May 11, 1948. J. F. HIDZICK 2,441,541

WIRE CUTTING MACHINE

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Fig. 2

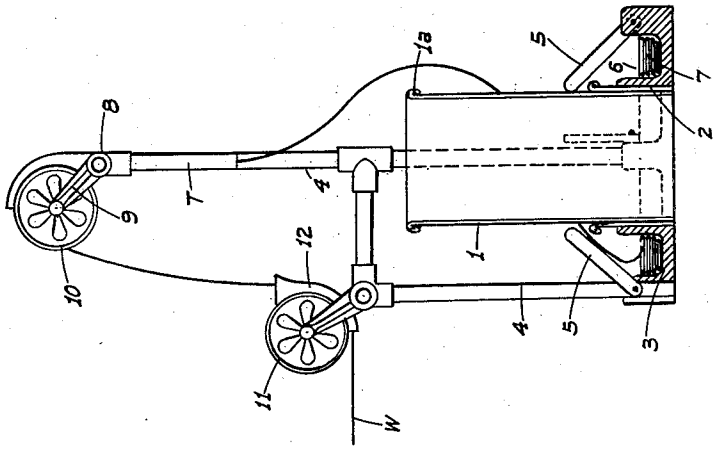


Fig. 1

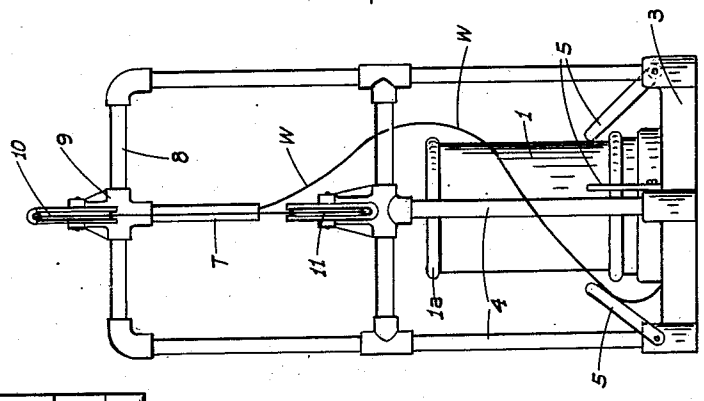


Fig. 15

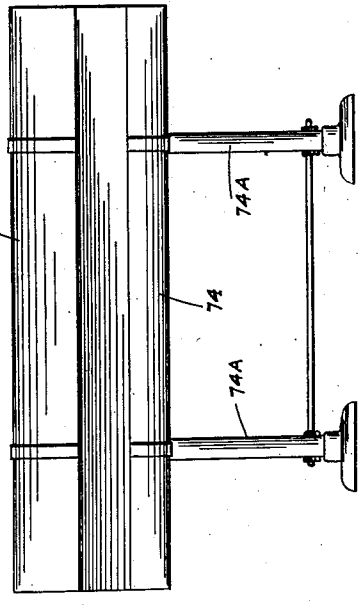
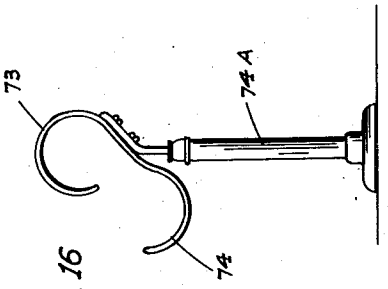


