

(No Model.)

E. W. McGUIRE.
RATCHET MECHANISM.

No. 423,266.

Patented Mar. 11, 1890.

Fig. 1.

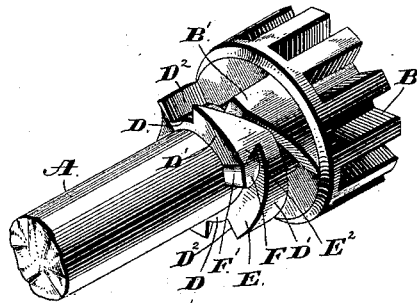


Fig. 2.

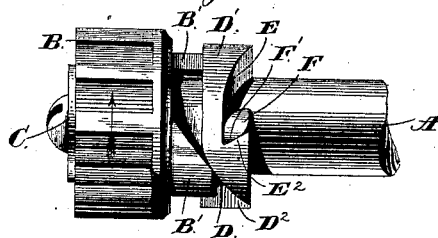


Fig. 3.

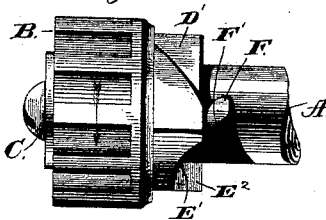


Fig. 4.

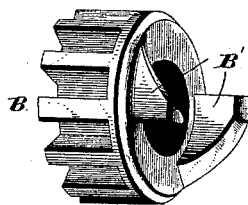
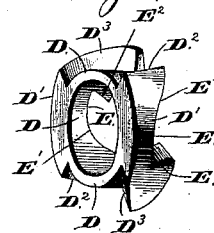


Fig. 5.



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UNITED STATES PATENT OFFICE.

ELWOOD W. MCGUIRE, OF RICHMOND, INDIANA.

RATCHET MECHANISM.

SPECIFICATION forming part of Letters Patent No. 423,266, dated March 11, 1890.

Application filed December 23, 1889. Serial No. 334,634. (No model.)

To all whom it may concern:

Be it known that I, ELWOOD W. MCGUIRE, of Richmond, in the county of Wayne, and in the State of Indiana, have invented certain new and useful Improvements in Ratchet Mechanism; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

10 Figure 1 shows a perspective view of my ratchet mechanism; Fig. 2, a view of the same in side elevation with the parts in position, as when the pinion or barrel and arbor are locked together; Fig. 3, a similar view of the mechanism with the parts in position, as when
15 the barrel or pinion is turning back on the arbor; Fig. 4, a detail perspective view of the inner end of the pinion or barrel, and Fig. 5 a similar view of the annular pawl-piece.
20 Letters of like name and kind refer to like parts in each of the figures.

The object of my invention is to provide an improved ratchet mechanism; and to this end my invention consists in the mechanism
25 and the construction, arrangement, and combination of the parts thereof, as hereinafter specified.

In the so-called "backing-ratchet devices" as heretofore made and used for locking the
30 movable pieces together or leaving them independent of one another, according as one of the pieces is moved in one direction or the other, there has usually been employed to act with ratchet-teeth on the one piece a movable
35 pawl carried by the other. Such pawl, whether actuated by gravity, by a spring, or by some positive means, has been so constructed that it would, when one of the pieces was turned backward with reference to the other, ride in
40 and out over the ratchet-teeth. This constant engagement of the pawl with the teeth is liable to cause rapid wear of the pawl and teeth, while the striking of the pawl against successive teeth makes an objectionable
45 amount of noise. With these objections in view the special purpose of my present invention has been to provide a ratchet mechanism in which, when one of the pieces to be connected is turned in one direction, the two
50 parts shall be positively clutched together; but when said piece is turned the other way

there will be no pawl riding in and out over ratchet-teeth, so as to cause wear and noise.

In the drawings, A designates the arbor or shaft, and B the pinion thereon, to be coupled
55 with and uncoupled from the shaft by my ratchet mechanism as the pinion or shaft is turned in one direction and the other.

