Aug. 4, 1936. A. J. LEWIS 2,049,914

WIRE FEED

Filed Dec. 24, 1934 2 Sheets-Sheet 1

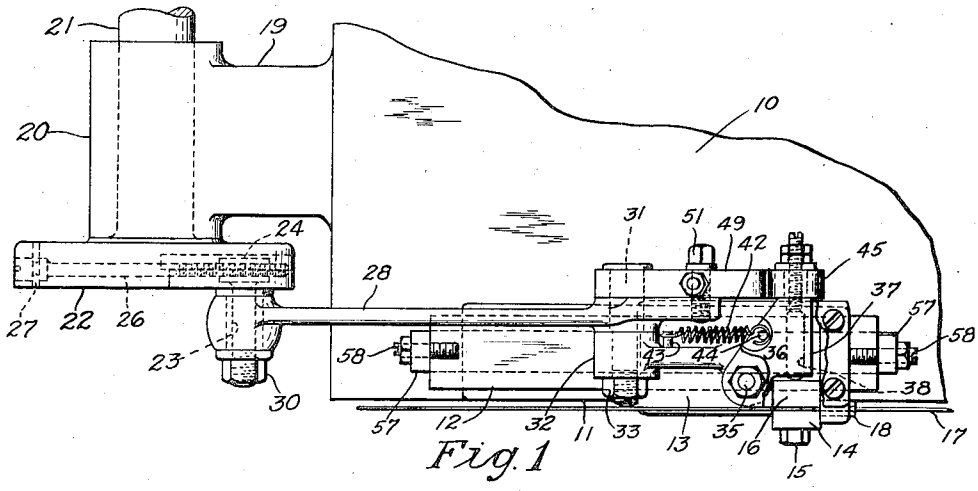


Fig. 1

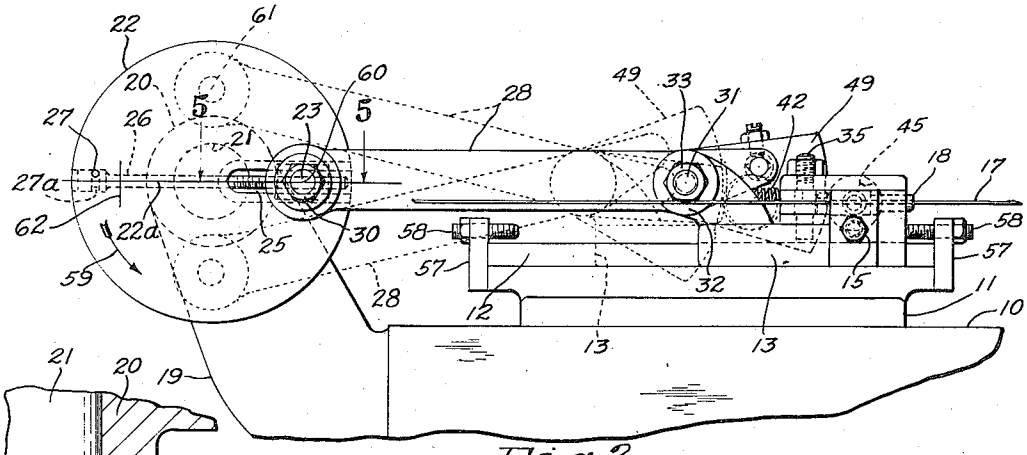


Fig. 2

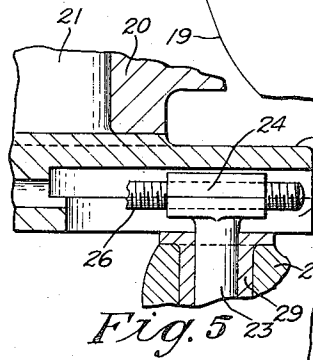


