Feb. 14, 1933. P. R. GLASS 1,897,046

FASTENER SUPPLYING MECHANISM

Original Filed Sept. 10, 1929

Fig. 1.

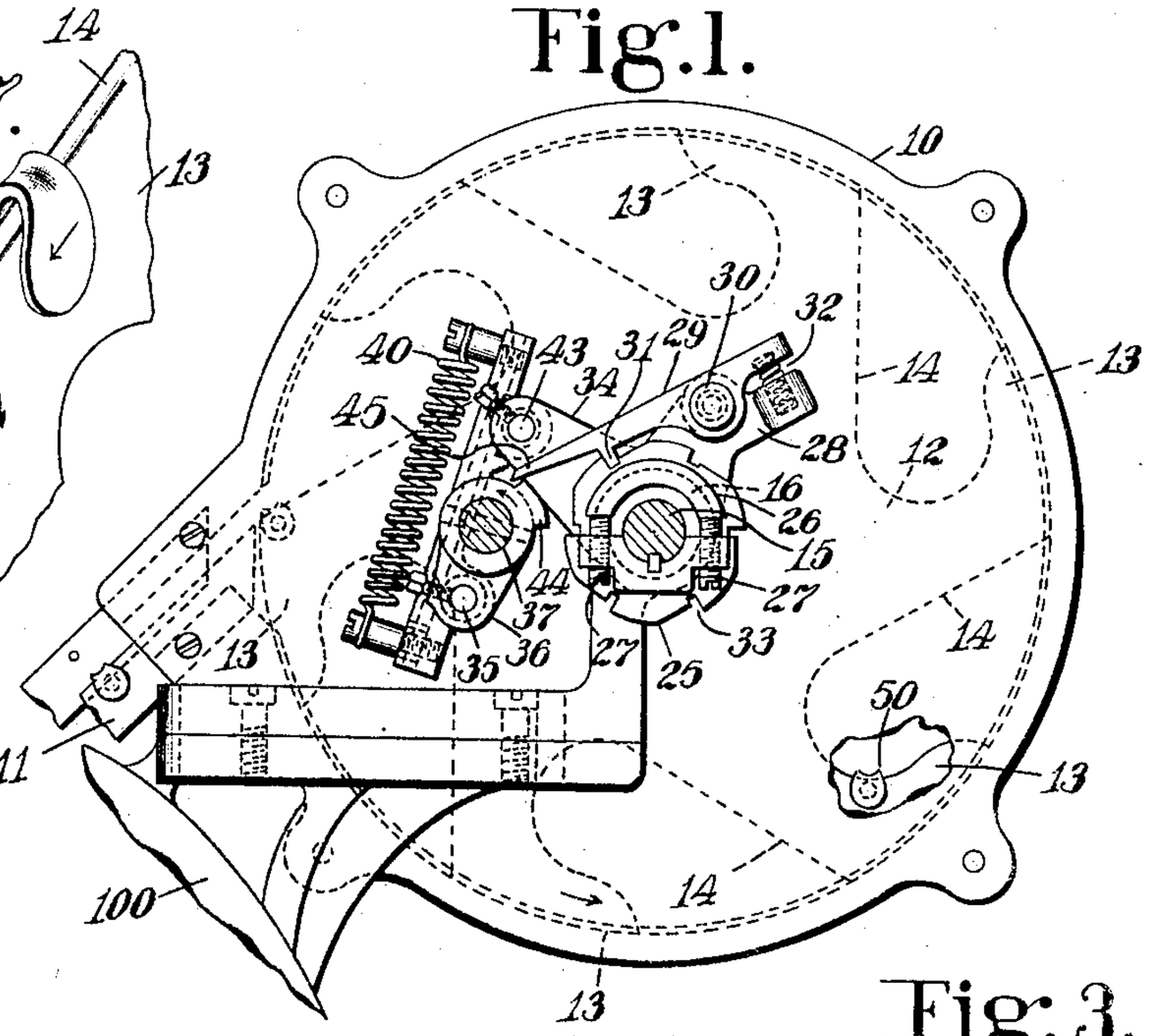



Fig. 7.




Fig. 2.

