(No Model.)

J. E. SINCLAIR.

RATCHET WRENCH.

No. 349,007. Patented Sept. 14, 1886.

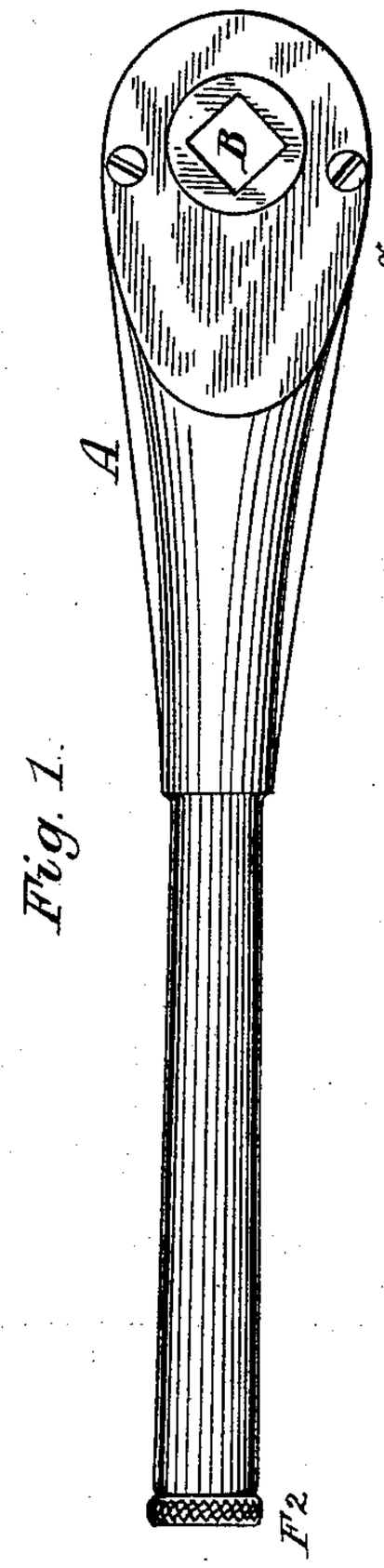

Fig. 1.

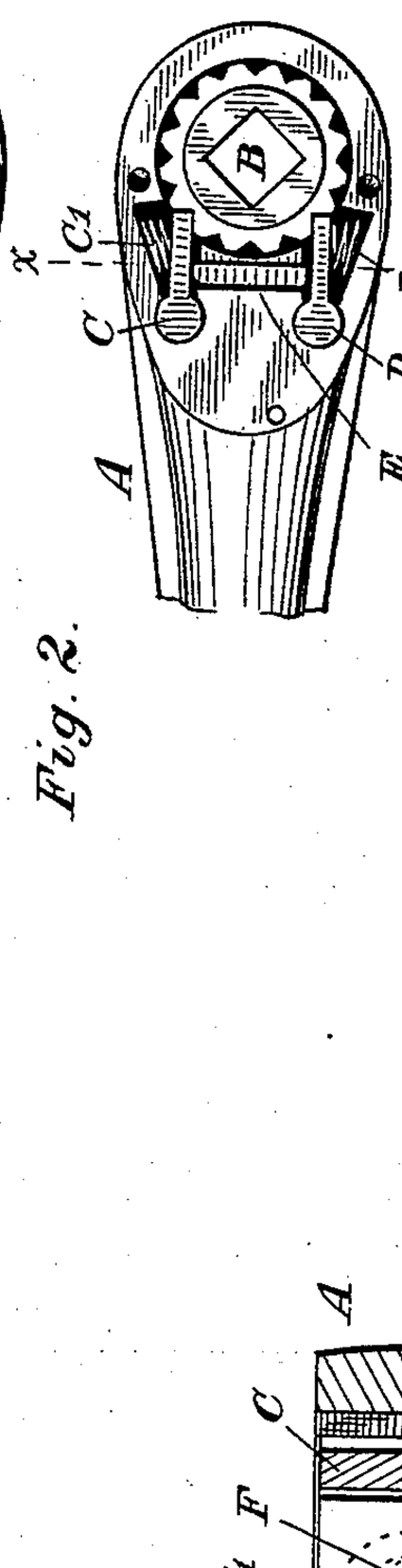

Fig. 2.