Fig. 5

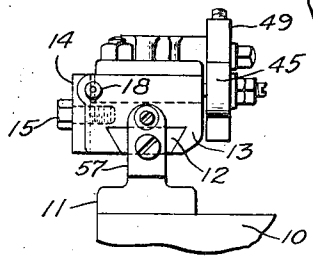


Fig. 4

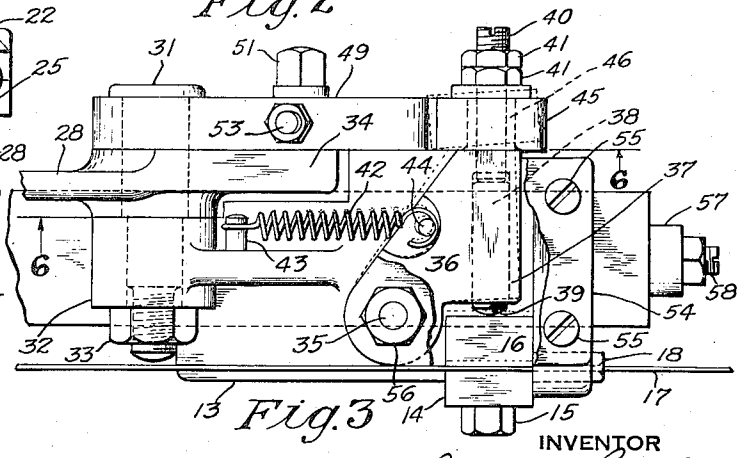


Fig. 3

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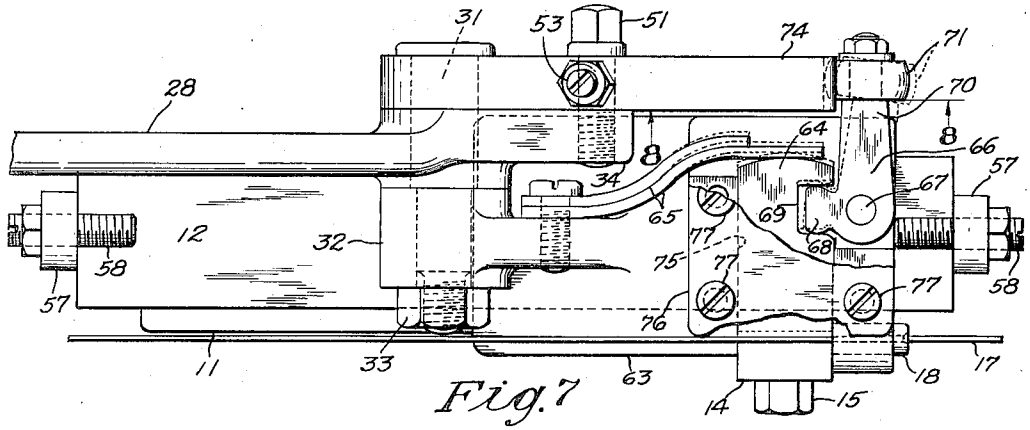