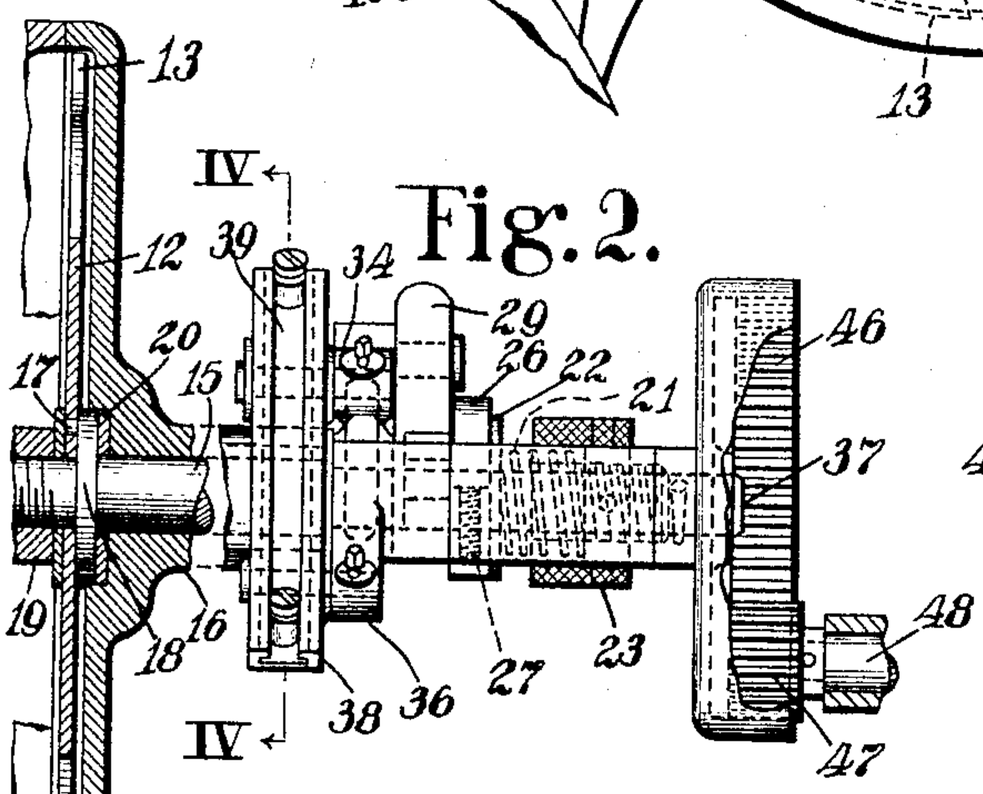



Fig. 3.

