No. 882,539. PATENTED MAR. 17, 1908.

E. A. SCHADE.

RATCHET MECHANISM.

APPLICATION FILED JUNE 2, 1906.

Fig. 1.

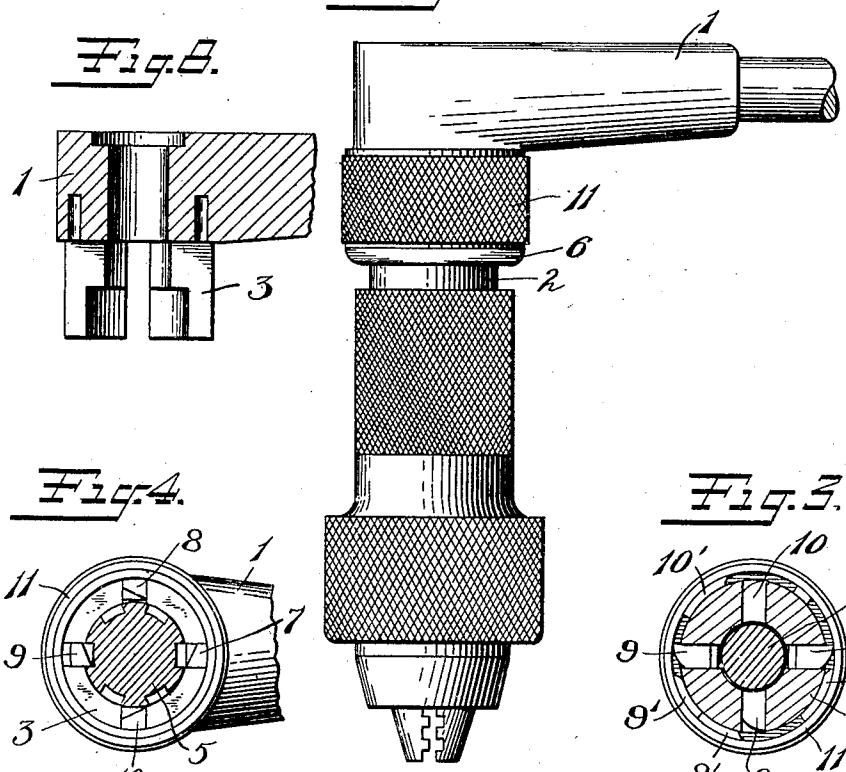


Fig. 8.

Fig. 4.

Fig. 3.

Fig. 2.

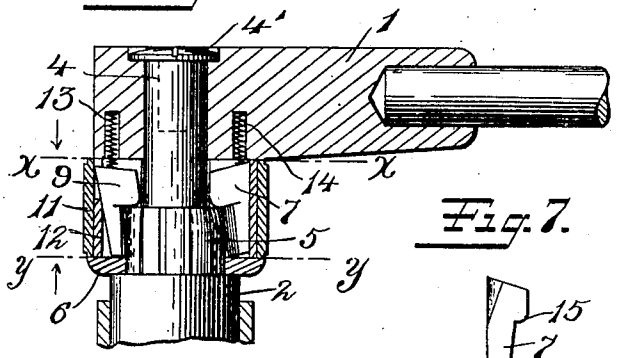


Fig. 6.

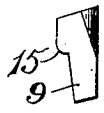
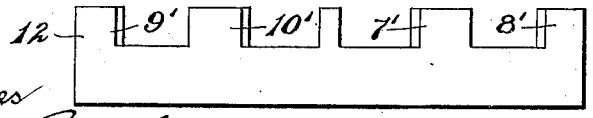


Fig. 7.

Fig. 5.



Witnesses

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RATCHET MECHANISM.

No. 882,539. Specification of Letters Patent. Patented March 17, 1908.

Application filed June 2, 1906. Serial No. 319,827.

To all whom it may concern:

Be it known that I, EDMUND A. SCHADE, a citizen of the United States, residing at New Britain, county of Hartford, State of Connecticut, have invented certain new and useful Improvements in Ratchet Mechanism, of which the following is a full, clear, and exact description.

My invention relates to improvements in ratchet mechanism, and is particularly intended for hand tools such as bit braces.

The application of J. P. Bartholomew, filed February 24th, 1905, shows a construction embodying certain principles of this invention.

It is my object to improve upon the Bartholomew construction and make it possible to construct a mechanism having greater strength and adapted to operate through a smaller degree of rotation of the driving member.

The invention consists in improvements, the principles of which are illustrated in the accompanying single sheet of drawings.

