Feb. 16, 1932. C. A. JOHNSON 1,845,667

CLUTCH

Filed Nov. 30, 1927

Fig. 1.

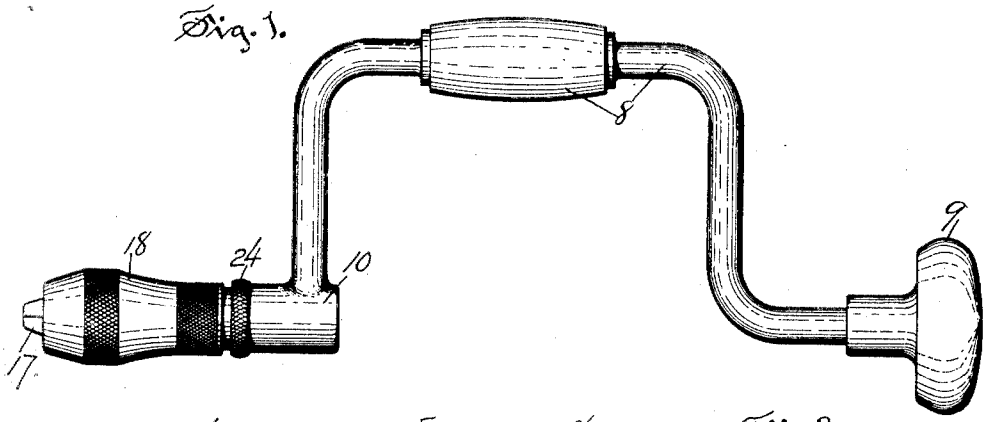


Fig. 2.

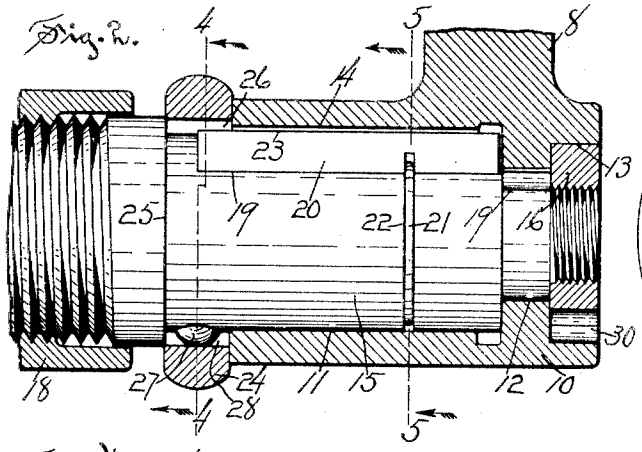


Fig. 3.

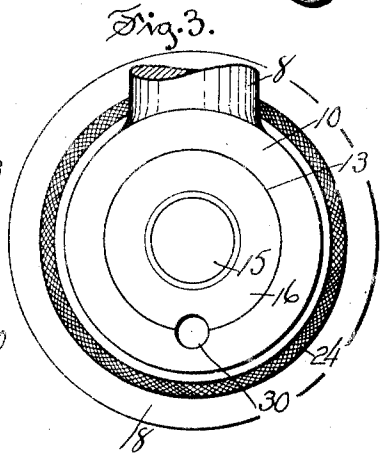


Fig. 4.

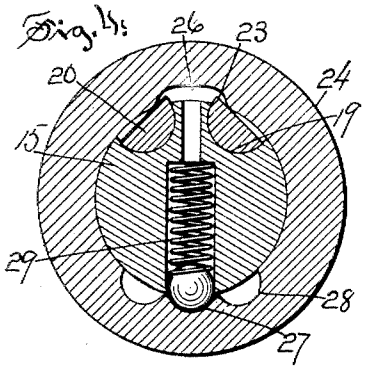


Fig. 5.

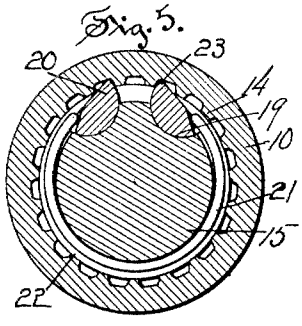


Fig. 6.

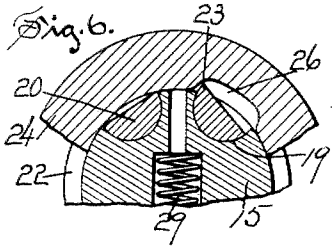
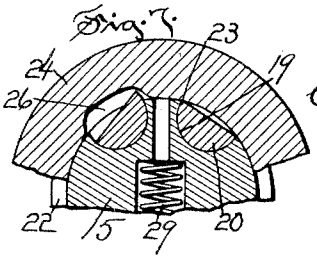


Fig. 7.