Fig. 16



INVENTOR
JOSEPH F. HIDZICK
BY
Harry C. Schroeder
ATTORNEY

May 11, 1948. J. F. HIDZICK 2,441,541

WIRE CUTTING MACHINE

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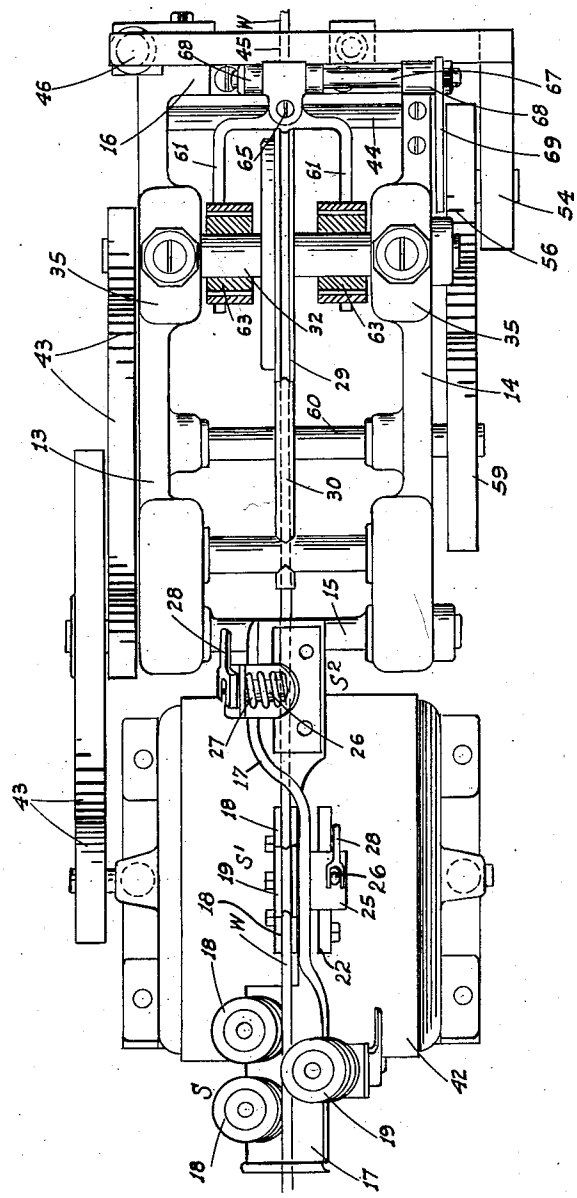


Fig. 3

INVENTOR
JOSEPH F. HIDZICK
BY
Harry C. Schroeder
ATTORNEY

May 11, 1948. J. F. HIDZICK 2,441,541

WIRE CUTTING MACHINE

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Fig. 8

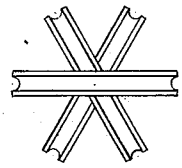


Fig. 4

INVENTOR
JOSEPH F. HIDZICK

BY
Harry C. Schroeder
ATTORNEY

May 11, 1948. J. F. HIDZICK 2,441,541

WIRE CUTTING MACHINE

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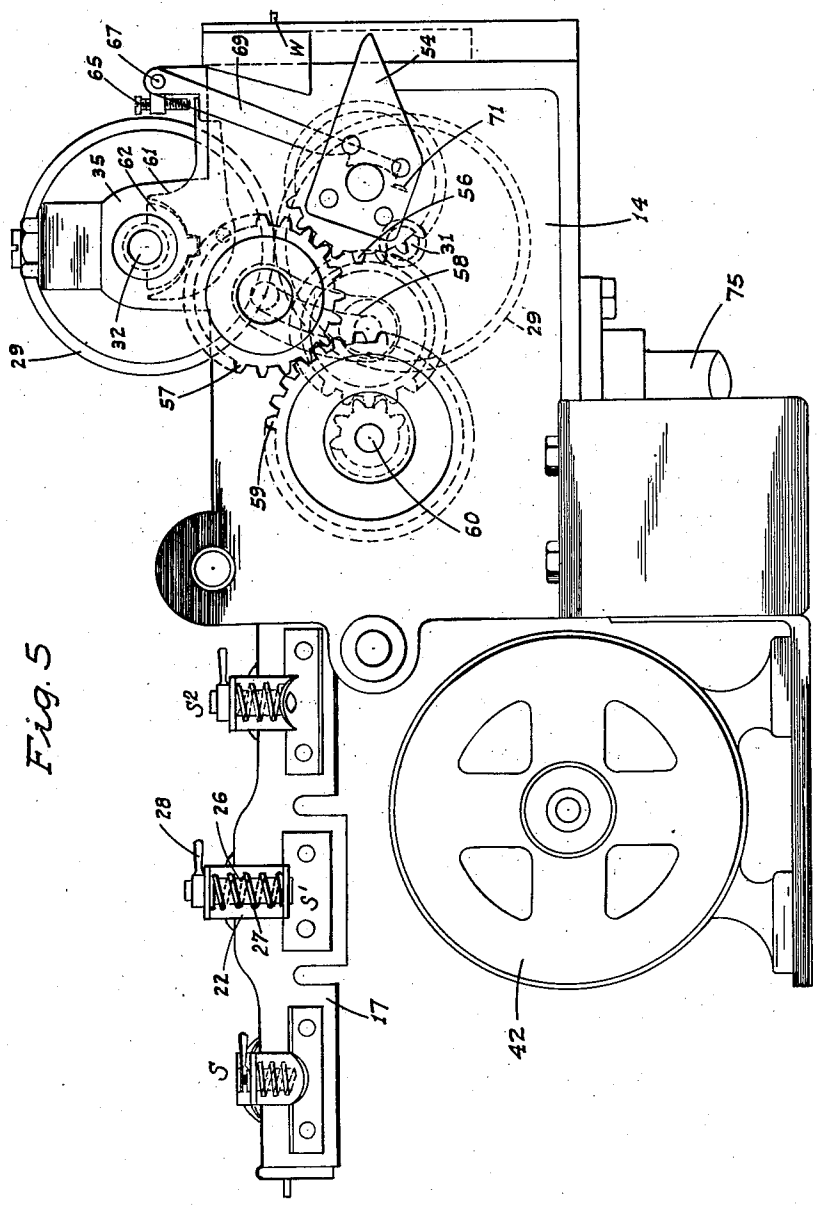