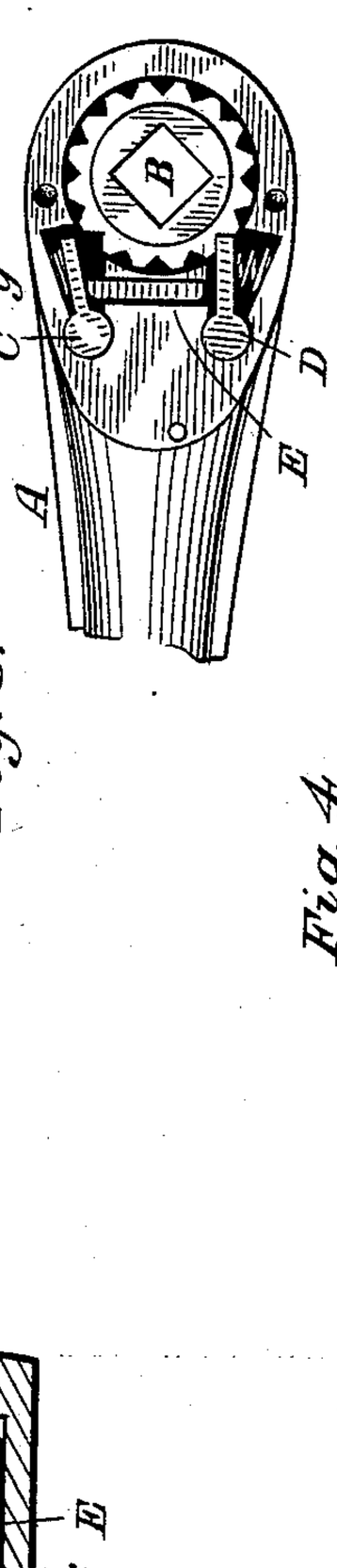

Fig. 3.

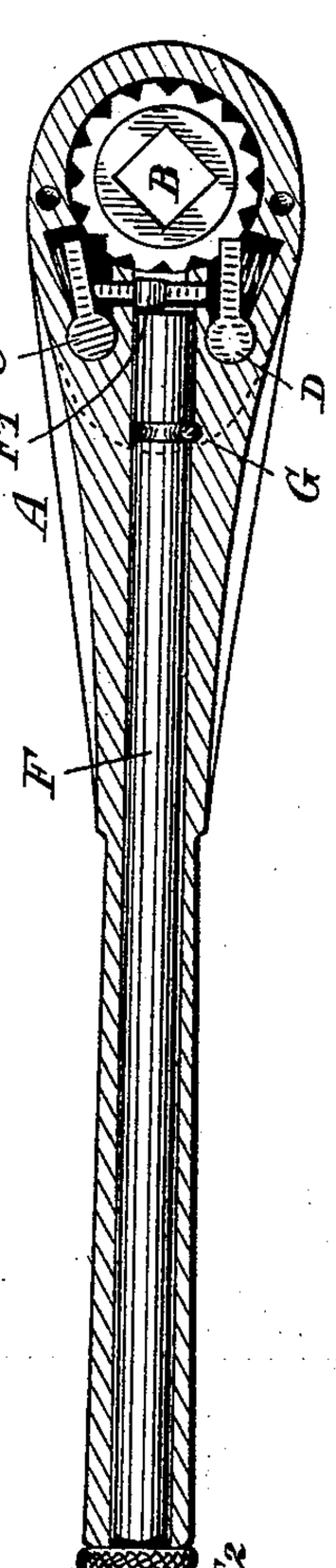

Fig. 4.

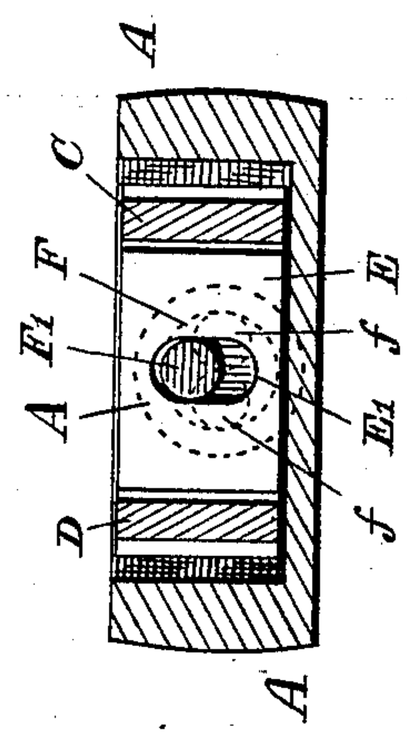

Fig. 5.

WITNESSES

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RATCHET-WRENCH.

SPECIFICATION forming part of Letters Patent No. 349,007, dated September 14, 1886.

Application filed April 10, 1886. Serial No. 198,441. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. SINCLAIR, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain Improvements in Ratchet-Wrenches, of which the following is a specification.

My invention relates to the well-known class of ratchet-wrenches in which a pair of pawls is employed to engage with and to actuate the ratchet-head, rotation being thereby imparted to the ratchet-head in one direction or the other, according as one or the other of the pawls is in engagement with the ratchet-teeth.

It particularly relates to the means of accomplishing the engagement and disengagement of the pawls with the ratchet-teeth; and the invention consists of an improved mechanism for performing this operation, which is illustrated in the annexed drawings.

Figure 1 is a plan view of a complete ratchet-wrench to which my invention is applied. Figs. 2 and 3 are partial views of the same, with a covering-plate removed to show the internal arrangement of parts. Fig. 4 is a sectional plan showing more completely the internal arrangements; and Fig. 5 is a transverse section taken on the line *x y*, designed to illustrate Fig. 4 more fully.

