

March 3, 1942.

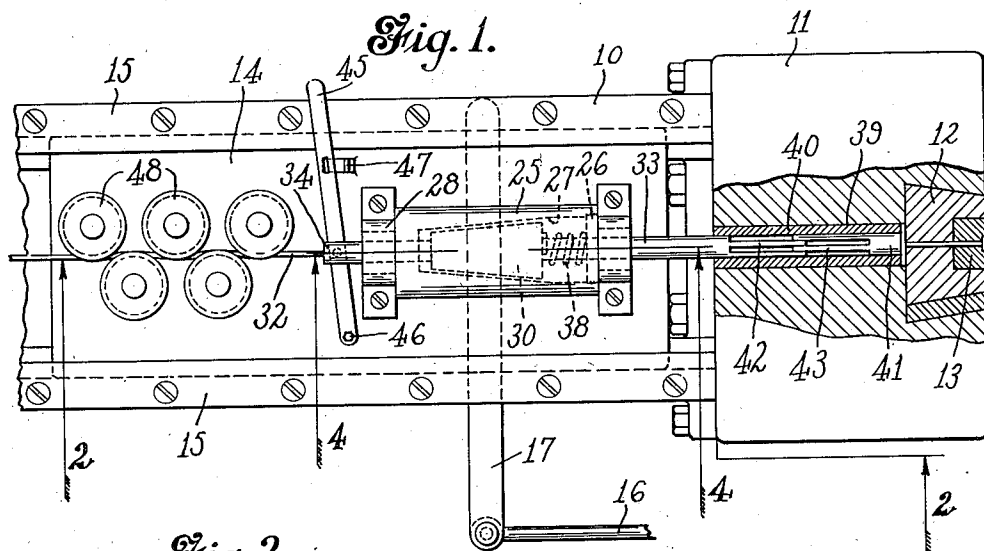
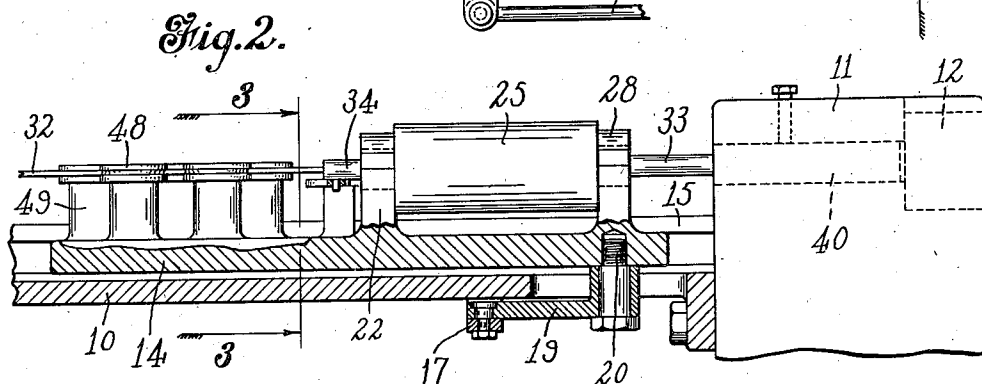
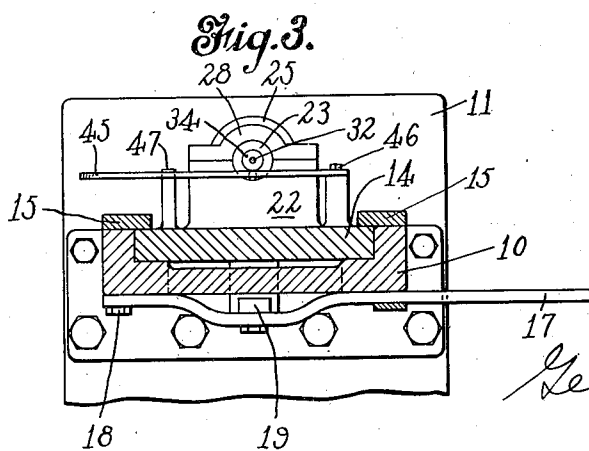
G. M. O'LOUGHLIN