While I have shown a pinion and shaft or arbor as supplied with my ratchet mechanism,
60 I desire it to be understood that such mechanism can be equally well used for connecting a drum or barrel with a shaft arbor or hub or any two movable levers or pieces with each other. Upon the outer end of the shaft is shown
65 a screw-attached head C, for keeping the pinion from falling or working off. Such head is, however, not necessary, as any other desired pinion retaining device can be used instead. Upon the inner side or end of the pinion B
70 are two ratchet-shaped projections B' B', each of which, extending out from the pinion side in a direction substantially parallel with the shaft, has one side abrupt and the other side
75 inclined. While parallel with the shaft or arbor, the projections both stand at a short distance from the shaft or arbor periphery. Surrounding the arbor at the inner side of the pinion is the loose ring D, which has the
80 radially-projecting portions D' D', two in number, adapted to be brought into the spaces between the projections B' B' on the pinion when the ring has been moved toward the latter. Said projecting portions D' D' correspond substantially in shape and size with
85 the spaces described above. Each one has on its opposite sides an abrupt face D², to engage the abrupt face on one tooth or projection B', and an inclined face D³, to engage the corresponding inclined face on the other
90 projection B'. The parts of the ring between the projecting portions D' D' are made so as to be capable of passing in under the projections B' B' and between the latter and the periphery of shaft A, so that the inner side of
95 the ring can be brought against or close to the pinion side. In the side of the ring away from the pinion are the two diametrically-opposite ratchet-shaped notches or recesses E E, each having its inclined side E' extending
100 in a direction opposite to that of the inclined faces D³ D³ on the projecting portions D' D'

of the ring, and its abrupt side E^2 facing in the same direction as the abrupt sides of said portions D D. Instead of being in planes parallel with the axis of the shaft or arbor A, abrupt side E^2 of each notch is preferably cut at an angle to such plane, as shown, so as to make the outer edge of the abrupt side or face project beyond its inner edge. This construction gives the notch a hooked or overhanging end, for a purpose to be described hereinafter.

Situated on the shaft or arbor A at a distance from the inner face of the pinion less than the combined distances from the inner to the outer end of one of the projections B' B', and from the inner to the outer sides or ends of one of the projecting portions D' D' on the ring D, is the radially-projecting stud or pin F, having the side F' inclined to correspond with the inclination or angle of the abrupt side of one of the notches E E in ring D. The side of the stud opposite to the inclined face F' is preferably rounded or beveled, as shown, for a purpose to be set forth.

If desired, there may be another stud on the shaft or arbor situated diametrically opposite to the one shown and described.

While I have set forth a certain special shape of the stud, I desire it to be understood that I do not limit myself thereto. It may be in the form of a simple cylindrical pin attached to or formed on the arbor.

The operation of my mechanism is as follows: Regarding the pinion as being the driven part to be coupled with and drive the arbor or shaft A when the pinion is turning in the direction indicated by the arrow in Fig. 2, the ring D will by the engagement of the inclined faces of the projections B' B' and projecting portions D' D' on the pinion and ring, respectively, be forced away from the pinion side toward the stud F. When one of the recesses E E comes opposite the stud, the ring will then move out far enough to bring the abrupt side of the recess in position to engage the stud. As the space between the stud and the pinion is less than the length of one of the projections B', measuring from its outer end to the pinion side, plus the distance from the inner to the outer side of the projecting portions D' D', it follows that even when the stud occupies one of the recesses E the projections B' B' and projecting portions D' D' cannot pass by each other, so as to let the pinion revolve independently of the ring. The pinion, ring, and shaft must then turn together. With the stud having the inclined face F' and the recess E having the undercut abrupt end to engage the stud, the ring and stud will be securely connected together as long as the pinion turns in the direction described, and the pressure of the end of the recess against the stud will tend to hold the ring out toward the stud and not to force the same inward toward the pinion. If, now, the pinion is turned in the direction indicated by the

arrow in Fig. 3, the abrupt faces of the projections B' B' on the pinion will first engage the corresponding faces on the projecting portions D' D' on the ring D, so that the latter will be caused to move with the pinion around the arbor. As the ring thus moves the inclined end of the recess occupied by the stud strikes the round or beveled side of the latter. By its engagement with this face the stud will cause the ring to move inward toward the pinion until the outer side of the ring can pass freely by the stud. The pinion will then be free to continue its rotation in the direction indicated around the shaft. The rounding or beveling of the side of the stud which is to engage the inclined face or end of the recess E facilitates the camming inward of the ring described just above.

With the parts of the mechanism in the relative positions set forth the pinion can continue to turn noiselessly and without any of the rattle and click which comes from the ratchet mechanisms where a pawl is continuously working over ratchet-teeth during backing action. There is no riding in and out of a movable piece, as the ratchet-teeth successively pass by it, and consequently there is in my mechanism a great saving in wear of the parts as well as in noise and jar.