Fig. 7

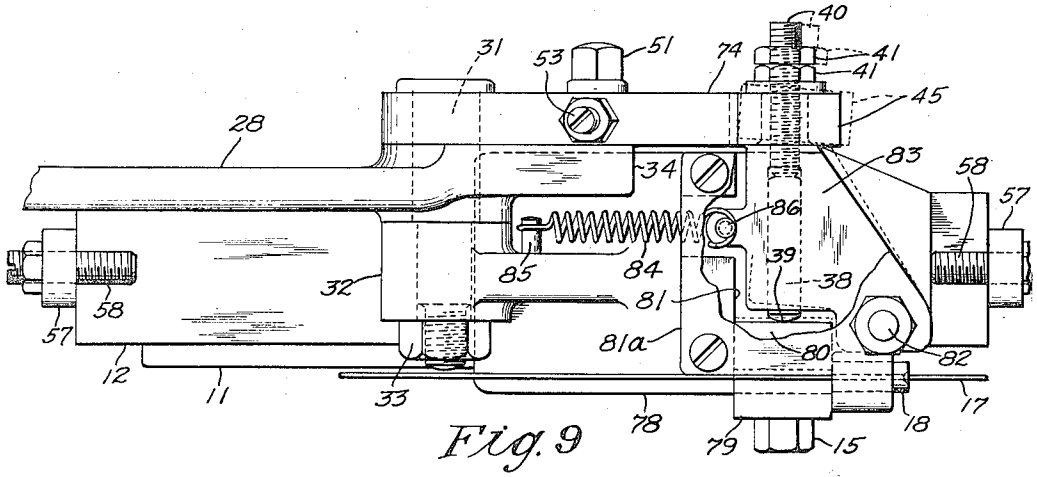


Fig. 9

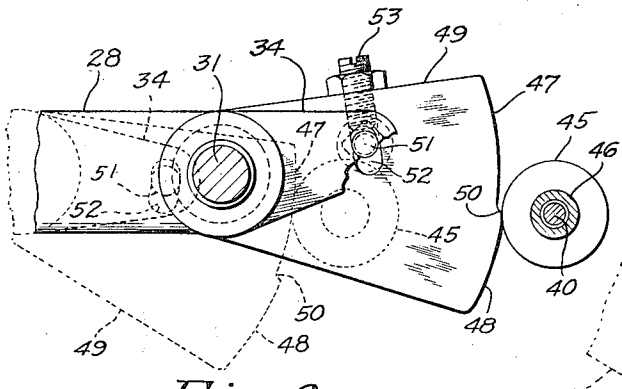


Fig. 6

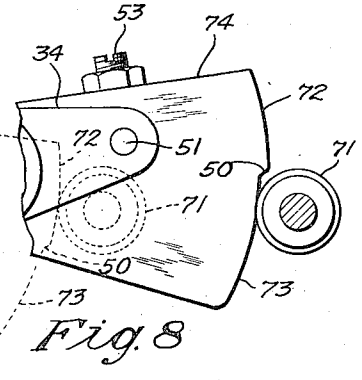


Fig. 8

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UNITED STATES PATENT OFFICE

2,049,914

WIRE FEED

Arthur J. Lewis, Stratford, Conn., assignor to The Baird Machine Company, Bridgeport, Conn., a corporation of Connecticut

Application December 24, 1934, Serial No. 759,024

19 Claims. (Cl. 140—130)

This invention relates to new and useful improvements in wire feeds for wire forming machines or for any machines requiring the feeding of wire in relatively short lengths.

An object of the invention is to provide a mechanism whereby a wire is fed forwardly the same predetermined distance during each successive feeding movement of the mechanism.

Another object is to provide a wire feed in which the wire is gripped and released by a lever connected to a rotating crank, and the wire is gripped as the crank is passing at right angles to the direction of motion of the slide or feed so that the grip is effected when the feed slide is stationary.

A further object is to provide a wire feed mechanism of simplified construction and including convenient adjustments whereby the mechanism is adapted for the handling of different diameters of wire or for the feeding of the wire accurately in the desired lengths.

Other objects and advantages will become apparent from a consideration of the following detailed description taken in connection with the accompanying drawings wherein satisfactory embodiments of the invention are shown. However, it will be understood that the invention is not limited to the details disclosed but includes all such variations and modifications as fall within the spirit of the invention and the scope of the appended claims.

In the drawings:

Fig. 1 is a top plan view showing a wire feed mechanism constructed according to the present invention and with a portion of a top or cover plate broken away;

Fig. 2 is a side elevational view looking from the lower side of Fig. 1;

Fig. 3 is an enlarged top plan view of a forward portion of the mechanism shown in Fig. 1;

Fig. 4 is an end elevational view looking from the right in Fig. 2;

Fig. 5 is an enlarged detail sectional view taken substantially along the line 5—5 of Fig. 2;

Fig. 6 is a detail sectional view taken substantially along the line 6—6 of Fig. 3;

Fig. 7 is a view somewhat similar to Fig. 3 but showing a modified construction;

Fig. 8 is a detail sectional view taken substantially along the line 8—8 of Fig. 7; and

Fig. 9 is a view similar to Fig. 7 but showing a slightly different construction.

Referring in detail to the drawings, and at first particularly to Figs. 1 through 6 thereof, at 10 is shown a support, which may be a part of the base of a wire forming machine or the like, on which is mounted the improved wire feed. The latter comprises a base 11 including a guide rail 12 on which is mounted a slide 13. The slide has a dove-tail connection with the guide rail 12 as shown best in Fig. 4, whereby the slide may be given reciprocating movement along the guide but has no other movement relative to the guide.

On the slide 13 is a stationary jaw 14 secured as by a bolt 15, and opposite the jaw 14 is a movable jaw 16. The wire 17, being fed, passes between the jaws 14 and 16 and through a quill 18, and the jaw 16 is movable toward and from the jaw 14 to grip and release the wire. Projecting from the support 10 is a bracket 19 carrying a bearing 20 in which is a rotatable shaft 21 driven by any suitable means (not shown) and at one end carrying a wheel or disc 22 mounting a crank 23.