2,275,269

WIRE-FEEDING DEVICE FOR HEADING MACHINES

Filed Aug. 1, 1940

3 Sheets-Sheet 1



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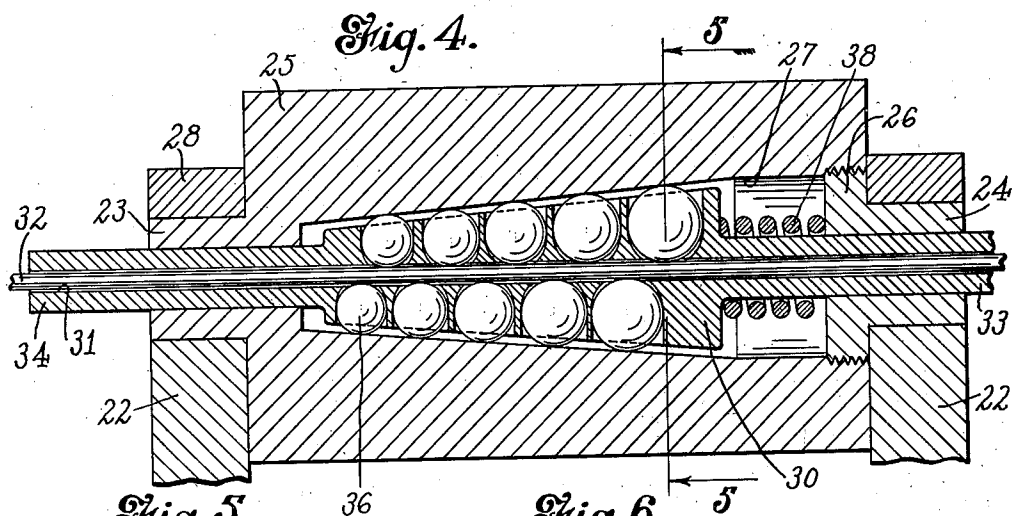
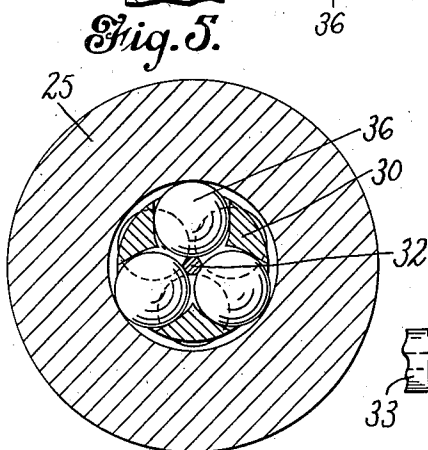
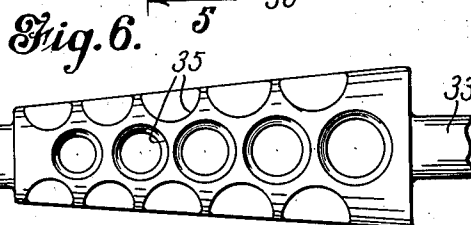
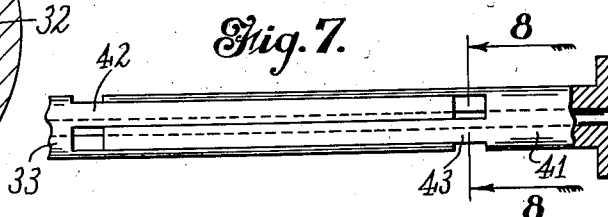
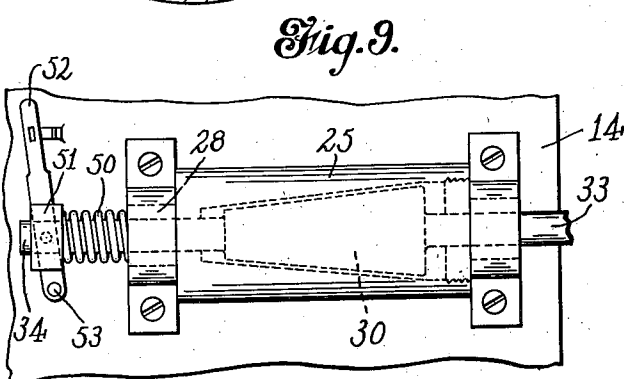
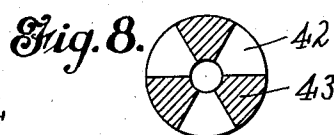
G. M. O'LOUGHLIN

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WIRE-FEEDING DEVICE FOR HEADING MACHINES