Fig. 5

INVENTOR
JOSEPH F. HIDZICK
BY
Harry A. Schroeder
ATTORNEY

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WIRE CUTTING MACHINE

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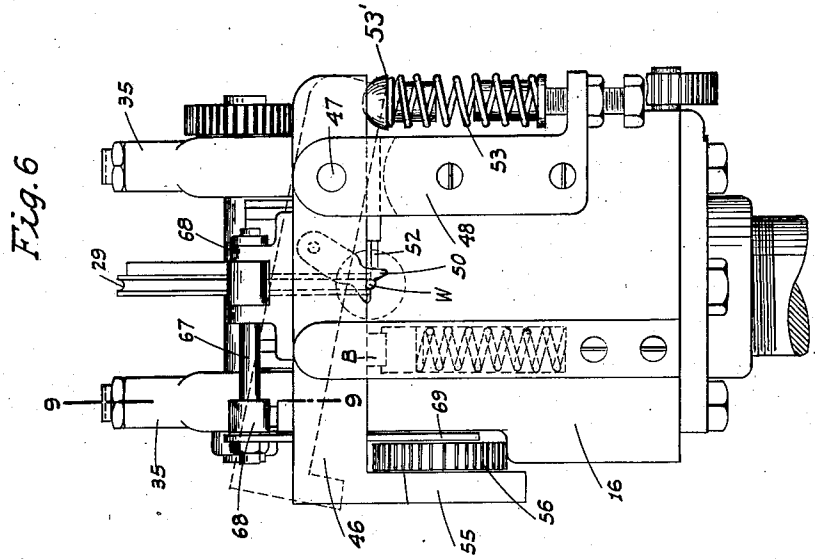