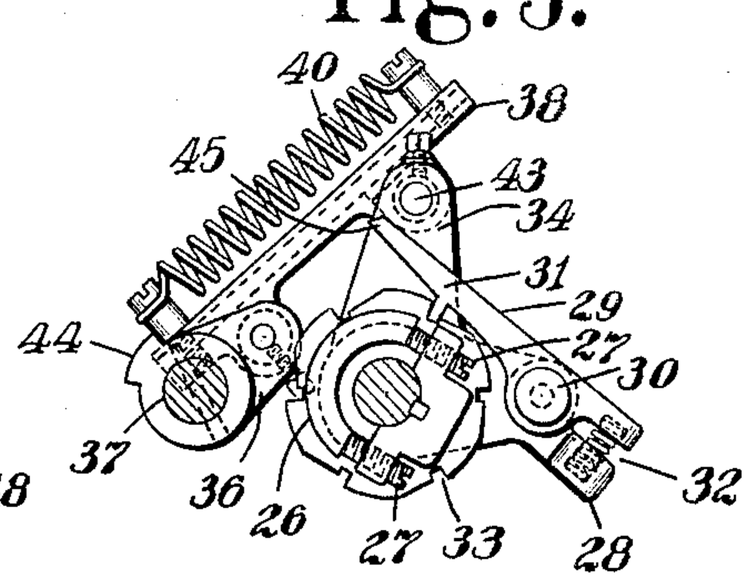



Fig. 4

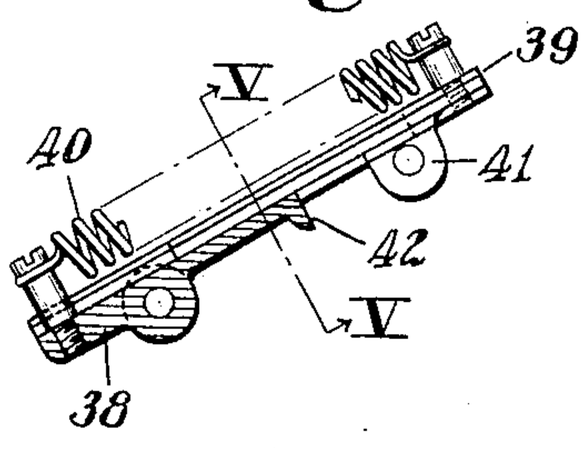



Fig. 6

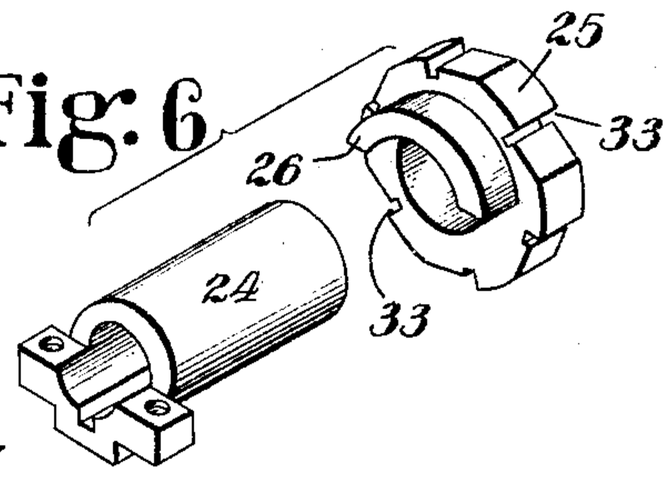
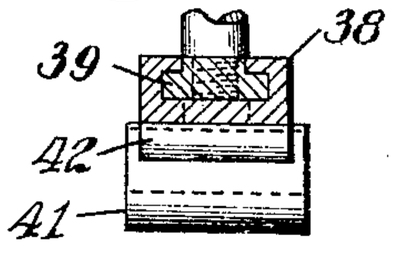



Fig. 5.

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By his Attorney,

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# UNITED STATES PATENT OFFICE

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## FASTENER SUPPLYING MECHANISM

Original application filed September 10, 1929, Serial No. 391,657. Divided and this application filed September 26, 1930. Serial No. 484,624.

This invention relates to apparatus for feeding fasteners from a hopper to a raceway and is herein illustrated as embodied in a construction more especially designed to feed lacing-hooks. Nevertheless, the invention is not limited to use in supplying fasteners of the type mentioned, although for convenience it will be described in terms relating to that type.

The subject-matter of the present invention is also illustrated and described in my copending application Serial No. 391,657, filed September 10, 1929, of which this application is a division.

The most approved type of hopper for supplying lacing-hooks to the raceway of a hook-setting machine comprises a rotary feeding member of well-known disk form having a series of notches by which its margin is divided into equally spaced hook-shaped blades. The disk is arranged to rotate about a horizontal axis so that its blades will dip into a mass of lacing-hooks lying below the axis. The thickness of the blades is less than the depth of the throats of the lacing-hooks, the "throats" being the spaces between the heads and the shoulders of the lacing-hooks. Consequently, the blades enter the throats of some of the lacing-hooks and scoop the latter from the mass. As each blade traverses the upper half of its cycle of rotation each lacing-hook lodged thereon slides along its leading edge and thence to the trailing edge (back edge) of the blade next in advance, and is discharged therefrom by the force of gravity when that edge is suitably inclined and in register with the receiving end of a raceway.

Successful operation of a feeding member of this type requires interrupting its rotation when the trailing edge of each blade is exactly in register with the raceway, the duration of the dwells being commonly about one-half second and the steps of rotational movement being of about the same duration. Moreover, to avoid bending or breaking the blades in case the feeding member encounters some abnormal obstruction, such as an improperly lodged lacing-hook, it has been common to provide operating mechanism capable of yielding though designed to drive the feeding member intermittently under normal conditions. One example of such a mechanism is illustrated in Letters Patent of the United States No. 811,839, granted February 6, 1906, on my application. However, no operating mechanism heretofore provided to drive a feeding member intermittently with a yielding action has also been capable of arresting the feeding member at its intended positions of dwell. Accordingly, it has been customary to provide a friction brake and to rely on that to arrest the rotation of the feeding member after each driving impulse imparted thereto, but the results obtained with such a combination are uncertain because the blades of the feeding member sometimes overrun the raceway and at other times they stop short of registering with the raceway. These errors of operation cannot be entirely avoided in former constructions because the effectiveness of a friction brake is altered by dirt and oil and is subject to other variable factors, one of which is the momentum of the feeding member.

With a view to avoiding such errors, an object of the present invention is to provide improved mechanism for rotating a feeding member step by step and arresting it at certain predetermined positions without sacrificing the important feature of a yielding element in the driving train to guard against damage to the feeding member whenever its rotation is otherwise arrested as by some abnormal obstruction.