Crank 23 is adjustable toward and from the center of the wheel 22 whereby the throw of the crank may be varied, and to this end the crank is carried on a slide 24, adjustable in a radial slot or recess 25 in the wheel. A relatively long bolt 26 extends diametrically across the wheel and along the slot or recess 25 and is threaded through the slide 24, and it will be apparent that on said bolt being turned in one direction or the other the slide 24 will be adjusted toward or from the center of the wheel and will carry the crank 23 with it so as to vary the eccentric relation of the crank with the axis of the wheel, and thereby vary the throw of the crank. A pin or key 27 in a groove 27a in the bolt head prevents longitudinal movement of bolt 26 so that turning movement of said bolt must result in sliding movement of the slide 24 radially of the wheel.

A connecting rod 28 connects the crank 23 with the slide 13, and the rear end portion of the connecting rod receives the crank and may be bushed as at 29. It is secured on the crank by any suitable means as by a nut 30. Connecting rod 28 has its forward end portion pivotally secured to the rear portion of the slide 13 as by means of a pin or bolt 31 passing through the forward portion of the connecting rod and through an enlarged portion or eye 32 of the slide, the pin or bolt being secured as by a nut 33. The connecting rod includes a portion 34 projecting forwardly of the pivot pin 31 and the purpose of such portion will later be fully described.

Pivotally mounted on the slide 13 as by a bolt 35 is a lever 36 including a portion 37 overlying the movable jaw 16. Such portion of the lever

is provided with a recess or pocket receiving a slidable pin 38 having an end portion 39 extending out of the lever and engaging the rear of the jaw 16. A bolt 40 engages the inner end of the pin 39 and is adjustable inwardly or outwardly to cause the end 39 of the pin to project more or less from the lever as will be understood and the bolt 40 may be provided with lock nuts 41. A coil spring 42 has one end anchored to the slide as by being engaged over a pin 43 and has its other end anchored to the lever as by being engaged over a pin 46. It will be apparent that the normal tendency of this spring is to rock the lever 36 about its pivot 35 in a direction to carry the projecting end 39 of the pin 38 away from the movable jaw 16.

A roller 45 is mounted on the lever 36 for turning movement about a tubular portion 46 of said lever, and this roller cooperates with a lower cam surface 47 and a higher cam surface 48 (see Fig. 6) on an extension or cam 49 movable with the connecting rod 28. The cam surfaces 47 and 48 are separated by an offset 50 and the roller 45 cooperates with said cam faces in the shifting of the jaw 16 toward the jaw 14 and in the releasing of the jaw 16 for the return movement of the slide as will later more fully appear. Spring 42 holds the roller 45 pressed against the cam surfaces. Pivot pin 31 passes through the rear end portion of the extension or cam 49, and while this extension is movable with the connecting rod it is also adjustable relative thereto.

To provide for the adjustment a clamping screw 51 is passed through an elongated opening 52 in the extension and is threaded into the projecting end portion 34 of the connecting rod. An adjusting screw 53 is threaded in the extension and its lower end enters into the slot 52, and it will be apparent that on turning said screw in one direction or the other while its clamping screw is loose the extension 49 may be adjusted relative to the connecting rod. With this adjustment the offset 50 between the cam surfaces 47 and 48 of the extension may be properly located to have the correct surface engage the roller 45 at exactly the right time.

Preferably a cover plate 54 is placed over the lever 36 and the movable jaw 16, and this cover plate may be secured in place as by screws 55 and a nut 56 on the upper end of the bolt 35. Upstanding lugs 57 at the respective ends of the guide rail 12 each carry a screw 58 and these screws are adjustable through the lugs and function as stops to limit movement of the slide 13 in each direction.

In the operation of the device, assuming that the wheel 22 and crank 23 are rotating in the direction of the arrow 59 of Fig. 2 and that the crank 23 is at the dead center position 60 of said figure, the roller 45 of the lever 36 will be at the upper end of the high cam surface 48 as shown by the full lines in Fig. 6, and the lever 36 will be in such position that the projecting end 39 of the pin 38 is holding the jaw 16 in position clamping the wire 17 to the stationary jaw 14. This is the position of the parts at the end of a forward or wire feeding movement of the slide 13. As the wheel 22 continues its movement the crank 23 is being moved substantially vertically upwardly through its dead center position with the result that the connecting rod 28 is rocked about the pin or pivot 31 in a direction to carry the extension or cam 49 downwardly.