The operation of the wrench is as follows: The socket-head B is adapted to any mechanical purpose requiring its rotation, and is held in the frame A, free to rotate therein, except as the pawls C and D, by engaging with the ratchet-teeth, prevent it. These pawls are so mounted within the frame A as to admit of a limited oscillation in suitable cavities sunk in the substance of the frame A. Springs C′ D′, Fig. 2, are placed behind the pawls, acting to push them out into the positions shown in Fig. 2. If, with the parts in these positions, the frame of the wrench be oscillated, as when in use, the head B must partake of the motion in both directions, being locked to the frame by the engagement of both pawls. If by any means one of the pawls be thrown back out of engagement with the ratchet, as is the pawl C in Fig. 3, and the other pawl, D, is free to act, then oscillation of the frame will cause an intermittent rotation of the head B, the pawl D acting in a well-known manner. Likewise, it is evident that if the position of the pawls be reversed, then rotation of the head will take place in an opposite direction.

To provide an improved means of setting the pawls to produce the above-described results is the object of my invention. The mechanism for accomplishing this consists of a plate, E, adapted to slide longitudinally in a channel sunk in the material of the frame A, in such location and so arranged that its ends come alternately in contact with the pawls, and of a shaft, F, upon the end of which is formed an eccentric or crank pin, F′. The plate E is provided with a slotted aperture, E′, Fig. 5, so arranged and of such shape as to admit the crank-pin F′, in the manner exhibited in Figs. 4 and 5. The shaft F is contained within the handle of the wrench, and is free to turn axillary therein, the milled button-head F² being provided for this purpose. It is evident that rotation of the shaft will cause (by means of the crank or eccentric pin F′ working in the slot E′) the plate E to traverse longitudinally in its groove, a half-revolution of the shaft bringing the pin F′ into the dotted-line positions *f f*, Fig. 5, giving to the plate its extreme of travel from side to side. The relation of the position, the length, and the travel of the plate E to the pawls is such that one or the other of the pawls is pushed back out of range of engagement with the ratchet-teeth when the plate is at either extreme of its travel. When one pawl is thus withdrawn from action, the other is advanced to action by means of the spring behind it, as illustrated by Figs. 3 and 4, which show one position of the parts. It is evident that a half-revolution of the shaft will reverse the position and action of the parts. If the shaft be turned into the position shown in Fig. 5—that is, to bring the plate E to a middle position of its travel—both pawls will be engaged with the gear-teeth at the same time, and the socket-head B, restrained from turning independently of the frame A, becomes a fixture within it. This position of the parts is shown in Fig. 2. This pawl-operating mechanism accomplishes also the locking of the plate in either extreme position of its travel, so that the pawl under the action of the spring, aided by the jar which the instrument receives in use, may not thrust back the plate and come into action prematurely. This locking results from the described

arrangement of the parts, and from proportioning them so that the crank-pin F′ shall travel over slightly more than a semicircle, coming to rest against the lower end of the slot E′ in the plate E—a position slightly over and beyond the center. Pressure of the pawl against the plate will tend to rotate the shaft by carrying the pin still farther beyond the center, which motion cannot take place, because the crank-pin has reached the end of the slot. The pawl is thus securely locked until released by turning the button-head F². Another advantage from this device is, that as the pawls are depressed and the springs resist with increasing force this is counteracted by the increasing leverage of the crank-arm as the crank-pin approaches the center, the mechanical advantage and disadvantage so nearly balancing one another that no perceptible increase of resistance is felt in operating the button-head F². A special advantage from this device is, that the pawls can be operated and the rotation reversed at a distance from the rotating piece. In this way a rotation can be produced among the revolving wheels of various machines when the common method of reversing the pawls would be dangerous. As far as I am aware, this cannot be practically accomplished by any other ratchet mechanism hitherto known.

I am not limited in my invention to the precise form or arrangement of mechanism shown, which is only one convenient application of it.

My invention essentially consists of the application to any double-pawl ratchet mechanism of a shaft provided with a crank or eccentric adapted to operate the pawls alternately through the medium of a sliding plate or an equivalent.

I claim as my invention the following:

1. The shaft F, having an eccentric or crank pin, and the sliding plate E, adapted to be operated by the eccentric or crank pin, in combination with a pair of pawls operating together, substantially as and for the purpose specified.

2. The combination, with the socket-head of a wrench having a ratchet-wheel and a pair of pawls, of a shaft having means of operating the said pawls, the shaft projecting through the frame containing the said socket-head, substantially as and for the purpose specified.

3. The combination, with a pair of pawls, of a shaft provided with a crank-pin and a slotted plate adapted to be operated by the said crank-pin, for the purpose of controlling the said pawls, substantially in the manner and for the purpose specified.

4. The combination, with a pair of pawls, of a shaft provided with a crank-pin and a sliding plate having a slot so adjusted to the travel of the crank-pin that the plate will be locked at each end of its travel by the crank-pin going beyond the center and striking the end of the slot, substantially in the manner and for the purpose specified.

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Witnesses:

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