April 26, 1932. C. E. COLLINS 1,855,939

FRICTION LOCKING MECHANISM

Filed April 30, 1930

FIG. 1.

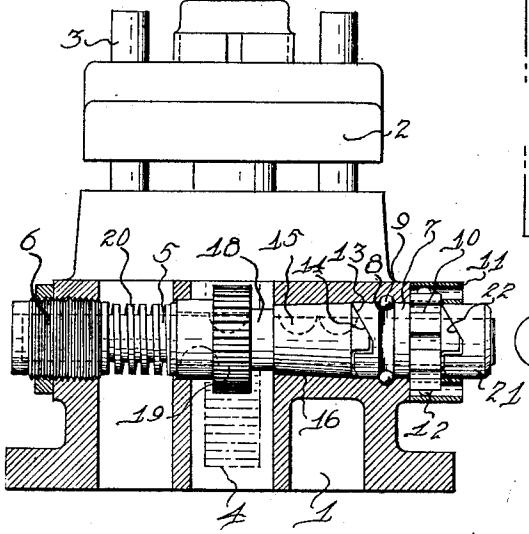


FIG. 2.

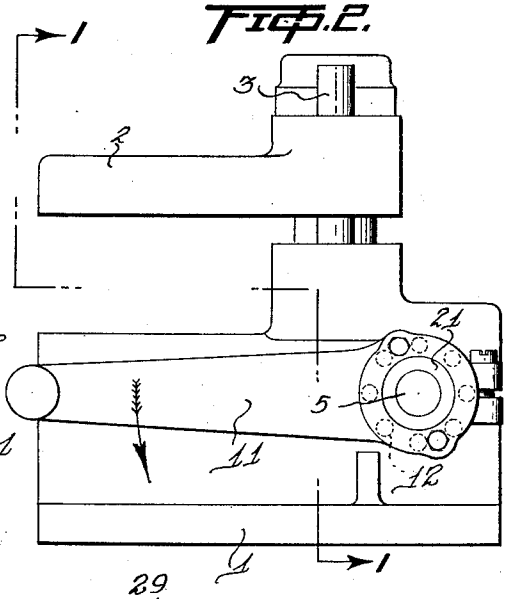
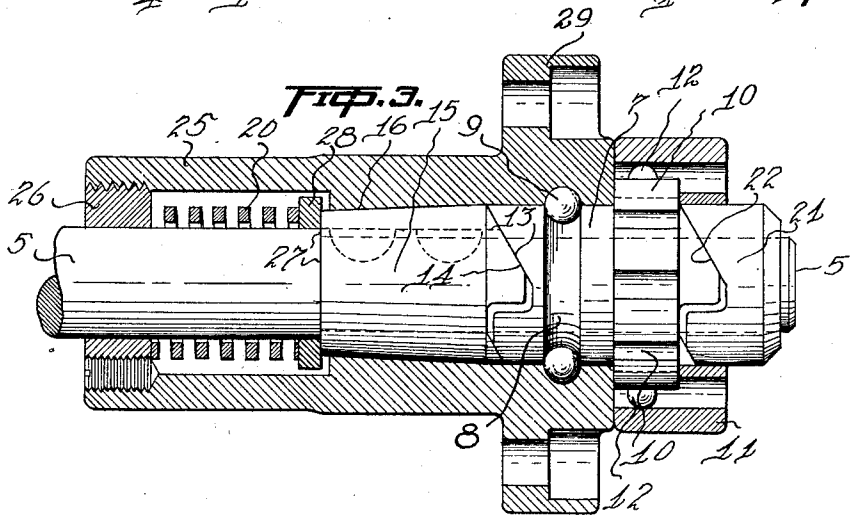


FIG. 3.



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FRICTION LOCKING MECHANISM

Application filed April 30, 1930. Serial No. 448,767.

The present invention pertains to a novel frictional locking mechanism for rotatable shafts, being particularly adapted for use in quick acting vises or jigs.

The primary object of the present invention is to provide a mechanism operated by a hand crank for rotating a shaft such as is used for operating the work clamping head in a quick acting vise or jig, said mechanism being capable of exerting a certain or predetermined clamping pressure upon the work clamping head and then locking the shaft against further or backward rotation in order to lock the work clamping head in the clamping position.

Another object of the present invention is to devise a mechanism which is applicable to any shaft to impart rotation thereto where it is desirable to prevent backward rotation of said shaft when the rotative pressure in the proper direction has been removed. In other words, the mechanism is capable of rotating the shaft in any direction but the shaft cannot rotate the mechanism backwards as a result of any forces exerting backward pressure upon the shaft.

With the above and other ends in view, the invention consists in the matters hereinafter set forth and more particularly pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a cross sectional view of a jig incorporating the present frictional locking mechanism;

Fig. 2 is a side elevation of the jig; and

Fig. 3 is a cross sectional view of the present frictional locking mechanism constructed as a separable unit adapted for attachment in any type of device where a locking mechanism is required.

Like characters of reference are employed throughout to designate the corresponding parts.

The numeral 1 indicates the hollow base of a jig having a work clamping head 2 slidably mounted thereon, the sliding movement of the head being in a vertical direction and guided by the posts 3. A rack 4, shown in broken lines in Fig. 1, extends downwardly from the head into the base 1 so that the head may be moved up and down by rotary movement of a gear wheel contained in the base, the gear wheel generally being provided in the base upon a shaft which extends through the side of a base to be operated by a suitable handle or crank. The above construction is conventional in jigs and is merely described in order that an understanding of the present invention may be readily reached.

