No. 864,860. PATENTED SEPT. 3, 1907.

W. P. RANDALL.

WIRE FEEDING DEVICE.

APPLICATION FILED JAN. 2, 1907.

2 SHEETS—SHEET 1.

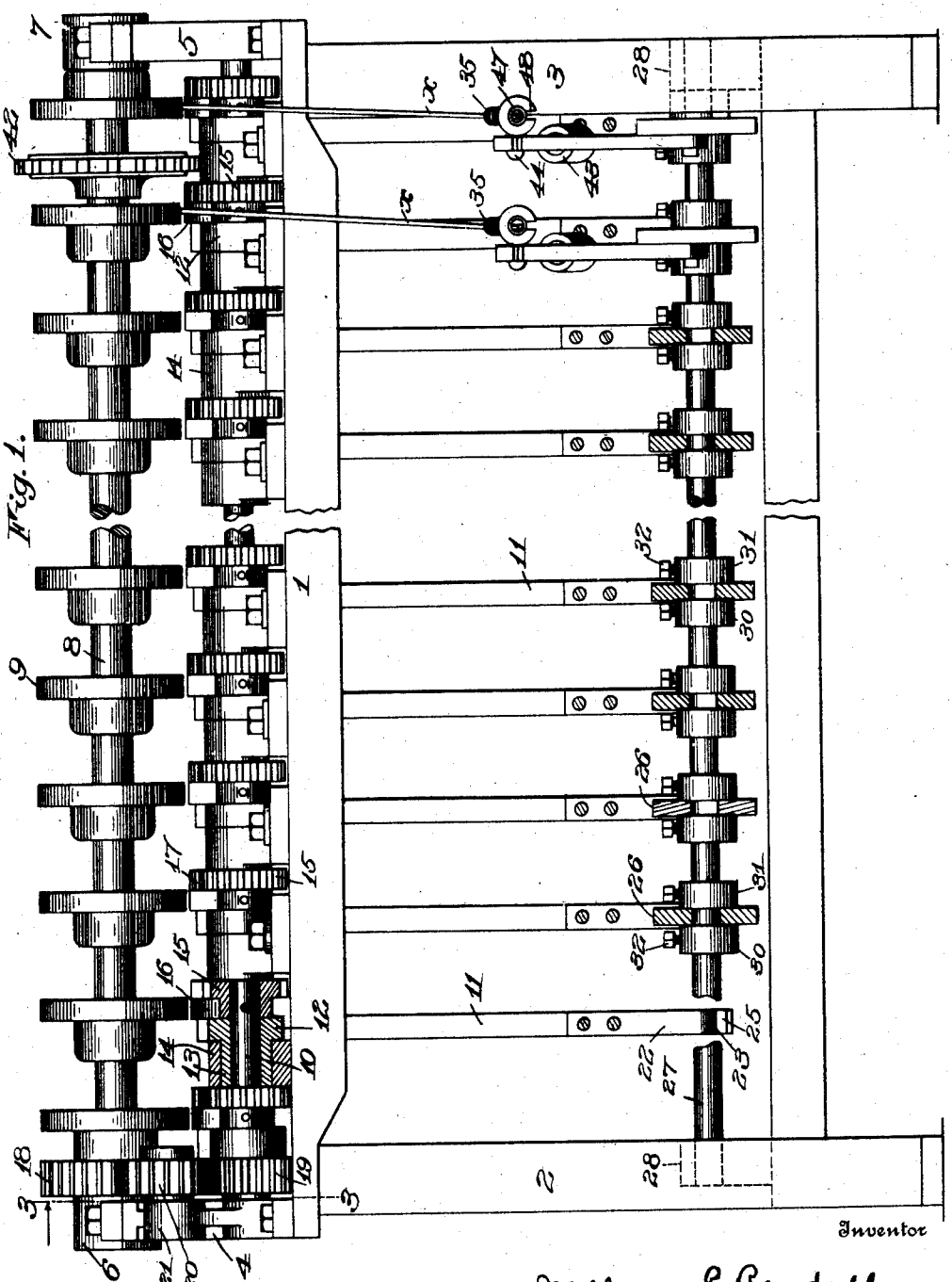


Fig. 1.