When this occurs the high cam surface 48 moves away from the roller 45 and the spring 42 acts to shift the lever and move the same to the dotted line position of Fig. 3, bringing the roller 45 into engagement with the lower cam surface 47. As the spring moves the lever 36 in the direction described the jaw 16 is released so that the wire is released. Continued movement of the wheel 22 results in continued movement of the crank 23 upwardly and rearwardly through the dotted position 61 with the result that the slide is drawn rearwardly or given its return movement, and the timing is such that when the crank reaches the dead center position 62 the slide is fully withdrawn or has completed its return stroke. When the crank is in this position the offset 50 in the cam is against roller 45 so this roller runs up on the raised surface 48 of the cam when the crank passes the center line 22*a*.

As the crank moves through the dead center position 62 the connecting rod 28 has its rear end portion rocked downwardly about the pivot 31 as an axis, with the result that the forward or cam surface of the extension 49 is carried upwardly so that its high cam surface 48 is brought under the roller 45. This forces the lever 36 about its pivot 35 against the action of the spring 42 in a direction to have the projecting end of the pin 38 force the jaw 16 toward the jaw 14 whereby to grip the wire 17. On continued movement of the wheel 22 the connecting rod is carried forwardly, and since the wire is gripped it is fed forwardly.

Attention is particularly directed to the fact that the connecting rod is rocked about the pivot 31 in a direction to bring the high cam surface 48 against the roller 45 and thereby cause the lever 36 to move the jaw 16 to gripping position, during the time that the crank 23 is passing through dead-center position 62, at right angles to the direction of motion of the slide. That is, the gripping of the wire takes place during a time when the slide is practically stationary at the end of a return stroke and the beginning of a feeding stroke. Similarly, the jaw 16 is released as the crank is passing upwardly through dead-center position 60 at right angles to the direction of motion of the slide and while the slide is substantially stationary. The crank is rigidly connected to the slide so that the slide takes the full stroke of the crank and the length of the wire fed at each stroke is the length of the throw of the crank. The wire is gripped as the crank moves through one dead center and released as the crank moves through the other dead center and while the slide is practically stationary at the ends of its respective movements, and so the wire will always be fed the same distance.

Figs. 7 and 8 show a modified construction, but where the parts are the same as those previously described and function in the manner previously described they have been given the same reference characters. In the modification the slide is designated 63 and is to be reciprocated on the guide 12 by a crank (not shown) operating through a connecting rod 28 all as previously described. A movable jaw 64 is slidable toward and from the stationary jaw 14 to grip and release the wire 17, and bearing against the outer end of the jaw 64 is a spring 65 the normal and constant tendency of which is to move the jaw 64 to grip the wire.

A lever 66 is pivoted on the slide at 67, and includes an arm 68 entering a recess 69 in one edge of the jaw 64. The other arm 70 of the lever carries a roller 71 cooperating with the high

and low cam surfaces 72 and 73 of an extension or cam 74 carried by the connecting rod and adjustable relative thereto by the screws 51 and 53. A comparison of Figs. 7 and 8 will show that the high and low cam surfaces 72 and 73 of the extension or cam 74 have their positions reversed as compared with the corresponding surfaces of the extension or cam 49. Therefore, assuming that the crank operating the slide 63 is moving in a counter clockwise direction, the connecting rod 28 will have its forward end rocked downwardly during return movement of the slide, with the result that during such movement the high cam surface 72 of the extension 74 will be against the roller 71 as shown by the dotted lines in Fig. 8 so that the latter and the lever 66 will be in the dotted line position of Fig. 7 and the jaw 64 will be in a retracted or released position. On forward or feeding movement of the slide the extension 74 will have been rocked upwardly so that the roller 71 will be against the low cam surface 73 as shown by the full lines in Fig. 8, the lever 66 will be in the full line position of Fig. 7 and the spring 65 will be forcing the jaw 64 into position gripping the wire 17.

From the foregoing it will be understood that with the construction of Figs. 1 through 6 positive means move the jaw 16 to cause gripping of the wire and the spring 42 acts to release the jaw, while with the construction of Figs. 7 and 8 the spring 65 moves the jaw 64 to cause gripping of the wire and positive means act to move such jaw to release the wire. Where the wire is of soft metal and is likely to be deformed it is preferred to use an arrangement where the movable jaw is shifted to gripping position by a spring rather than by a positive mechanical means likely to cause the jaw to exert such pressure as to deform the wire.