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UNITED STATES PATENT OFFICE

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CLUTCH

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My invention relates more especially to that class of devices for releasably securing two members to rotate together, or independently one of the other, and an object of my invention, among others, is to provide a device of this class that shall be simple in construction and widely varied and efficient in operation.

One form of clutch embodying my invention and in the construction and use of which the objects herein set out, as well as others, may be attained, is illustrated in the accompanying drawings, in which—

Figure 1 is a side view of a bit stock equipped with my improved clutch.

Figure 2 is a view, scale enlarged, partially in lengthwise section through the head of a bit stock illustrating my improved clutch as embodied in a tool of this class.

Figure 3 is an end view of the structure shown in Figure 2.

Figure 4 is a view in section on a plane denoted by the dotted line 4—4 of Figure 2.

Figure 5 is a similar view on a plane denoted by the dotted line 5—5 of Figure 2.

Figure 6 is a view in cross section of a fragment of the structure illustrating the pawls in position to rotate the driven member in one direction only.

Figure 7 is a view similar to Figure 6, but illustrating the pawls in position to rotate the driven member in the opposite direction from that illustrated in Figure 6.

My invention is not limited in its application to a mechanism of any particular character, as it may be applied to various structures for the purpose of locking two members to effect a rigid connection for simultaneous movement of both in opposite directions, or varied connections to effect simultaneous rotation of said members in one direction and independent rotation of one of said members in the opposite direction, or vice versa. These conditions are found in a bit stock as one of many mechanisms in which they are present, and for this reason such bit stock has been selected by me for the purpose of disclosing my invention herein.

In the accompanying drawings the numeral 8 denotes the handle or crank portion of a bit stock, 9 the button and 10 the head thereof which parts, with the exception of the head, may be of ordinary construction. The head has a chamber 11 extending inwardly from one end nearly to the opposite end thereof with a hole 12 extending through the bottom of the chamber and terminating in a recess 13. The wall of the chamber 11 is provided with ratchet teeth 14 each extending for a considerable portion of the length of the chamber and the series of teeth extending entirely around it.

The shank 15 of a chuck body extends through the head 10 and is rotatably attached to said head as by means of a nut 16 located in the recess 13 and engaged with the screw-threaded tip of said shank. The chuck body is provided at its outer end with chuck jaws 17 and an operating sleeve 18 which jaws and sleeve may be of any ordinary and well-known construction and for which reason a further and detailed description is omitted herein.

The shank 15 of the chuck body is provided with pawl recesses 19, two in number, in which pawls 20 are located, the recesses in cross section being formed on the arc of a circle and the pawls in cross section being substantially half of a round piece of material, and as shown in Figs. 4 to 7 of the drawings. Each pawl is notched on one side to receive the end of a pawl spring 21, said spring being located in a groove 22 extending around the shank 15, and opposite ends of said spring being located each in a notch in one of the pawls 20. Each end of the spring presses against a pawl tooth on one side of the axial center thereof, causing said pawls to be rocked so that their toothed edges 23 under certain conditions, will actively engage the ratchet teeth 14, and as shown in Fig. 5 of the drawings. That side of each pawl which is engaged by the spring is termed the inactive side to distinguish it from the opposite and active side which bears the tooth to actively effect rotation of the shank 15.

A setting ring 24 is rotatably mounted in a groove formed between a shoulder 25 on the shank 15 and the end of the head 10, and as shown in Fig. 2 of the drawings. This set-

ting ring has a controlling notch 26 in one side of a width to receive the toothed edges 23 of the pawls 20, which toothed edges will be rocked into said notch by the action of the spring 21 whenever said notch is located opposite said toothed edges, either or both, in the rotation of the ring 24.

In the operation of the device when the ring 24 is in the position shown in Fig. 4, the spring 21 will force the toothed edges 23 of the detents into engagement with the ratchet teeth 14 and as shown in Fig. 5, with a result that rotation of the head 10 will cause the shank 15 to be rotated with said head irrespective of its direction of rotation. If the ring 24 be rotated to the position shown in Fig. 6 the pawl on the right will be located with its toothed edge in position to engage the ratchet teeth 14 and a rotation of the head 10 to the right or in a clockwise direction will cause the shank 15, and consequently the chuck, to be rotated in that direction. A movement of the head 10, however, in a reverse or lefthand direction will cause rotation of said head independently of the shank 15.