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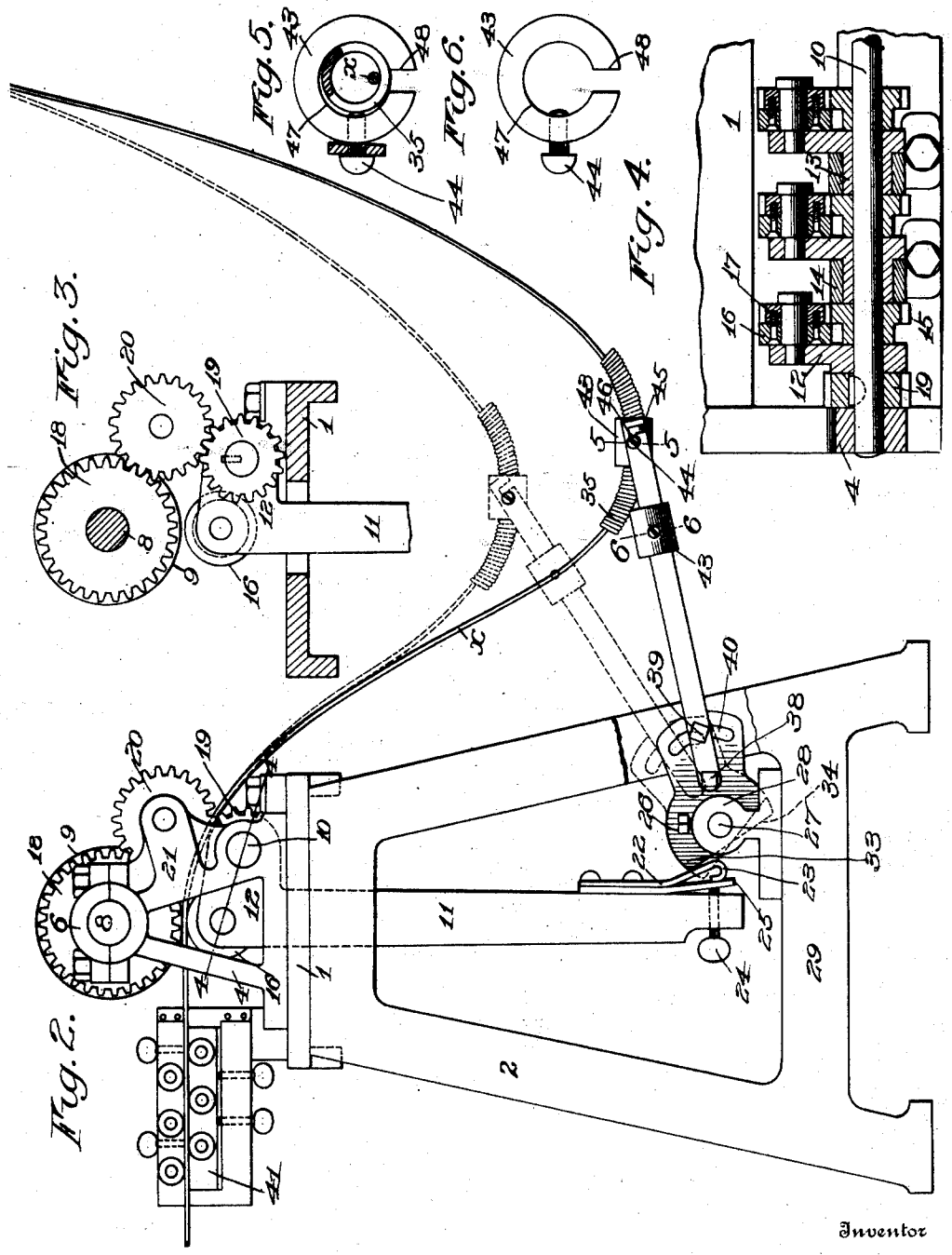
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WIRE-FEEDING DEVICE.

No. 864,860. Specification of Letters Patent. Patented Sept. 3, 1907.

Application filed January 2, 1907. Serial No. 350,489.

To all whom it may concern:

Be it known that I, WILLIAM P. RANDALL, of Le Roy, in the county of Genesee and State of New York, have invented certain new and useful Improvements in Wire-Feeding Devices; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of the specification, and to the reference-numerals marked thereon.

My present invention relates to improvements in devices for feeding or controlling the feed of wire from a suitable supply to wire working machines of various kinds wherein the wire is to be used, and the object of the invention is to provide a device of this kind having coöperatively arranged feed rolls so mounted and driven that the wire is fed efficiently without undue strain on the rolls and their coöperating parts, and furthermore, to provide a device embodying improved controlling means for the feed rolls whereby the feed of the wire extending between them may be controlled without the necessity of interrupting the operation of the rolls, the device shown in the present instance being especially adapted to be employed between a machine having a step-by-step feed and the usual freely revoluble supply reels whereby the unevenness in movement of the wire being drawn into the machine is compensated for in order to insure an even movement of the supply reels, and the supply of wire is accurately regulated.