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3 Sheets-Sheet 2



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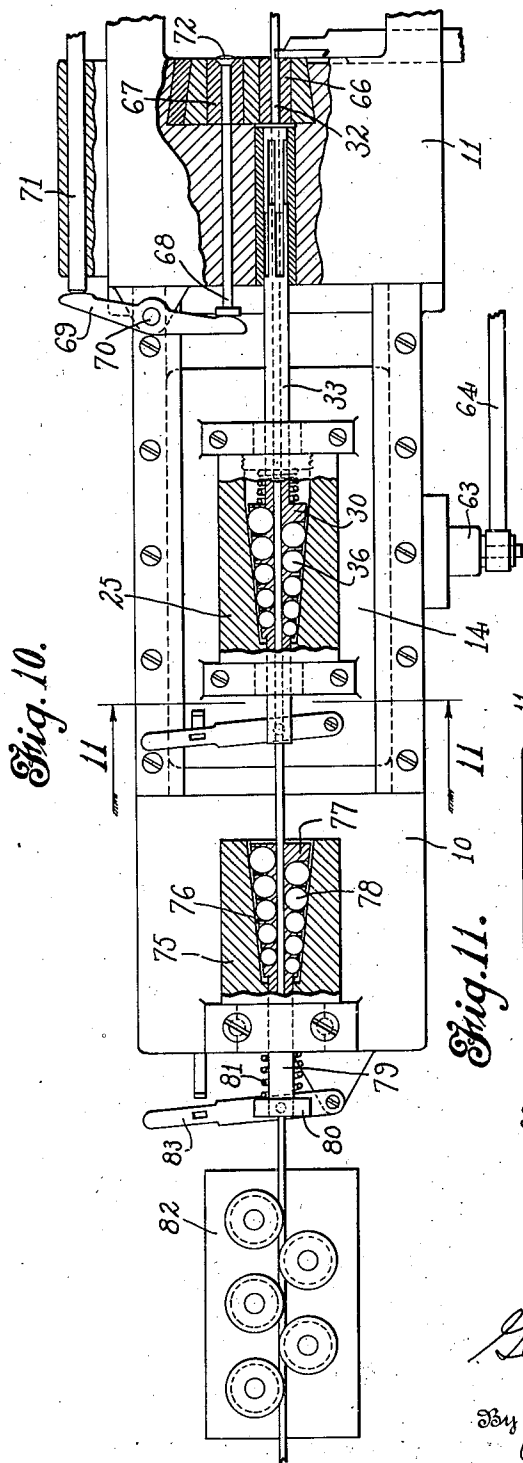
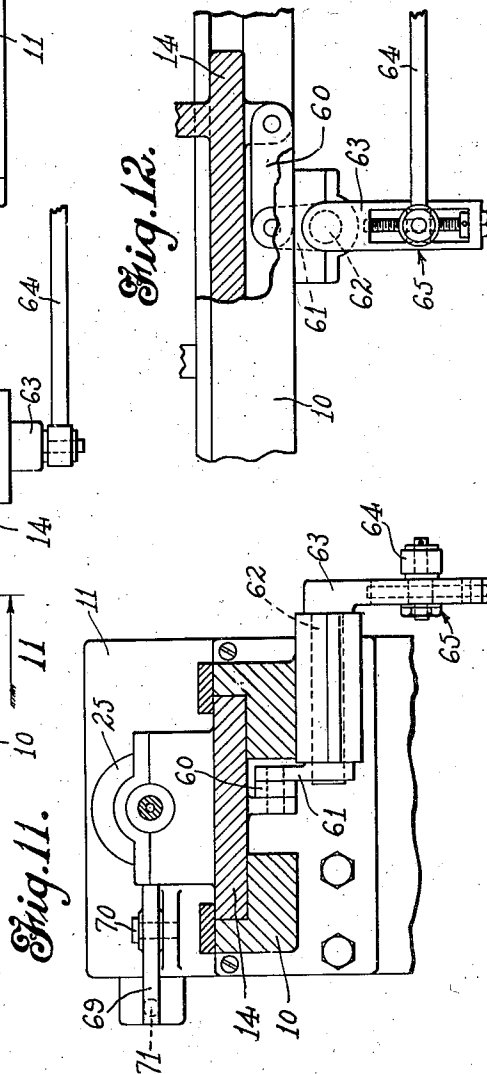
G. M. O'LOUGHLIN

2,275,269

WIRE-FEEDING DEVICE FOR HEADING MACHINES

Filed Aug. 1, 1940

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,275,269

WIRE-FEEDING DEVICE FOR HEADING MACHINES

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Application August 1, 1940, Serial No. 349,266

15 Claims. (Cl. 140—130)

This invention relates to wire-feeding devices, and more particularly to a wire-feeding device for machines such as heading machines, for example, in which it is desired to feed forwardly a predetermined length of wire stock in a step-by-step movement. While the invention is illustrated in connection with a heading machine, it will be understood that the invention is equally applicable to other devices wherein a step-by-step feeding movement is desired.