Figure 1 is a side elevation of a portion of a bit brace embodying the improvements of my invention. Fig. 2 is a fragmentary sectional view showing one of the pawls in engagement with the ratchet, and another pawl disengaged. Fig. 3 is a horizontal section on the plane of the line X—X Fig. 2, looking down, but showing two of the pawls in their position of engagement with the ratchet. Fig. 4 is a horizontal section on the plane of the line Y—Y Fig. 2, looking up, with the pawls in the same position as shown in Fig. 2. Fig. 5 is a view showing the development of the cam operating member. Figs. 6 and 7 are detail side views of the pawl members. Fig. 8 is a vertical sectional view of the driving member.

1 indicates a portion of what may be termed the driving member.

2 indicates a portion of the driven member. The driving member has a hub 3 which is slotted longitudinally at its lower end to provide carrying pockets for the several pawls later referred to. The driven member has a spindle 4 which extends through the driving member and is secured in place by suitable means, for instance, the screw 4′. The ratchet member 5 is carried by the driven member and has a plurality of teeth extending longitudinally of the axis of the driven member. In the preferred form, as shown, there are six teeth in this ratchet spaced 60° apart.

6 is a washer, which closes the pockets formed in the slotted hub 3.

The pawl member rotates always with the driving member. The pawls 7 and 8 constitute one set for coöperating with the teeth of the ratchet and transmitting rotative movement from the driving to the driven member in one direction. These pawls are spaced apart 90°. When the pawl 7 is engaging one of the teeth so as to transmit motion, the pawl 8 rests upon the outer face of another tooth of the ratchet, and thus operates only one at a time. The pawls 9 and 10 constitute another set for transmitting motion in the opposite direction to the first set. These pawls 9 and 10 are opposite pawls 7 and 8 respectively, and are adapted to operate one only at a time.

11 is a housing ring or sleeve carrying on its interior the cam member 12, which is provided with the portions 7′—8′—9′—10′, corresponding with the pawls 7, 8, 9 and 10 respectively, and between which are recesses or spaces, as shown in Fig. 5. The pawls are held yieldingly in their operative positions by means of springs such as 13 and 14 pressing from above. Each pawl has an inward projection above the pawl tooth which rests on an annular shoulder formed between the spindle 4 and the outer face of the ratchet 5. These projections 15 also extend well into the longitudinal slots in the driver 3.

When the parts are in the position shown in Fig. 2, the pawl 7 is held between the spindle 4 and the portion 7′ of the cam, so that its tooth is disengaged from the ratchet teeth 5. In this position the pawl 8 (not shown in Fig. 2) is held in a similar position by means of the portion 8′ of the cam. The pawl 9 is free to be tilted, and as shown is in engagement with a tooth of the ratchet, so that rotation may be transmitted from the driving to the driven member in a reverse clockwise direction, as viewed in Fig. 4. At this time the pawl 10 rests on the outer surface of another of the ratchet teeth, as shown in Fig. 4. When the driving member and its hub and pawl member are rotated clockwise, as viewed in Fig. 4, through the space of one tooth, the pawl 9 will ride up on the tooth to the rear and the pawl 10 will be

thrown into operative position with the tooth upon which it has rested. This ratchet operation may be continued so as to obtain a complete revolution of the driven member by twelve impulses of the driving member, although only four pawls are employed.

When the parts are in the position shown in Fig. 3, the two opposite pawls being in engagement with the ratchet, rotation may be transmitted from the driving to the driven member in either direction, since the parts are now locked. When the cam 12 is rotated anti-clockwise, as viewed in Fig. 3, the portions 8′ and 7′ coöperate with the segments 8 and 7 so as to prevent their engagement with the ratchet. This is the position of Fig. 4. When the cam ring 12 is rotated in a clockwise direction, as viewed in Fig. 3, the portions 9′ and 10′ coact with the pawls 9 and 10 and prevent their coöperation with the ratchet. In such position the pawl section, composed of two pawls 7 and 8, will be in operation.

By reason of the pawl segments being located in the slots in the driving hub, they are engaged by the relatively rotating spindle, so that wedging is prevented. By the peculiar construction of pawls herein shown, it is possible to obtain a broad engagement between the pawl segments and the ratchet teeth, so that the parts will have great strength and be little likely to be injured in operation.

What I claim is:

1. In a ratchet mechanism, comprising driving and driven parts, a spindle connecting said parts, a ratchet carried by one of said parts and having teeth facing outward from the axis thereof, a pawl fulcrumed at one end of said ratchet, a spring engaging the end face of said pawl and carried by the driving part, and an operating member having a cam portion arranged to coöperate with said pawl to hold it from engagement with the ratchet.

2. A ratchet mechanism, comprising driving and driven parts, a spindle connecting said parts, a ratchet carried by one of said parts and having teeth facing outwardly from the axis thereof, a plurality of independent sets of pawls, the teeth of one set facing in a direction opposite to the teeth of the other set, a fulcrum for said pawls at one end of said ratchet and springs engaging the end faces of said pawls, and a pawl-operating device arranged to coöperate with said pawls.

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