position, and means for locking said positive clutch in engagement in opposition to such yielding means.

3. A friction driven chuck comprising a driving element, a driven element frictionally engaged therewith, and a tool holder rotatably carried by said driving element, said driven element and said tool holder being provided with mutually engageable abutments constituting a positive clutch device for rotatively connecting them, yielding means positioned for normally holding said clutch device in disengaged relation, and a stop on the driving element adjustable for engaging the tool holder to prevent endwise movement thereof for locking the latter in engagement with the said driven element.

4. A friction driven chuck comprising a driving element, a driven element frictionally engaged therewith, and a tool holder rotatably carried by said driving element, said driven element and said tool holder being provided with mutually engageable abutments constituting a positive clutch device for rotatively connecting them, yielding means positioned for normally holding said clutch device in disengaged relation, and

a stop on the driving element adjustable to engage the tool holder for preventing endwise movement thereof without preventing rotative movement of said holder in the driving element, said tool holder being formed for thus engaging with the stop when positioned in engagement with the driven element.

5. A friction driven chuck comprising a driving element, a driven element frictionally engaged therewith, and a tool holder rotatably carried by said driving element, said driven element and said tool holder being provided with mutually engageable abutments constituting a positive clutch device for rotatively connecting them, yielding means positioned for normally holding said clutch device in disengaged relation, said tool holder having a circumferential groove, and a radially adjustable stop carried by the driving element adapted to engage said groove for locking said tool holder in engagement with the driven element without preventing its rotation in said driving element.

6. A friction driven chuck comprising a driving element, a driven element frictionally engaged therewith, and a tool holder rotatably carried by said driving element, said driven element and said tool holder being provided with mutually engageable abutments constituting a positive clutch device for rotatively connecting them, yielding means positioned for normally holding said clutch device in disengaged relation, an adjustable stop on said driving element, and yielding means for causing the engagement thereof with the tool holder to prevent endwise movement of said holder, together with adjusting means for positively withdrawing said stop from engagement with said holder.

In testimony whereof I have hereunto set my hand at Chicago, Illinois, this 15th day of April, 1916.

JOHN M. BODENE.