In machines of this character it is desired to have a predetermined length of wire stock accurately fed forward at each movement of the heading device, and it is also desirable that the gripping means of the feeding mechanism be such that, while it will grip the wire positively, at the same time it will not deform the wire so as to interfere with the finished product. As it requires that a certain amount of pressure be applied to the wire in order that it may be positively gripped, it is desirable to spread this pressure over as many points as possible to prevent deformation of the wire. By the present invention it is contemplated to provide a wire-feeding machine which will have a plurality of gripping members distributed not only about the circumference of the wire being fed, but also spaced longitudinally of the wire so that the latter may be gripped at a plurality of points, and therefore only a small amount of pressure need be applied to any one point.

The gripping members are so arranged that they will be forced into contact with the wire simultaneously, so that each of these members will actively perform its function and grip the wire with equal pressure.

One object of the invention is the provision of a new and improved wire-feeding device for heading or like machines.

Another object of the invention is the provision of an improved wire-feeding device of the character described, which shall be provided with a plurality of wire-gripping means spaced along the longitudinal dimension of the wire whereby the latter will be evenly gripped at a plurality of points along its length.

A still further object of the invention is the provision of a wire-feeding device having a plurality of gripping elements spaced along the longitudinal dimension of the wire and also about the circumference thereof, whereby the wire may be evenly gripped by these elements about its circumference, and also at a plurality of spaced points along its length.

A still further object of the invention is the

provision of a wire-feeding device having a plurality of wire-gripping elements so arranged that each element will grip the wire with a substantially equal frictional force, and so arranged that a relatively large number of such elements may be employed in a relatively small space.

The invention has also for its object improved wire-guiding means associated with the feeding device so that the wire will be accurately fed to the heading or other mechanism with which the feeding device is associated.

To these and other ends the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings:

Fig. 1 is a top plan view;

Fig. 2 is a sectional view on line 2—2 of Fig. 1;

Fig. 3 is a sectional view on line 3—3 of Fig. 2;

Fig. 4 is a sectional view through the gripping device on line 4—4 of Fig. 1;

Fig. 5 is a sectional view on line 5—5 of Fig. 4;

Fig. 6 is a detail elevational view of the ball carrier;

Fig. 7 is a detail elevational view of a portion of the wire guide;

Fig. 8 is a sectional view on line 8—8 of Fig. 7;

Fig. 9 is a top plan view of a gripping device of slightly modified construction;

Fig. 10 is a top plan view partly in section of a modified form of wire-heading machine;

Fig. 11 is a sectional view on line 11—11 of Fig. 10; and

Fig. 12 is an elevational view partly in section of the slide-operating mechanism.

To illustrate a preferred embodiment of my invention I have shown in Fig. 1 of the drawings a portion of a header or like machine comprising a frame member 10 and head 11, the latter carrying a die block 12 which supports the heading die 13. It will be understood that the invention is applicable to other devices, and that the features of the heading machine are illustrated merely for the purpose of showing one application of the invention.

On the frame member 10 is mounted a slide 14 held in place by plates 15 so that it may be reciprocated with respect to the frame. It will be understood that the slide may be reciprocated automatically from the power of the heading machine, and this may be done by means of the link 16 connected to a lever 17, this lever being pivoted at 18 and having connected thereto a link 19, which is in turn pivoted at 20 to the slide.

The slide 14 may be provided with standards 22 designed to receive at their upper ends the

reduced ends 23 and 24 of the casing 25 of the gripping mechanism. The part 24 is formed as a part of a screw cap 26 threaded into the end of a chamber 27 provided in the casing 25 and extending longitudinally thereof. Both members 23 and 24 are provided with openings to be hereinafter referred to, so that these members are tubular in form. The casing may be secured in place upon the standards 22 by means of the plates 28.