Accordingly, a feature of the invention consists in a novel combination comprising a rotatable feeding member and resilient driving mechanism by which periodic power impulses are applied with resilient effect to turn the feeding member step by step under normal conditions, and by which the feeding member is prevented from overrunning certain predetermined positions of dwell. Thus, when, as in the illustrated construction, the feeding member is arrested as its blades are brought exactly into register with a raceway, one of the common causes of unsatisfactory operation is avoided. Preferably, and as

herein illustrated, the driving mechanism is constructed to arrest the feeding member coincidentally with the termination of each driving impulse.

Other features of the invention are herein illustrated and described.

Referring to the drawing,

Fig. 1 is a side elevation of a hopper from which fasteners are fed to a raceway leading therefrom, the view including improved mechanism, embodying the present invention, for operating the fastener-feeding member located in the hopper;

Fig. 2 is a front elevation, partly broken away, of the operating mechanism included in Fig. 1, and includes a portion of the hopper in vertical section, the direction of the view of Fig. 2 being from left to right of Fig. 1;

Fig. 3 is a view of the operating mechanism as shown in Fig. 1 except that the parts occupy different positions;

Fig. 4 is a longitudinal section of a resilient extensible connecting link included in each of the preceding figures and intersected by line IV—IV of Fig. 2;

Fig. 5 is a cross-section of the said link in the plane indicated by line V—V of Fig. 4;

Fig. 6 is a perspective view of a ratchet member and a sleeve member which, when assembled as shown in Figs. 1 and 3, provide for regulating the positions at which the blades of the feeding member dwell; and

Fig. 7 is a perspective view on a larger scale showing a fragment of a raceway and a fragment of one of the blades of the feeding member in registering relation, a lacing-hook being lodged on the blade of the feeding member and about to gravitate therefrom to the raceway.

The hopper 10, represented in Fig. 1, embodies a construction commonly used to supply lacing-hooks to the raceway of a machine for inserting and clenching the lacing-hooks. The fragmentary structure indicated at 100 is a portion of the frame of a hook-setting machine of the type illustrated and described in my copending application above referred to, and is the support to which the hopper 10 is attached. The raceway, a portion of which is indicated at 11, leads from the hopper 10 to conduct the lacing-hooks to the mechanism by which they are to be inserted and clenched. The upper end of the raceway extends into the hopper 10 and is inclined sufficiently to insure gravitation of the lacing-hooks lodged thereon.

The hopper 10 is provided with a rotatable fastener-feeding member 12 of well-known type in the form of a disk, the margin of which is cut away to form a series of hook-shaped blades 13. This feeding member is arranged to rotate about a horizontal axis so that the blades 13 will dip into a mass of lacing-hooks lying in the hopper, the blades being formed to pick up some of the hooks by entering the throats of those that lie in certain positions. A lacing-hook 50 is represented as having become lodged on the leading edge of the blade at the lower right of Fig. 1. The feeding member 12 is rotated in the direction indicated by an arrow in this figure, as a result of which the lacing-hook slides along the leading edge of the blade by which it is scooped from the mass and thence along the trailing edge 14 of the blade next in advance.

As the feeding member rotates, the edges 14 are brought successively into register with the upper edge of the raceway member 11 as shown in Figs. 1 and 7 and are permitted to dwell in that position while the lacing-hooks gravitate from the registered blades to the raceway. To insure the passage of the lacing-hooks from the blades of the feeding member to the raceway, accurate register of the edges 14 with the upper edge of the raceway is necessary, since if, through faulty register, a lacing-hook becomes obstructed at the point of transfer it will not only interrupt the delivery of lacing-hooks to the raceway but may also, in some cases, arrest the subsequent turning of the feeding member.

To guard against faulty register the present invention provides improved mechanism for both rotating the feeding member 12 step by step and arresting it at the termination of each driving impulse. The feeding member is affixed to a shaft 15 journaled in a bearing 16, a driving connection being afforded by a key 17 (Fig. 2) projecting into the feeding member from a collar 18 integral with the shaft. The feeding member is detachable from the shaft but is secured thereto by a nut 19 arranged to clamp it against the collar 18. A washer 20 of frictional material, such as leather, is interposed between the collar 18 and the bearing 16 for the purpose of providing a brake to maintain the feeding member frictionally against accidental turning movement during its periods of dwell. End-thrust of the collar 18 against the washer 20 is maintained by a compression spring 21 surrounding the shaft 15 and compressed between a washer 22 and a collar 23. This collar is affixed to the shaft but the washer 22 is sustained against endwise movement by a sleeve 24 interposed between it and the bearing 16. The sleeve 24 is splined to the shaft and is surrounded and driven by a ratchet-wheel 25 (Fig. 6), the number of teeth in the ratchet-wheel being equal to the number of blades 13 with which the feeding member 12 is provided. A segmental flange 26 formed on the ratchet-wheel is abutted by two opposed screws 27 carried by the sleeve 24. This construction constitutes an articulated and adjustable transmission coupling which provides for regulating the angular relation between the