In reference to Figs. 1 and 2, the numeral 5 indicates a shaft which is rotatably mounted in the base 1 by means of the bearing 6 and the sleeve 7, the latter being held against longitudinal movement by providing a groove 8 to partly receive balls 9 which engage in a groove formed in the base 1. The outer end of the sleeve is provided with an enlarged grooved head 10 to receive the operating handle 11, the handle being provided with a circular bore adapted to slide over the head 10 and having balls 12 to project into the grooves in the head to key the head to the handle. By providing a plurality of equally spaced grooves and a plurality of equally spaced balls, it is possible to position the operating handle at various angles to suit the convenience of the operator.

The inner face of the sleeve 7 is provided with a ratchet like cam face 13 which engages the similarly shaped cam faces 14 on the cone shaped sleeve 15 which is keyed to the shaft 5 to rotate therewith, but it is free to slide longitudinally thereon. The conical sleeve 15 is received in a tapered bore 16 formed in the base 1 and at one stage of its longitudinal movement the end thereof engages the flange 18 which is formed on the shaft 5. A pinion 19 is keyed to the shaft 5 and is held in engagement with the flange 18 by means of a spring 20, the pinion meshing with the rack 4 to provide a connection whereby rotation of the shaft 5 causes the work clamping head 2 to be raised or lowered.

The outer end of the shaft 5 is provided with a cam-faced sleeve 21, integrally secured thereto to engage the cam faces 22 formed on the head 10.

In operation, when the operating handle

11 is rotated in the direction of the arrow (Fig. 2), the shaft 5 is rotated due to the fact that the spring 20 crowds the pinion against the flange 18 which in turn causes the conical sleeve to be crowded against the sleeve 7. The sleeve 7 is rotated by the handle and the cam faces 13 and 14 cause rotation of the conical sleeve 15 which rotates the shaft 5 to move the work clamping head to its clamping position. When the work clamping head is in contact with the work and rotative pressure is exerted upon the handle 11 which is in excess of the pressure exerted by the spring 20, the cam faces 13 force the conical sleeve in a direction away from the handle and cause it to be wedged into the tapered bore 16 in the base 1. By wedging the conical sleeve in the tapered bore it is possible to lock the shaft in any position when the clamping pressure on the clamping head equals the pressure exerted by the spring 20.

To unlock the present device, or in other words, to move the conical sleeve out of wedging contact with the conical bore 16 it is necessary to rotate the operating handle in the opposite direction to that above described. The opposite rotation causes the cam faces 22 to engage the cam faces 21 and force the shaft 5 outwardly until the flange 18 has drawn the tapered sleeve out of the tapered bore which leaves the shaft free to rotate in order to rotate the pinion to move the work clamping head in its opposite direction.

In Fig. 3 the above described frictional locking mechanism is illustrated as a unit adapted to be equipped upon any device where it is desirable or necessary that it should be locked in a position where it is exerting or maintaining pressure. In this form the mechanism is mounted within a sleeve 25 having a bearing 26 mounted in one end and its opposite end provided with a flange 29 permitting its installation into various machines.

In this form the shaft 5 is provided with a shoulder 27 which eliminates the above described flange 18 and has a washer 28 surrounding the shaft and butting against the end of the conical sleeve 15, a compressed helical spring 20 being interposed between the washer 28 and the bearing 26.

Although specific embodiments of the present invention have been illustrated and described, it is to be understood that various alterations may be made in the details of construction without departing from the spirit of the invention, and such changes are contemplated.

What I claim is:—

1. The combination with a rotatable shaft upon which back pressure is exerted, of a conical sleeve keyed on said shaft and received in a tapered bore, a spring normally preventing longitudinal movement of said sleeve, and means for rotating said conical sleeve, said means having cam faces adapted to wedge said conical sleeve into said tapered bore to prevent rotation of said shaft when the back pressure thereon exceeds the pressure of said spring.

2. The combination with a rotatable shaft upon which back pressure is exerted, a conical sleeve keyed on said shaft to slide longitudinally thereon and rotate therewith and received in a conical bore formed in a rigid member surrounding said shaft, a cam faced sleeve adapted to impart rotary movement and longitudinal movement to said conical sleeve, and means for resisting the longitudinal movement of said conical sleeve until a predetermined pressure is reached after which said cam faced sleeve wedges said conical sleeve into said tapered bore to prevent rotation of said shaft.

3. The combination with a rotatable shaft upon which back pressure is exerted, a conical sleeve keyed on said shaft to slide longitudinally thereon and rotate therewith and received in a conical bore formed in a rigid member surrounding said shaft, a cam faced sleeve adapted to impart rotary movement and longitudinal movement to said conical sleeve, means for resisting the longitudinal movement of said conical sleeve until a predetermined pressure is reached, after which said cam faced sleeve wedges said conical sleeve into said tapered bore to prevent rotation of said shaft, and cams formed on said cam faced sleeve adapted to move said shaft in a manner to withdraw said conical sleeve from said tapered bore.

4. The combination with a rotatable shaft upon which back pressure is adapted to be exerted, of a casing surrounding said shaft and having a tapered bore formed therein, a conical sleeve keyed to rotate with and slide longitudinally on said shaft and received in said tapered bore, a spring received in said casing and engaging said conical sleeve in a manner to resist movement of said sleeve into said tapered bore, a rotating member mounted upon said shaft, and cam faces formed on said sleeve and rotating member through which rotative pressure is transmitted from said rotating member to said conical sleeve in a manner whereby back pressure on said shaft in excess of the pressure of said spring causes relative pressure on said rotating member to move said conical sleeve into wedging engagement with said tapered bore and thereby prevent rotation of said shaft.

In testimony whereof I affix my signature.

CLEVELAND E. COLLINS.