If the ring 24 be turned to the position shown in Fig. 7, the other pawl opposite that just mentioned will be located as shown in Fig. 7 with its toothed edge in position to engage the ratchet teeth 14 and rotation of the head 10 in a contra-clockwise direction or to the left will effect rotation of the shank 15 in the same direction, but a reverse movement of the head 10 will be independently of the shank 15. In this reverse or independent movement in either direction, as just described the pawl that has its toothed edge located in the notch 26 will rock in and out, being forced out by the teeth 14 and in by the end of the spring 21, this toothed edge thus riding over the teeth 14.

In order to retain the ring 24 in its different positions to effect the results hereinabove described, a yielding detent is provided, located either on the shank member 15 or ring member 24 to engage within retaining notches in the other member. In the structure herein shown this detent 27 is carried by the shank 15 to engage retaining notches 28 in the ring 24, said detent being held by a spring 29 to yieldingly engage the notches so that a little force applied to the ring 24 to turn it will cause said detent to be disengaged from the notch in which it may be located.

A hole 30 may be formed in the nut 16 and head 10 for the insertion of a tool to enable the nut to be turned by the handle 8 to loosen it on the threaded end of the shank.

The greater the force applied to the pawls 20 by the head member 10 the more tightly will such pawls engage said head and the shank member 15, and such pawls therefore act as struts affording a very rigid connection between said members on that side on which the pawls are located and pressing said members into close contact on the opposite side thereof, thereby providing a very rigid structure comprising said members when in operation.

In accordance with the provisions of the patent statutes I have described the principles of operation of my invention, together with the device which I now consider to represent the best embodiment thereof; but I desire to have it understood that the device shown is only illustrative and that the invention may be carried out by other means and applied to uses other than those above set out.

I claim—

1. A clutch including a head containing a chamber having ratchet teeth on its inner surface, a shank extending into said chamber and having longitudinally extending and laterally opening curved pawl seats located at their ends outside of the head, a pair of pawls each half round rockably mounted throughout their entire lengths in said seats and having edges to engage said ratchet teeth, a setting member rotatably mounted on said shank between opposed shoulders on said head shank, means on said setting member to operate said pawls to rigidly connect said head and shank to prevent rotation of one independently of the other, or to effect a rigid connection for rotation of the shank in either one of two opposite directions only and means for engaging the inactive edges of said pawls for rocking the latter in a direction opposite to that caused by the setting member.

2. A clutch including a driving member and a driven member, said driving member including a chamber formed with teeth on the wall thereof, said driven member having longitudinally extending and laterally opening curved seats in its periphery, and half round pawls rockable throughout their entire lengths in said seats and adapted to selectively engage the teeth formed in said chamber.

3. A clutch including a driving member having a chamber therein with ratchet teeth on the wall thereof, a driven member extending into said chamber and having longitudinally extending and laterally opening curved seats located on one side of the driven member, half round pawls rockable throughout their entire lengths in said curved seats, a spring received within a groove formed in the driven member and having its ends engaging within notches formed in the said pawls for moving the pawls in opposite directions, and means for selectively moving the pawls against the tension of said spring.

4. A clutch including a head containing a chamber and a shank extending into said chamber, one of said members having ratchet teeth on its surface and the other having longitudinally extending and laterally opening curved pawl seats, a pair of pawls each

half round rockably mounted throughout their entire lengths in said seats and having their ends located outside of the end of said head and their edges located to engage said ratchet teeth, a setting member rotatably mounted on said shank between opposite shoulders on said head and shank, means on said setting member to operate said pawls to rigidly connect said head and shank to prevent rotation of one independently of the other, or to effect a rigid connection for rotation of the shank in either one of two directions only, and means for engaging the inactive sides of said pawls for rocking the latter in a direction opposite that caused by the setting member.

5. A bit stock including a shank having a shoulder and pawl recesses of half round shape in its periphery and with a detent recess located opposite said pawl recesses, pawls of half round shape located in said pawl recesses, a spring pressed detent located in said detent recess, a setting member rotatably mounted on said shank against said shoulder and having a pawl setting member and detent receiving notches extending therethrough, a head having a chamber within which said shank and pawls are received, said chamber having ratchet teeth extending along its inner surface for engagement by said pawls, and means for rotatably attaching said head to said shank.

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