With the construction of Figs. 7 and 8, the extension or cam 74 is rocked up and down as the crank operating the connecting rod 28 moves through diametrically opposite dead center positions the same as in the first form, and while the crank is moving in directions substantially at right angles to the direction of motion of the slide. It will, therefore, be understood that the wire is gripped and released while the slide is practically motionless at the ends of its respective strokes. The jaw 16 is slidable in a guide 75, and preferably a cover plate 76 is extended over this jaw, the greater portion of the lever 66 and the spring 65, and such cover plate may be secured in place as by screws 77.

Fig. 9 shows a further slightly modified construction. In this form the parts are of substantially the same construction as those of Figs. 1 through 6 but some of them are reversed. In this construction a slide 78 is provided with a stationary jaw 79 and a movable jaw 80, and the slide is adapted to be reciprocated along the guide rail 12 by means of a crank (not shown) operating through a connecting rod 28 secured to the slide by the pivot 31 the same as in Figs. 1 and 2. Jaw 80 is slidable in the guide 81 below a cover plate 81a, and pivoted to the slide 78 at 82 and controlling movements of the jaw 80 is a lever 83 substantially similar to the lever 36, but pivoted at the side of the movable jaw opposite that at which the lever 36 of Fig. 1 is pivoted. Lever 83 is provided with a jaw engaging pin 38 and an adjusting screw 40 for such pin and is also equipped with a roller 45. The extension or cam 74 shown more fully in Fig. 8 is used in the mechanism of Fig. 9, and its cam surfaces cooperate with the roller 45 to control movement of the lever 83. A coil spring 84 has one end anchored to a pin 85 rigid with the slide and has its other end anchored to a pin 86 on the lever 83. This spring constantly tends to rock the lever 83 about its pivot in a direction to have the projecting end 39 of its pin 38 engage the jaw 80 and move the same to wire gripping position.

When the spring 84 shifts the lever 83 to cause the jaws to grip the wire the roller 45 of said lever is over the lower cam surface 73 of the extension 74. The roller runs off the higher surface 72 as the crank passes through a dead center position at one side of which the return stroke is complete and at the opposite side of which the feed stroke starts. That is, the arrangement is such that the gripping of the wire takes place while the crank is passing in a direction substantially at right angles to the direction of motion of the slide and while the slide is practically stationary. On the slide completing its movement in the opposite direction and as the crank moves through its other dead center position the extension or cam 74 is rocked to have its high cam surface 72 engage the roller 45 and force the lever 83 against the action of the spring 84 to the dotted line position releasing the jaw 80 so that the wire is released and will not be moved during return movement of the slide.

It will now be understood that with the construction of Figs. 1 through 6 the jaw 16 is positively moved in one direction to cause gripping of the wire and that the spring 42 shifts the lever 36 in the opposite direction to release such jaw and thereby the wire. In Figs. 7, 8 and 9 the movable jaw is forced against the wire only by a spring action, and positive mechanical means function to bring about a release of the jaw. These latter constructions are, therefore, preferred when the wire being fed is of soft metal likely to be deformed should a jaw be forced against them by a positive means. In any of the constructions the means controlling the jaw is such that the wire is gripped and released while the operating crank is moving in a path substantially at right angles to the direction of movement of the slide so that the latter is practically without motion when the gripping and release takes place.

It should also be understood that with the arrangement of Figs. 7 and 9 the desired operation may be obtained with the same extension or cam 49 as shown in Figs. 1–6 provided the direction of movement of the crank is reversed. That is, should the connecting rods 28 of Figs. 7 and 9 be driven by a crank moving in a clockwise direction then a cam having cam surfaces arranged as in Fig. 6 might be used.

Having thus set forth the nature of my invention, what I claim is:

1. In a wire feed, a guide, a slide reciprocable on said guide, a crank and connecting rod for reciprocating said slide, said crank being mounted to rotate in the plane extending in the same general direction as the movement of the slide, a pair of wire clamping jaws on said slide and operable to grip and release the wire being fed, and means operated by movement of the crank as the crank is passing at right angles to the direction of motion of the slide to cause the jaws to grip the wire.