To these and other ends the invention consists in certain improvements and combinations and arrangements of parts all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the accompanying drawings: Figure 1 is a front elevation of a wire feeding device constructed in accordance with my invention. Fig. 2 is an end elevation of the device shown in Fig. 1, the dotted lines indicating the position of the controlling lever when the feed rolls are separated to discontinue the feed of the wire. Fig. 3 represents a sectional view on the line 3—3 of Fig. 1, looking in the direction of the arrow. Fig. 4 represents a section on the line 4—4 of Fig. 2. Fig. 5 represents a cross section on the line 5—5 of Fig. 2. Fig. 6 represents a section on the line 6—6 of Fig. 2.

The wire feeding device shown in the present embodiment of my invention is provided with controlling devices wherein the relative tension or amount of slack in the wire leading from the machine is utilized to control the feeding operation of the machine, and it is especially adapted for use in connection with machines having a step-by-step or irregular feed movement, such for instance, as machines for manufacturing wire fencing, wherein the cross wires are applied to the strand wires during a pause in the feed movement of the strand wires, and in the present instance these controlling devices feed the wire in quantities determined according to the amount of wire actually required, so that the wire is under control at all times.

This machine in the present instance comprises a bed 1 supported by standards 2 and 3, and having end bearings 4 and 5 mounted on the ends thereof, the latter being provided with bearings 6 and 7, wherein are journaled the opposite ends of a relatively fixed shaft 8 carrying a set of feed rolls 9 corresponding in number to the number of wires it is desirable to feed to the machine or other device wherein the wires are to be employed. Beneath the shaft for the upper rolls is journaled a roll-operating shaft 10 by means of which the lower coöperating rolls are driven, this shaft being mounted in the end bearings previously described and having a set of roll adjusting or pressure levers 11 having the general form of a bell crank, one arm 12 of which is bored to loosely fit the shaft 10 and each having a laterally extended journal sleeve or hub 13 journaled in a bearing 14 secured by a bracket or other suitable means directly to the top of the bed, the hubs 13 of the several levers coöperating with the bearings 14 as fulcrums to sustain the pressure between the feed rolls during the feed operation.

Fixed to the shaft 10 are a set of pinions 15 corresponding in number to the number of feed rolls employed, and on each roll-adjusting or pressure lever at a point between its fulcrum and operating arm is journaled a feed roll 16, the latter being provided with a pinion 17 arranged to turn therewith and to coöperate with the driving pinion 15 on the operating shaft 10, the movement of the roll-adjusting lever about the bearing 14 as a fulcrum serving to move the roller 16 into coöperative relation with its corresponding upper roller 9, the pinions 15 and 17 remaining in coöperative relation irrespective of the positions of the feed rollers, by the fact that the roll-regulating or adjusting lever turns about the operating shaft 10 as a center. It is preferable to drive the upper and lower feed rollers at the same peripheral speed, and this is accomplished in the present instance by providing gears 18 and 19 on the shafts 8 and 10 respectively, having diameters varying in ratio to that of the rolls, that is to say, the gear 18 will be double the diameter of the gear 19 in cases where the roll 9 is double the diameter of the roll 18, and these gears are connected by an intermediate gear 20 mounted on bearing arms 21 on the end bearings. Of course, the ratio of diameters of the coöperating rolls may be varied as desired, and in any case the diameters of the driving gears on the shafts 8 and 10 respectively will be correspondingly proportioned to insure the

same peripheral speed of these wire feed rolls, the intermediate gear 20 serving to revolve the rolls in the proper directions.

The free arms of the roll-adjusting levers or members 11 extend some distance below the bed, and each lever is provided at its lower end with a yielding abutment or connection which may be adjusted relatively to a coöperating part to vary the amount of pressure produced between the feed rolls at each feeding operation, this connection in the present instance being in the form of a leaf spring 22 having one end fixed to the lever and its other end doubled or provided with a bend as at 23, an adjustable stop in the form of a set screw 24 extending through the regulating lever behind the spring and having its inner end bearing against a plate 25, the latter cooperating with the bend in the spring and serving to adjust the position thereof relatively to the free end of the lever, the bend in the spring permitting the latter to yield relatively to the operating lever when pressure is applied thereto.