As shown more particularly in Fig. 4, the chamber 27 is of conical shape and tapers toward the rear end thereof considered in relation to the direction of the feed of the wire, which feed, as will be explained, is toward the right in Figs. 1 and 4 of the drawings. Within this chamber is mounted the wire-gripping mechanism, which in this instance comprises a plurality of balls and a carrier within which the balls are mounted. The carrier is shown at 30, and as illustrated is also conical in shape, the taper being in the same direction as that of the chamber 27, and also corresponding in degree to that of the chamber. This carrier has a longitudinal opening 31 extending therethrough to receive the wire stock 32, and is provided at each end with guide stems 33 and 34 through which the opening 31 extends and which project through the reduced end portions 23 and 24. The carrier 30 is also provided with a plurality of radially formed openings 35 in which are housed a plurality of ball members 36, these ball members being of a proper size to engage the wall of the chamber 27 at their outer poles, and the wire stock 32 at their inner poles, the openings in the carrier communicating with the longitudinal opening 31, and also opening through the outer periphery of the carrier for this purpose.

It may here be noted that the balls are graduated in size, being smaller at the small end of the chamber 27 and carrier 30, and gradually increasing in size toward the larger ends of these members. While variation in respect to the number and arrangement of the balls may be made, I have shown in the drawings, and particularly in Figs. 4 and 5, ten sets of ball members, each set being made up of three balls. The balls of each set are arranged about the periphery of the wire, as shown in Fig. 5, the axes of the radial openings to receive the balls lying at substantially 120° from each other. It will also be noted from reference to Figs. 4 and 5 that the balls of one set are staggered in relation to those of the adjacent sets. This staggered relation of the balls about the circumference of the wire enables me to provide a greater number of sets of gripping elements within a given space, and it will also be noted that the balls of one set will not grip the wire along the same longitudinal line as those of an adjacent set.

A compression spring 38 surrounds the stem 33 and tends to urge the carrier 30 toward the left, as shown in Fig. 4, or toward the smaller end of the chamber 27. This tends to maintain the outer poles of the balls against the inner wall of the chamber 27, and thus forces the gripping elements into contact with the wire 32, the balls being of slightly larger diameter than the thickness of the wall of the carrier 30 between the opening 31 and the outer periphery of the carrier. As shown, the wire will thus be gripped at thirty points distributed along the longitudinal dimension of the wire as well as about its circumference, although I do not, of course,

wish to be limited to the precise number or arrangement of the gripping elements.

The head 11 of the machine is provided with an opening 39 within which is mounted a tubular member 40 to receive the tubular guide stem 33 projecting from the carrier. This stem projects only part way through the member 40, and is mounted in the other end of this member is a second guide tube 41. The adjacent ends of the stem 33 and the guide tube 41 are slotted in Figs. 1, 7 and 8, to provide a plurality of fingers 42 and 43, the fingers of one member overlapping and dovetailing with the fingers of the other member to cooperate to form a complete tube. It will be understood that the guide stem 33 reciprocates with the wire gripper and slide 14, and this overlapping and dovetailed relationship of the fingers 42 and 43 provides for relative movements between the guide members 33 and 41, while still maintaining a tubular guide element about the wire at all times. For this purpose the fingers 42 and 43 will be as long, or slightly longer, than the length of the stroke of the slide 14. From the tubular guide 41 the wire stock passes through the die block 12 to the heading die 13 in a manner well understood in the art.

It may be desirable to provide means for releasing the hold of the gripping elements on the wire, so as to prevent the feeding operation. This may be accomplished by a lever 45 pivoted at 46 to the slide, and also pivoted intermediate its ends to the stem 34. A detent 47 may be provided upon the slide to hold the lever in adjusted position. It will be apparent that when the upper end of this lever is moved toward the right in Fig. 1 the carrier 30 will be moved toward the right against the tension of the spring 38 and thus release the grip of the balls upon the wire. Also mounted upon the slide 14 are a plurality of wire-straightening rollers 48 through which the wire passes to the gripper, these rollers being mounted upon posts 49 upon the slide, so that they are reciprocated with the slide to pass over the wire.