ratchet-wheel and the feeding member so that the edges 14 of the blades may be set to insure their alinement with the raceway 11.

The sleeve 24 also serves as a fulcrum for an oscillatory pawl-carrier 28. An operating pawl 29 is mounted on a pivot pin 30 carried by the member 28 and is provided with a square lug 31 arranged to cooperate with the teeth of the ratchet-wheel. A compression spring 32 carried by the member 28 bears against the pawl 29 to maintain the lug 31 normally in engagement with the ratchet-wheel as shown in Figs. 1 and 3.

The teeth of the ratchet-wheel are separated from each other by square notches 33 of a width equal to the thickness of the lug 31. Throughout each driving stroke of the pawl the lug 31 occupies one of the notches 33 and thus prevents the ratchet-wheel from overrunning the pawl. Consequently, when the pawl reaches the terminal limit of its driving strokes the lug prevents the feeding member 12 from overrunning its several predetermined positions of dwell at which the edges 14 should register exactly with the raceway.

The pawl-carrier 28 is formed with an arm 34 by which it is oscillated. To-and-fro operating motion of the pawl-carrier is derived from an eccentric wrist-pin 35 carried by an arm 36 affixed to a continuously rotating shaft 37. The operating connection between the wrist-pin 35 and the arm 34 is resilient with respect to driving the feeding member but its action is positive with respect to arresting the rotation of the feeding member. This connection comprises two cooperative slidable tongue-and-groove members 38 and 39 (Figs. 4 and 5) and a tension spring 40 connecting them. These elements constitute an extensible link which, as shown in Fig. 4, may be drawn out to an abnormal length, whereas under normal conditions the spring 40 maintains the lug 41 of the part 39 against the abutment 42 formed on the part 38. The part 39 of this link is connected to the arm 34 by a pivot pin 43, while the part 38 is mounted on the wrist-pin 35. If, while the mechanism is operating, an obstruction prevents rotation of the feeding member 12 the operating motion of the wrist-pin 35 will be dissipated in distension of the link.

The radius of the arc through which the pivot pin 43 travels is considerably greater than the radius of the circle in which the wrist-pin 35 travels. Consequently, although the wrist-pin travels at a uniform rate of speed the operating pawl 29 is caused to move to and fro with harmonic motions. Each step of rotation of the feeding member 12 is therefore initially slow and gradually accelerative through the first half of its length and is thereafter gradually decelerative to its terminal limit.

It is to be observed that the feeding member 12 is brought to a state of rest positively by the lug 31 while the latter is seated in any one of the notches 33, but after the completion of each operating stroke of the pawl and while one of the blades of the feeding member is in register with the raceway 11 as shown in Fig. 1, the lug is lifted out of the notch that it has occupied during the feeding stroke just completed. For this purpose the hub of the arm 36 is provided with a boss 44 arranged to raise an extension 45 formed on the pawl 29 at the instant when the wrist-pin 35 reaches the neutral or dead-center position shown in Fig. 1. The length of the boss 44 is sufficient to maintain the lug 31 out of engagement with the ratchet until the lug has been moved clockwise out of register with the notch. Thereafter the lug 31 rides back over the next tooth of the ratchet and eventually drops into the next notch 33 as shown in Fig. 3. The friction of the washer 20 (Fig. 2) is sufficient to prevent turning movement of the feeding member while the lug 31 moves from notch to notch of the ratchet-wheel.

Any suitable mechanism may be provided for driving the shaft 37. As shown in Fig. 2, the driving train comprises an internal gear 46 affixed to the shaft 37 and a pinion 47 affixed to a continuously driven countershaft 48.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. An apparatus for supplying fasteners from a hopper to a raceway leading therefrom, comprising a fastener, feeding member rotatably mounted in the hopper in cooperative relation to the raceway, and resilient driving mechanism by which periodic power impulses are applied with resilient driving effect to turn said feeding member step by step under normal conditions, said mechanism being provided with relatively movable abutting members by which the feeding member is prevented from overruning certain predetermined positions of dwell.