2. In a wire feed, a slide, a crank and connecting rod for reciprocating said slide, a pivotal connection between the connecting rod and the slide, a pair of jaws on the slide of which

one is movable in directions toward and from the other to grip the wire while the slide is moving in one direction and release the wire while the slide is moving in the opposite direction, and a cam connected to the connecting rod and operated by a swinging movement of the rod on said pivotal connection to control movement of the movable jaw.

3. In a wire feed, a slide, a pair of jaws on the slide and movable relatively to grip and release the wire being fed, a crank and a connecting rod connected to the crank for reciprocating the slide, means operated by movement of the crank as the crank is passing at right angles to the direction of motion of the slide at the end of the movement of the connecting rod in one direction to cause said jaws to grip the wire, and means for causing said jaws to release the wire as the crank is passing at right angles to the direction of motion of the slide at the end of the movement of the connecting rod in the opposite direction.

4. In a wire feed, a slide, a pair of jaws on the slide and one of which is movable relatively to the other to grip and release the wire being fed, a crank and connecting rod for reciprocating the slide, and means operated by swinging movement of the connecting rod caused by movement of the crank transversely of the direction of motion of the slide at the end of the movement of the slide in one direction to cause shifting of the movable jaw.

5. In a wire feed, a slide, a pair of jaws on the slide and of which one is movable toward and from the other to grip and release a wire being fed, a crank, a connecting rod reciprocated by said crank, a pin pivoting the connecting rod to the slide to have the latter reciprocate with the former, a lever pivoted on the slide and controlling movement of said movable jaw, a spring normally tending to move said lever in one direction, a roller on said lever, a cam on said connecting rod and having high and low cam surfaces separately engageable with said roller, and said cam at the side of said pin opposite the crank whereby as the crank moves through a dead center position the cam is rocked to bring its higher cam surface against the roller and move the lever against the action of said spring.

6. In a wire feed, a slide, a pair of jaws on the slide and of which one is movable toward and from the other to grip and release a wire being fed, a crank, a connecting rod reciprocated by said crank, a pin pivoting the connecting rod to the slide to have the latter reciprocate with the former, a lever pivoted on the slide and controlling movement of said movable jaw, a spring normally tending to move said lever in one direction, a roller on said lever, an extension on said connecting rod and having a cam surface engageable with said roller, and said extension having its cam surface at the side of said pin opposite the crank whereby as the crank moves through a dead center position the extension is rocked to bring said cam surface against the roller and move the lever against the action of said spring.

7. In a wire feed, a carrier, a pair of jaws on said carrier of which one is movable toward and from the other to grip and release a wire being fed, a crank and connecting rod for moving said carrier, a pivotal connection between the connecting rod and the carrier, a spring controlling movement of said movable jaw in one direction, and means operated by swinging movement of the connecting rod about said pivotal connection at the end of a carrier movement controlling movement of the movable jaw in the opposite direction.

8. In a wire feed, a carrier, a pair of jaws on said carrier of which one is movable toward and from the other to grip and release a wire being fed, movable means on the carrier and operable to shift and to release said movable jaw, a crank and connecting rod for moving said carrier, a pivotal connection between the connecting rod and the carrier, a spring normally tending to move said movable means in one direction, means to move said movable means in the opposite direction against the action of said spring, and said last means operable by swinging movement of the connecting rod about said pivotal connection as the crank moves through a dead center position.

9. In a wire feed, a slide, a pair of jaws on the slide and adapted to be opened and closed to grip and release a wire, a crank and connecting rod for reciprocating the slide, a pivotal connection between the connecting rod and the slide, means operated by swinging movement of the connecting rod about said pivotal connection as the crank is passing at right angles to the direction of motion of the slide at the end of the movement of the slide in one direction to cause said jaws to grip the wire, and means for causing said jaws to release the wire as the crank is passing at right angles to the direction of motion of the slide at the end of the movement of the slide in the opposite direction.

10. In a wire feed, a slide, a pair of jaws on the slide adapted to be closed and opened to grip and release a wire, a connecting rod, a pivot securing said connecting rod to the slide, a crank for reciprocating the connecting rod to reciprocate the slide, a lever on the slide and controlling opening and closing of said jaws and movable between a position where said jaws are open and a position where the jaws are closed, a spring normally tending to cause movement of said lever to one of said positions, and an extension on and movable with the connecting rod and having a cam surface operable to cause movement of the lever to its other position as the connecting rod is rocked on movement of the crank through a dead center position.