If, with the pinion uncoupled from the shaft, as described, the former be turned forward again in the direction indicated by the arrow in Fig. 2, the cam or inclined faces on the projections B' B' will, as they engage the corresponding inclined faces on the ring portions D' D', cam the ring outward away from the pinion, so that as soon as one of the recesses E E comes opposite to the stud the abrupt end E^2 of such recess will by the movement of the ring be brought at once into position to engage and be held by the stud. The parts are now in the position first described, and the pinion and shaft will be connected and must turn together, as the pinion cannot, on account of the engagement of its projections B' B' with the portions D' D' of the ring D, turn past the ring, and the latter cannot rotate past the stud F, on account of the engagement of the latter with the abrupt side of a recess E in the ring.

While I have shown and described the pinion as the driver and the shaft as the driven part, the latter can of course be the driver instead of the pinion without any change in the parts of the mechanism, except such as may be necessary to give the proper direction to the rotation of the pinion by the shaft.

If the pinion is to be driven by the shaft in the direction indicated by the arrow in Fig. 2, the directions in which the engaging surfaces on the pinion, ring, and stud extend should be changed.

In practice I have found that my ratchet mechanism is positive and quick in action, and is noiseless and not subject to any wear while the part to be coupled to another by it is being turned backward. As it has no

spring or springs, but only positively-acting parts, there is nothing in it which is liable to break or get out of order.

While my mechanism has been shown and described as applied to a pinion and shaft, it is equally applicable for securing the connection and disconnection of other movable pieces or devices.

Having thus described my invention, what I claim is—

1. In combination with the arbor having a stud, the rotary piece having on the side toward the stud a series of alternately-arranged inclined and abrupt surfaces, and a ring between the piece and stud having projecting portions to engage the inclines and abrupt surfaces on the rotary piece, and one or more inclined and abrupt surfaces on its side toward the stud, with each incline extending in a direction opposite to that of the inclined surface or surfaces on the rotary piece, substantially as and for the purpose specified.

2. In combination with an arbor having a stud, the rotary piece having on its side toward the arbor-stud a projection with inclined and abrupt faces, the ring between the rotary piece and stud having inclined and abrupt faces to engage the corresponding faces on the rotary piece, and a ratchet-shaped recess on the side toward the stud, substantially as and for the purpose shown.

3. In combination with an arbor having a stud, the rotary piece having ratchet-shaped projections on its side toward the stud, and the intermediate ring having inclined and abrupt faces to engage the similar faces on the rotary-piece projection, and with ratchet-shaped recesses on the side toward the stud, substantially as and for the purpose set forth.

4. In combination with a shaft or arbor having a stud, the rotary piece having one or more projections extending toward the arbor-stud, each having two surfaces, the one substantially at right angles and the other inclined to the direction of movement of the

projection as the rotary piece revolves, the ring on the arbor between the rotary piece and the stud having projecting portions each with an abrupt and inclined face corresponding in arrangement with the similar faces on the rotary-piece projection, and one or more ratchet-shaped recesses on its side toward the arbor-stud, each recess having its inclined face running in a direction opposite to that of the inclines on the projections of the rotary piece, substantially as and for the purpose described.

5. In combination with the pinion or rotary piece having several ratchet-shaped cam projections, each with an inclined and an abrupt face, the ring having on its side toward the pinion a series of alternately-arranged inclined and abrupt surfaces to engage the corresponding surfaces on the pinion projections and on its other side a series of oppositely-arranged inclined and abrupt faces, and the piece made rotary with reference to the pinion, having the stud situated so as to prevent the movement of the ring far enough from the pinion to allow disengagement of the engaging surfaces on the pinion and ring, substantially as and for the purpose specified.

6. In combination with the rotary piece having the ratchet-shaped projections, the ring having projecting portions provided with inclined and abrupt surfaces to engage the similar surfaces on the pinion projections and on its side away from the pinion inclines opposite to those on its inner side, and undercut abrupt faces at the inner ends of such inclines, the arbor and the stud thereon having the inclined face to engage the undercut abrupt faces on the ring, substantially as and for the purpose shown.

In testimony that I claim the foregoing I have hereunto set my hand this 17th day of December, A. D. 1889.

ELWOOD W. McGUIRE.

Witnesses:

ELIZABETH JONES,
ALVIN E. CROCKER.