In Fig. 9 I have shown a slightly modified form of my invention wherein, instead of employing a spring such as 38 (shown in Fig. 4) within the chamber 27, I employ a spring 50 surrounding the stem 34 without the chamber to urge the carrier 30 toward the small end of the chamber. This spring acts against the standard 22 at one end and against a collar 51 secured on the stem 34 at the other end. A lever 52, pivoted at 53, may be connected to this collar to move it toward the right against the tension of the spring in order to relieve the grip of the balls on the wire, the lever 52 serving the same function as the lever 45 shown in Fig. 1.

It is believed that it will be clear from the foregoing description that when the slide 14 is reciprocated by means of the lever 17, the gripping mechanism will be moved to feed the wire stock in a step-by-step movement to the heading die. When the slide 14 is moved toward the left, the resistance of the wire 32 to movement in that direction will cause the carrier 30 to move relatively to the casing 25 toward the large end of the chamber 27 against the tension of the spring 38, so that the grip of the balls upon the wire is released, and the gripping mechanism will move freely over the wire stock in a rearward direction. When the direction of the slide is reversed and this member is moved toward the right, both the spring 38 and the movement

of the casing 25 will cause the carrier 30 to be moved toward the smaller end of the chamber 27, and the gripping elements will be caused to engage the walls of the chamber and press firmly at their inner portions upon the wire stock. The latter, being gripped at a number of points along its length and about its circumference, will be positively fed toward the right for an accurately predetermined distance, and at the same time the pressure of any one ball upon the wire will not be sufficiently great to deform the latter. Moreover, owing to the arrangement of the dovetailed overlapping fingers 42 and 43 on the guide members 33 and 41, the wire will be properly guided to the heading mechanism without any tendency to bend or kink.

In Figs. 10, 11 and 12 of the drawings I have shown a wire-heading machine of modified form, wherein the slide 14 is reciprocally mounted in the frame or bed 10, and carries the casing 25 of the wire-gripping mechanism, within which casing is a carrier 30 having the gripping balls 36 mounted therein, all as previously described in connection with the modification shown in Figs. 1 to 8. This device is also provided with the guide sleeve 33, previously described, which extends between the gripping mechanism and the die.

As shown in Figs. 11 and 12, the slide 14 may be reciprocated by means of a link 60 pivoted to the upper end of a crank arm 61 connected to a rock shaft 62, which rock shaft is provided with a second crank arm 63 having pivoted thereto the link 64 by which the crank arm may be oscillated. The end of the link 64 is adjustably connected to the crank arm 63, as shown at 65, so that the length of the feeding stroke may be varied.

The head 11 of the device is provided with a cut-off die 66 and a heading die 67. The heading die may be provided with a knock-out punch 68 operated by the lever 69 pivoted at 70, the lever being in turn operated by a rod 71, which rod is actuated from a movable part of the machine in the usual manner. It will be understood that in this type of machine the wire 32 is cut off adjacent the face of the die 66 and moved transversely to the heading die 67 to be headed over, as shown at 72. It will be understood that when the wire has been cut off it will be more or less loose in the die 66 and guide sleeve 33, and is apt to feed back slightly upon the return stroke of the slide 14, thus destroying the accuracy of the feed on the forward stroke. As it is, of course, desirable to have an accurate feed in order to deliver a product of uniform length from the machine, I have provided in the present device means for preventing this feed back of the wire. This means comprises a second gripper casing 75, which is provided upon a portion of the stationary frame 10 of the machine, the casing being provided with an internal chamber 76 of conical shape within which is mounted a carrier 77 of similar shape, which carrier is provided with balls 78. This gripping device acts in a manner similar to the gripper 25, previously described. To the carrier 77 is secured a hollow sleeve 79 which extends from the casing 75 and has a collar 80 secured upon its end. A spring 81, acting against a portion of the frame of the machine and against the collar 80, tends to urge the carrier to the left as shown in Fig. 10, so as to urge the carrier toward the smaller end of the cham-

ber 76, and thus maintain the balls in frictional contact with the wire 32.

The wire extends through the sleeve 79 and may pass through a wire straightener 82 of the usual form, although, as the balls 78 will themselves serve to straighten the wire, in many instances the additional straightener 82 may be dispensed with.

I may also provide a lever 83 pivoted to the collar 80 to move the collar to the right, as shown in Fig. 10, and relieve the grip of the balls upon the wire, so that the latter may be freely pulled through this grip mechanism when desired. It is understood that the lever 83 will act in the same manner as the lever 51 described in connection with the disclosure of Fig. 9 of the drawings.