11. In a wire feed, a slide, a pair of jaws on the slide adapted to be closed and opened to grip and release a wire, a connecting rod, a pivot securing said connecting rod to the slide, a crank for reciprocating the connecting rod to reciprocate the slide, a lever on the slide and controlling opening and closing of said jaws and movable between a position where said jaws are open and a position where the jaws are closed, a spring normally tending to cause movement of said lever to one of said positions, an extension on and movable with the connecting rod and having a cam surface operable to cause movement of the lever to its other position as the connecting rod is rocked on movement of the crank through a dead center position, and means to adjust the position of said extension on the connecting rod whereby to determine the time at which said cam surface functions.

12. In a wire feed, a slide, a pair of jaws on the slide and adapted to be opened and closed to grip and release a wire, a crank and connecting rod for reciprocating the slide, means operated by the crank for causing said jaws to grip the

wire as the crank is passing at right angles to the direction of motion of the slide at the end of the movement of the connecting rod in one direction, means for causing said jaws to release the wire as the crank is passing at right angles to the direction of motion of the slide at the end of the movement of the connecting rod in the opposite direction, and means to adjust said crank to vary the throw of said connecting rod.

13. In a wire feed, a slide, a pair of jaws on the slide and of which one is movable toward and from the other to grip and release a wire, a lever pivoted on the slide and by the direction of its movement controlling movement of said movable jaw, a crank and connecting rod means for reciprocating said slide, spring means normally tending to move said lever in one direction, means operable by the connecting rod for moving said lever in the opposite direction, a pin projecting from the lever and engaging the movable jaw, and adjustable means controlling the extent to which said pin projects from the lever.

14. In a wire feed, a slide, a pair of jaws on the slide adapted to close and open to grip and release a wire, a lever pivoted on the slide and movable to and from a position causing closing of said jaws, a crank and connecting rod for reciprocating said slide, means operable by said connecting rod to move said lever to close said jaws at the limit of movement of the connecting rod in one direction and maintain the jaw closed until the connecting rod reaches the limit of its movement in the opposite direction, and a spring to then move the lever to permit said jaws to open.

15. In a wire feed, a slide, a pair of jaws on the slide adapted to close and open to grip and release a wire, a lever pivoted on the slide and movable to and from a position forcing said jaws closed, a crank and connecting rod for reciprocating said slide, a cam surface movable with the connecting rod and engageable with the lever to move it to force said jaws closed as the crank is passing at right angles to the direction of movement of the slide, and a spring means for moving said lever in the opposite direction to permit said jaws to open.

16. In a wire feed, a slide, a pair of jaws on the slide adapted to close and open to grip and release a wire, a lever pivoted on the slide and movable to and from a position forcing said jaws closed, a crank and connecting rod for reciprocating said slide, a spring means acting to move said lever to force said jaws closed as the crank is passing at right angles to the direction of movement of the slide at the limit of movement of the connecting rod in one direction, and a cam surface movable with the connecting rod and operable to shift said lever against the action of the spring and permit said jaws to open when the connecting rod reaches the limit of its movement in the opposite direction.

17. In a wire feed, a slide, a crank and connecting rod for reciprocating said slide, a pair of jaws on the slide and of which one is slidable toward and from the other to grip and release a wire, a spring engaging the slidable jaw and normally tending to move it toward the other jaw, a lever pivoted on the slide and having a part engaging said slidable jaw, a cam surface movable with the connecting rod and engageable with said lever, and said cam surface adapted as the connecting rod is rocked on the crank passing through a dead center position to rock said lever about its pivot and shift said slidable jaw against the action of the spring to release the wire.

18. In a wire feed, a slide, a pair of jaws on the slide one of which is movable relative to the other to grip and release the wire, a crank, a connecting rod connected to the crank and pivotally connected with the slide for reciprocating the slide, and means operated by swinging movement of the connecting rod about said pivot to shift the movable jaw.

19. In a wire feed, a slide, a pair of jaws on the slide one of which is movable relative to the other to grip and release the wire, a crank rotating in a plane extending in the general direction of the movement of the slide, a connecting rod connected to the crank for reciprocating the slide by movement of the crank in a direction longitudinally of the movement of the slide, and mechanism responsive to movement of the crank in a direction transversely of the movement of the slide to shift the movable jaw.

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