2. An apparatus for supplying fasteners from a hopper to a raceway leading therefrom, comprising a fastener-feeding member rotatably mounted in the hopper in cooperative relation to the raceway, and resilient driving mechanism by which periodic power impulses are applied with resilient driving effect to turn said feeding member step by step under normal conditions, said mechanism being provided with relatively movable abutting members by which the feeding member is arrested coincidentally with the termination of each driving impulse.

3. An apparatus for supplying fasteners from a hopper to a raceway leading therefrom, comprising a fastener-feeding member rotatably mounted in the hooper in cooperative relation to the raceway, and driv-

ing mechanism including a notched wheel and a reciprocated operating pawl by which the feeding member is rotated step by step, said driving mechanism having means to arrest the feeding member at the completion of the feeding stroke.

4. An apparatus for supplying fasteners from a hopper to a raceway leading therefrom, comprising a feeding member rotatably mounted in the hopper and having a series of fastener-feeding blades arranged to register successively with the raceway, resilient mechanism arranged to drive said member step by step with resilient effect, and means to arrest the member as each of said blades reaches a position in register with the raceway.

5. An apparatus for supplying fasteners from a hopper to a raceway leading therefrom, comprising a feeding member rotatably mounted in the hopper and having a series of fastener-feeding blades arranged to register successively with the raceway, a notched wheel operatively connected to said feeding member, driving mechanism including a reciprocatory operating member provided with a driving lug for engaging the notches in said wheel successively, and driven means arranged to disengage said lug from the notched wheel after the latter has been arrested by the lug.

6. An apparatus for supplying fasteners from a hopper to a raceway leading therefrom, comprising a fastener-supplying member rotatably mounted in the hopper, a toothed wheel rigidly related to said member, a reciprocatory operating pawl, said pawl and the teeth of said wheel being formed not only to drive the wheel but also to arrest it, a crank by which said pawl is moved to and fro, and means driven in timed relation to said crank to disengage the pawl from said wheel whenever said crank passes one of its dead-center positions.

7. An apparatus for supplying fasteners from a hopper to a raceway leading therefrom, comprising a fastener-supplying member rotatably mounted in the hopper, a toothed wheel rigidly related to said member, a reciprocatory pawl arranged to operate said wheel, a crank by which said pawl is moved to and fro, and means rigidly related to said crank to disengage the pawl from said wheel whenever said crank passes one of its dead-center positions.

8. A mechanism for imparting step-by-step rotation to a rotary member for feeding fasteners from a supply-hopper, said mechanism comprising a ratchet-wheel by which the rotary member is driven, a reciprocatory operating pawl arranged to drive the ratchet-wheel, a rotary driven eccentric member by which the pawl is moved to and fro, and rotary driven means united with said eccentric member and arranged to disengage said pawl from the ratchet-wheel after the completion of each operating stroke of the pawl.

9. A mechanism for imparting step-by-step rotation to a rotary member for feeding fasteners from a supply-hopper, said mechanism comprising a ratchet-wheel by which the rotary member is driven, a reciprocatory operating pawl arranged to drive the ratchet-wheel, means arranged to move the pawl to and fro with a yieldable action in the driving direction and with a positive action in the reverse direction, and driven means arranged to disengage the pawl from the ratchet-wheel after the completion of each operative stroke of the pawl.

10. A mechanism for imparting step-by-step rotation to a rotary member having a series of blades for feeding fasteners from a hopper into a raceway, said mechanism comprising a ratchet-wheel by which said rotary member is operated, an operating pawl arranged to drive said ratchet-wheel, driven means arranged to move said pawl to and fro, and transmission means rigidly connecting said ratchet-wheel and said rotary member and provided with adjusting means for regulating the angular relation of the ratchet-wheel and the rotary member.

11. A mechanism for imparting step-by-step rotation to a rotary member having a series of blades for feeding fasteners from a hopper into a raceway, said mechanism comprising a ratchet-wheel in coaxial relation to said rotary member, an operating pawl arranged to drive said ratchet-wheel, driven means arranged to move said pawl to and fro, and articulated coupling means by which rotation of said ratchet-wheel is transmitted to said rotary member, said coupling means including adjusting means by which the angular relation of said ratchet-wheel and said rotary member may be regulated to bring about register of said blades with the raceway.

In testimony whereof I have signed my name to this specification.

PERLEY R. GLASS.