It will be understood that, as the gripping device in the casing 75 is on a fixed part of the frame, this device will not move, but will permit the wire to be moved freely therethrough toward the heading mechanism by means of the grip feeding device 25, 30 and 36. The movement of the wire in this direction tends, of course, to move the balls and carrier 77 toward the right, and thus relieve the pressure of the balls upon the wire. When, however, the feed-gripping mechanism moves toward the left, any tendency of the wire 32 to move toward the left will be resisted by the pressure of the balls 78 thereon, as the tendency of the wire to move in this direction would have a tendency to force the carrier 77 toward the left and thus cam the balls into contact with the wire. The wire will, therefore, be effectually held against a return movement, and the feed-gripping mechanism will pass over the wire and secure a grip at a new point thereon, which will be accurately determined by the length of the stroke, so that the length of wire fed to the die will in turn be accurately determined. When the wire moves to the right through the carrier 77 and balls 78, these balls will have a straightening effect thereon, and thus this mechanism serves a double purpose.

While I have shown and described some preferred embodiments of my invention, it will be understood that it is not to be limited to all of the details shown, but is capable of modification and variation within the spirit of the invention and within the scope of the appended claims.

What I claim is:

1. In a wire-feeding device, a reciprocable member provided with a chamber having a continuously tapered surface, a wire gripper within said chamber, said gripper comprising a plurality of sets of balls adapted to be engaged by the tapered surface of the chamber and forced inwardly to engage a wire passing between them, each set comprising a plurality of balls disposed in a plane extending transversely of the wire, and said sets being spaced longitudinally of the wire whereby the latter is gripped at a plurality of spaced points along its length.
2. In a wire-feeding device, a reciprocable member provided with a chamber having a continuously tapered surface, a wire gripper within said chamber, said gripper comprising a plurality of sets of balls adapted to be engaged by the tapered surface of the chamber and forced inwardly to engage a wire passing between them, each set comprising a plurality of balls disposed in a plane extending transversely of the wire, said sets being spaced longitudinally of the wire whereby

the latter is gripped at a plurality of spaced points along its length, and said balls being graduated in size to correspond to the taper of the chamber.

3. In a wire-feeding device, a reciprocable member provided with a chamber having a continuously tapered surface, a wire gripper within said chamber, said gripper comprising a plurality of sets of balls adapted to be engaged by the tapered surface of the chamber and forced inwardly to engage a wire passing between them, each set comprising a plurality of balls disposed in a plane extending transversely of the wire, said sets being spaced longitudinally of the wire whereby the latter is gripped at a plurality of spaced points along its length, a carrier for said balls, and said carrier having a longitudinal opening for the wire and transverse openings in which the balls are disposed.

4. In a wire-feeding device, a reciprocable member provided with a chamber having a continuously tapered surface, a wire gripper within said chamber, said gripper comprising a plurality of sets of balls adapted to be engaged by the tapered surface of the chamber and forced inwardly to engage a wire passing between them, each set comprising a plurality of balls disposed in a plane extending transversely of the wire, said sets being spaced longitudinally of the wire whereby the latter is gripped at a plurality of spaced points along its length, a carrier for said balls, said carrier having a longitudinal opening for the wire and transverse openings in which the balls are disposed, and said carrier having a tapered outer surface with its smaller end disposed in the smaller end of the chamber.

5. In a wire-feeding device, a reciprocable member provided with a chamber having a continuously tapered surface, a wire gripper within said chamber, said gripper comprising a plurality of sets of balls adapted to be engaged by the tapered surface of the chamber and forced inwardly to engage a wire passing between them, each set comprising a plurality of balls disposed in a plane extending transversely of the wire, said sets being spaced longitudinally of the wire whereby the latter is gripped at a plurality of spaced points along its length, and spring-pressed means urging said balls toward the smaller end of the chamber.

6. In a wire-feeding device, a reciprocable member provided with a chamber having a continuously tapered surface, a wire gripper within said chamber, said gripper comprising a plurality of sets of balls adapted to be engaged by the tapered surface of the chamber and forced inwardly to engage a wire passing between them, each set comprising a plurality of balls disposed in a plane extending transversely of the wire, said sets being spaced longitudinally of the wire whereby the latter is gripped at a plurality of spaced points along its length, a carrier for said balls, said carrier having a longitudinal opening for the wire and transverse openings in which the balls are disposed, and spring means acting on said carrier to urge it toward the smaller end of the chamber.