Each of the operating levers is preferably provided with one of these yielding abutments or connections in cases where it is desirable to so control the operation of the feed rolls as to frequently throw the latter into and out of feeding operation, and in such instances a cam 26 is provided to coöperate with the abutment on each lever, these cams in the present instance being loosely mounted on a common supporting shaft 27 and the latter in turn is supported by bearing brackets 28 supported on cross pieces 29 on the standards, these cams being set in their proper positions on the supporting shaft relatively to their respective controlling levers by means of collars 30 and 31 arranged on each side thereof and provided with set screws 32 by means of which they may be secured in adjusted position. Each of these cams has a projecting or operating portion 33 arranged to engage the spring 22 when the cam is rotated in one direction to move the feed rolls in coöperative relation, and having a recessed portion 34 arranged to permit the retraction of the controlling member to separate the feed rolls and discontinue the feed movement when the cam is rotated in an opposite direction, and in the present instance these cams are adapted to be operated by a lever which is controlled in its movements by the amount of slack in the wire leading from the machine, that is to say, the control of the machine is effected by the actual condition of the wire. Each of these controlling levers is preferably adjustable angularly in relation to the cam, being pivoted at 38 and provided with an adjusting screw 39 having a portion resting in a segmental slot 40 formed in the cam that will permit adjustment to vary the relation between the latter and the controlling lever.

The wire is fed to the feed rolls preferably through a wire straightening device 41 or through a suitable guiding device that will insure entrance of the wire between the rolls, as in the present instance, the surfaces of the rolls are preferably flat so that the wire will be pressed between parallel operating surfaces, a wire straightening device being preferably employed which will also serve as a guide for insuring the proper entrance of the wire between the rolls, and the feed rolls are preferably driven continuously, the driving wheel 42 being secured to the shaft 8 to receive a chain, belt or other power-transmitting device, by means of which continuous motion may be imparted to the rolls.

When the controlling levers occupy the positions shown in full lines in Fig. 2, the feed rolls will be disengaged from the wire, the pressure will be relieved and the wire will not be fed or advanced. However, when the controlling lever is elevated into the position indicated by the dotted lines in Fig. 2, the projections 33 on the cam 26 coöperating with the yielding abutment 22 on the roll adjusting member 11 will operate the latter to bring the lower feed rolls 16 into coöperative relation with its corresponding upper roll 9, pressing the wire between the rolls with sufficient pressure to feed it forward. This yielding abutment or connection is particularly advantageous when the movements of the controlling members are controlled by the amount of slack in the wire between the feed rolls and the machine to which the wire is fed, as the amount of slack therein varies at times between considerable limits, and in order to produce a substantially even pressure on the wire when the feed rolls are thrown into coöperative relation that will gradually start the wire forward and avoid excessive pressure that would flatten the wire and strain the rolls and their bearings and operating parts, it is preferable to employ the yielding connection described above, as it will yield when the pressure between rollers exceeds a given limit from inequality of wire. This is true also in cases where the feed rolls are controlled by means of an appropriate mechanical connection between the machine using the wire and the wire supply device.

In controlling the operation of the feed rolls according to the amount of slack in the wire, the wire leading from each pair of rolls, though the tension spring may be dispensed with using only the slotted collars of suitable weight to insure dropping, is preferably threaded through a helical spring 35 having sufficient flexibility to permit the wire to assume the proper curvature when it is hanging loosely between the feed roll and the machine in connection with which it is used, and on this spring is fitted a collar 43 having a headed screw or projection 44 on one side adapted to fit in a slot 45 provided in the upper or free end of the controlling lever, this slot being preferably open at the upper side of the collar to admit the projection of the collar and to retain this projection in the angular portion 46 by reason of the weight of the controlling lever. This collar is preferably formed of a casting having a bore 47 adapted to receive the spring 35 and having a radial slot 48 leading inwardly to this bore, this slot being of a width sufficient to permit the entrance of the wire so that the spring may be applied to the wire and the latter passed laterally through the slot 48 thus avoiding the necessity of threading the wire through the collar. In order to maintain a proper tension in the wires between the feed rolls and the machine using the wire, it is preferable to apply weights either to the controlling lever or to the tension spring and for this purpose it is preferable to so construct the collars 43 as to enable them to be applied interchangeable to the spring 35 or to the controlling lever, one of the collars being shown so applied in Fig. 2, and to accomplish this result, the wire receiving slot 48 should be formed to snugly fit an edge of the

controlling lever and to secure a hold sufficient to retain it on the controlling lever at any position at which it is placed, the distance of this weight from the center of movement of the lever determining the amount of tension to which the wire will be subjected.