7. In a wire-feeding device, a reciprocable member provided with a chamber having a continuously tapered surface, a wire gripper within said chamber, said gripper comprising a plurality of sets of balls adapted to be engaged by the tapered surface of the chamber and forced inwardly to engage a wire passing between them, each set comprising a plurality of balls disposed in a

plane extending transversely of the wire, said sets being spaced longitudinally of the wire whereby the latter is gripped at a plurality of spaced points along its length, spring-pressed means urging said balls toward the smaller end of the chamber, and means to relieve the pressure of said spring to release the grip of said balls on the wire.

8. In a wire-feeding device, a reciprocable member provided with a chamber having a continuously tapered surface, a wire gripper within said chamber, said gripper comprising a plurality of sets of balls adapted to be engaged by the tapered surface of the chamber and forced inwardly to engage a wire passing between them, each set comprising a plurality of balls disposed in a plane extending transversely of the wire, said sets being spaced longitudinally of the wire whereby the latter is gripped at a plurality of spaced points along its length, a carrier for said balls, said carrier having a longitudinal opening for the wire and transverse openings in which the balls are disposed, said carrier having a stem projecting from the chamber, and a spring surrounding the projecting portion of said stem and acting to urge said carrier toward the smaller end of the chamber.

9. In a wire-feeding device, a reciprocable member provided with a chamber having a tapered surface, wire-gripping means within said chamber, said means comprising a plurality of sets of balls adapted to be engaged and forced inwardly by the tapered surface of the chamber, each set comprising a plurality of balls disposed in a plane extending transversely of the wire to engage the latter when passed between them, said sets being spaced longitudinally of the wire whereby the latter is gripped at a plurality of spaced points along its length, and the balls of one set being staggered on the circumference of the wire with respect to those of an adjacent set.

10. In a wire-feeding device for a heading machine, a frame member, a slide reciprocable thereon, a wire-gripping means carried by said slide, a tubular guide stem movable with the slide to guide the wire therefrom, a second tubular guide member on the frame aligned with said stem, and said stem and member having overlapping and interfitting fingers on their adjacent ends which cooperate to form a guide tube and permit relative movement of said members without interrupting their wire-guiding relation.

11. In a wire-feeding device for a heading machine, a frame member, a slide reciprocable thereon, a carrier in said slide, a tubular guide stem secured to said carrier and projecting from the slide, a second tubular guide member carried by said frame, said stem and member having overlapping and interfitting fingers on their adjacent ends which cooperate to form a guide tube and permit relative movement of said stem and member without interrupting their wire-guiding relation.

12. In a wire-feeding device, a reciprocable member provided with a chamber having a tapered wall, wire-gripping means within said chamber, said means comprising a carrier and a plurality of balls mounted in the carrier and adapted to engage the wall of the chamber and be forced thereby into contact with a wire passing therethrough, said balls being arranged to grip the wire at spaced points about its circumference and at spaced points along its length.

13. In a wire-feeding device, a reciprocable member provided with a chamber having a ta-

pered wall, a wire-gripping means within said chamber, said means comprising a carrier and a plurality of balls mounted in the carrier and adapted to engage the wall of the chamber and be forced thereby into contact with a wire passing therethrough, said balls being arranged to grip the wire at spaced points about its circumference and at spaced points along its length and being graduated in size from the smaller to the larger end of the chamber.

14. In a wire-heading machine, a die, reciprocable means to feed the wire through the die in a step-by-step movement, a fixed wire-holding device to prevent the rearward movement of the wire with the backward stroke of the feeding means, said device comprising a tubular carrier having an opening through which the wire passes, a plurality of sets of balls mounted in the walls of the carrier, and each set comprising a plurality of balls and said sets being spaced along

the length of the wire, and means to cam said balls into contact with the wire upon any rearward movement of the latter.

15. In a wire-heading machine, a die, a reciprocable means to feed the wire through the die in a step-by-step movement, a fixed wire-holding device to prevent the rearward movement of the wire with the backward stroke of the feeding means, said device comprising a tubular carrier having an opening through which the wire passes, a plurality of balls mounted in the walls of the carrier, and means to cam said balls into contact with the wire upon any rearward movement of the latter, said holding device permitting the wire to move freely through the carrier in a forward direction, and said balls being arranged to grip the wire at spaced points about its circumference and at spaced points along its length.

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