In controlling the operation of the feed rolls according to the amount of wire actually required, of which one method is shown in the present instance, the controlling lever will be lifted when the slack in the wire is taken up or the tension thereof increases, and this will shift the cam to operate the roll-adjusting lever in a direction to bring the feed rolls into coöperative relation and thus start the feeding operation, and when a given amount of slack exists in the wire leading from the feed rolls, the controlling lever will be lowered by reason of its weight and the graduated weights applied thereto, and this will operate the cam to permit retraction of the roll-adjusting member, and thereby cause the pressure of the feed roll on the wire to be relieved, the feed movement of the wire being thus discontinued.

It is generally preferable to control the wire supply according to the amount of wire actually needed, as the feed devices operating in this way do not ordinarily require the care of an attendant. It is also advantageous to control the wire feed by relative adjustment of the feed rolls, as the latter may be driven continuously by means of a simple driving connection, thus avoiding the use of clutches, cams, or other complicated and expensive mechanism for controlling their movement, and as the feeding movement of the wire is produced by a yielding pressure thereon from the feed rolls, it will result that the wire is gradually started, and this is an advantage, as the drawing of the wire from the supply rolls, when these are employed, will be more or less regular, thus avoiding tangling of the wire. The controlling lever makes this feed mechanism a universal accessory to all wire working machines by reason of the adjusting feature through the bolt connection of levers in the radial slot of the cam; that is to say, by adjustment of this lever in the radial slot of the cam, the pressure of the feed rolls on the wire may be let off at any point desired. In practice the slack represents a given feed or movement of the machine, or a mulitiple of such feed, and of course, the operator may choose any given slack conformable to the requirements of machines by setting levers to throw out at the proper point.

I claim as my invention:

1. In a wire feeding device, the combination with a pair of coöperatively arranged feed rolls, and a pivoted member adjustably supporting one of said rolls in relation to the other roll, of a roll-driving device journaled concentrically with said member and operatively connected to the corresponding feed roll, and operating connections between said roll-driving device and the relatively fixed roll.

2. In a wire feeding device, the combination with a relatively stationary feed roll, an adjustable feed roll adapted to coöperate therewith, and a pivoted pressure lever supporting the adjustable roll, of a roll-driving device mounted concentrically with said lever and cooperating with the roll supported thereon, and a positive driving connection between the relatively stationary roll and said roll-driving device.

3. In a wire feeding device, the combination with the cooperatively arranged feed rolls adapted to receive the wire between them, of a pivoted lever supporting one of said rolls to permit relative adjustment between the rolls, a gear mounted concentrically with said lever, a driving gear for said adjustable roll coöperating with the first-mentioned gear, and a driving connection arranged between the first-mentioned gear and the relatively stationary roll.

4. In a wire feeding device, the combination with a suitable bed, and a relatively fixed feed roll mounted thereon, of a roll-adjusting member having a bearing portion thereon, a roll mounted on said member eccentrically of the bearing portion and adapted to coöperate with the relatively fixed roll, a bearing supported on the bed and coöperating with the bearing portion of the adjusting member as a fulcrum, a roll driving shaft mounted concentrically of the bearing for the adjusting member, an operative connection between the roll driving shaft and the feed roll on the adjusting member, and means for operating the rolls to feed the wire between them.

5. In a wire feeding device, the combination with a suitable bed, and a feed roll mounted to turn thereon, of a roll-adjusting member having a bearing portion thereon, a bearing supported on the bed and coöperating with the bearing portion of the adjusting member, a roll mounted on said member eccentrically of the pivotal center of the latter and adapted to coöperate with the first-mentioned roll, a roll-driving shaft mounted concentrically with the axis of movement of the adjusting lever, coöperating pinions mounted to turn with the roll driving shaft and the feed roll on the adjusting member respectively, and means for operating the rolls to feed the wire between them.

6. In a wire feeding device, the combination with a shaft carrying a set of feed rolls, of a set of pivoted adjusting levers, a feed roll carried by each lever and adapted to coöperate with a corresponding roll on said shaft, a driving shaft mounted in alinement with the axes of said levers, driving devices secured to said driving shaft and operatively connected to the respective feed rolls on said levers, and gearing connecting said shafts for driving the feed rolls.

7. In a wire feeding device, the combination with a support and a relatively fixed feed roll mounted thereon, of a lever, a feed roll mounted thereon and arranged to cooperate with the fixed roll, a bearing fixed to the support and serving as a pivot or fulcrum for said lever, a shaft mounted axially of said lever, a driving device carried by said shaft and operatively connected to the feed roll on said lever, and a driving connection between the said shaft and the stationary feed roll.

8. In a wire feeding device, the combination with a suitable support, and a feed roll mounted thereon, of a feed roll adapted to coöperate with the first-mentioned roll and having a gear connected thereto, a lever carrying the adjustable roll and having a bearing sleeve thereon, a bearing bracket secured to the support and adapted to receive the bearing sleeve of the lever, a shaft passing concentrically through the bearing sleeve of said lever, a gear on said shaft coöperating with that of the adjustable feed roll, and a driving connection arranged between the first-mentioned feed roll and the said shaft.

9. In a wire feeding device, the combination with a pair of coöperatively arranged feed rolls, and a member for relatively adjusting said rolls to control the feed of the wire passing therethrough, of a controlling lever operating on said member for controlling the wire feeding operation of said rolls.

10. In a wire feeding device, the combination with the coöperatively arranged feed rolls, and means for controlling the supply of wire fed between said rolls, of a tension device coöperating with the wire after leaving the feed rolls, means for varying the tension produced on the wire by the tension device, and operative connections between the tension device and the controlling means for the feed rolls.

11. In a wire feeding device, the combination with cooperatively arranged feed rolls for feeding wire between them from a suitable source, and devices for producing a yielding pressure between the feed rolls, of means controlled by the tension of the wire after leaving the feed rolls for controlling the feeding operation thereof.

12. In a wire feeding device, the combination with cooperatively arranged feed rolls for feeding wire from a

suitable source, and a pressure member for relatively adjusting the feed rolls, of a controlling lever, and a cam thereon coöperating with the roll adjusting member for controlling the wire feeding operation thereof.

13. In a wire feeding device, the combination with cooperatively arranged feed rolls, and a pressure member for moving the rolls into and out of coöperative relation, of a controlling lever, and a cam thereon coöperating with the pressure member for controlling the wire feeding operation of the rolls.

14. In a wire feeding device, the combination with cooperatively arranged feed rolls, and a pressure member for adjusting the pressure between the rolls, of a controlling lever, and a yielding connection between said lever and member for limiting the amount of pressure exerted between the rolls.

15. In a wire feeding device, the combination with cooperatively arranged feed rolls, a pressure member for controlling the pressure between the rolls, and a spring arranged on the pressure member, of a controlling lever having a cam arranged to coöperate with said spring on the pressure member for operating the latter to control the wire feeding operation of the rolls.

16. In a wire feeding device, the combination with cooperatively arranged feed rolls, and a pressure member for controlling the feeding operation of the rolls, of a controlling member arranged to coöperate with the pressure member to control its operation, and means for adjusting the relation between said members for varying the pressure produced on the wire by the feed rolls.

17. In a wire feeding device, the combination with cooperatively arranged feed rolls, and a pressure member for controlling the feeding operation of the rolls, of a controlling lever, a cam operatively connected thereto, a yielding spring mounted on the pressure member and arranged to coöperate with the cam on the controlling lever to produce a yielding pressure on the wire extending between the feed rolls.

18. In a wire feeding device, the combination with cooperatively arranged feed rolls, and a pressure member for moving them into and out of coöperative relation, of a controlling lever arranged to operate the pressure member, a tension device coöperating with the wire after leaving the feed rolls, and a detachable connection between said controlling lever and the tension device.

19. In a wire feeding machine, the combination with cooperatively arranged feed rolls, and a member for relatively adjusting them, of a controlling lever arranged to operate said member to move the feed rolls into and out of coöperative relation, a helical spring surrounding the wire after the latter has left the feed rolls for taking up the slack in the wire, and an operative connection between said spring and controlling lever for operating the latter according to the amount of slack in the wire.

20. In a wire feeding device, the combination with suitable feed devices, and a lever for moving said devices into and out of operative condition, and a tension device cooperating with the wire after leaving the feed devices and operatively connected to the said lever for controlling the operation of the latter according to the amount of slack in the wire, and a device for proportioning the amount of slack in the wire and adapted to interchangeably fit the controlling lever and said tension device embodying a weight having a slot therein adapted to snugly fit the said lever, and a bore adapted to fit the tension device when the weight is applied thereto.

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