Fig. 6

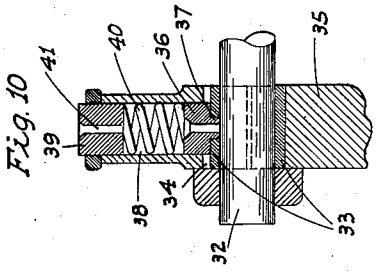


Fig. 10

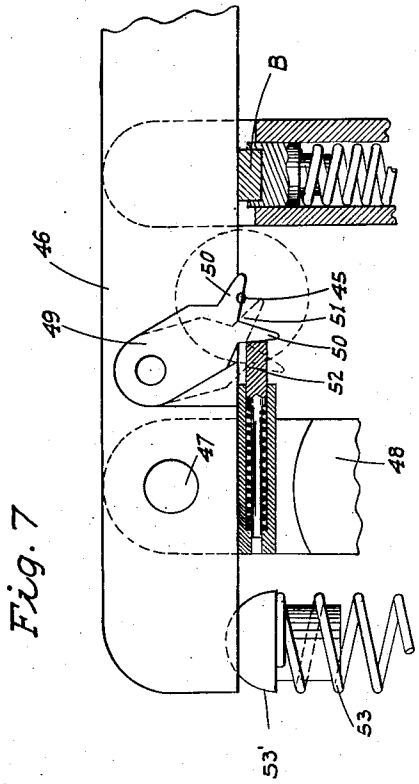


Fig. 7

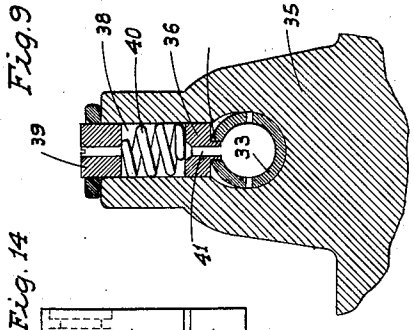


Fig. 9

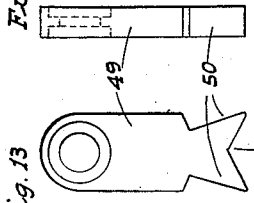


Fig. 14

Fig. 13

INVENTOR
JOSEPH F. HIDZICK

BY Harry C. Schroeder
ATTORNEY

May 11, 1948. J. F. HIDZICK 2,441,541

WIRE CUTTING MACHINE

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Fig. 11

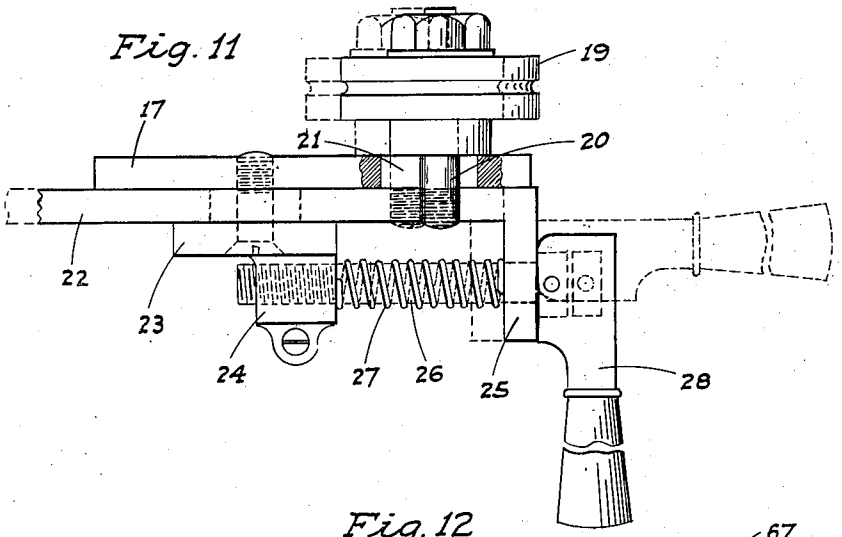
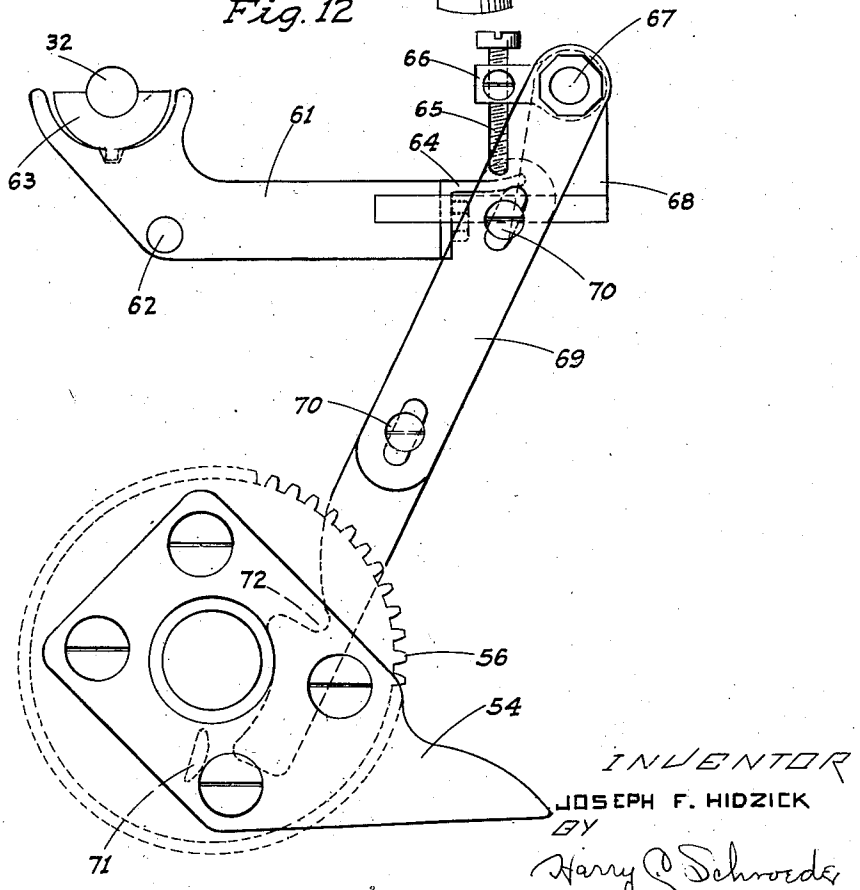


Fig. 12



INVENTOR
JOSEPH F. HIDZICK
BY
Harry C. Schroeder
ATTORNEY

Patented May 11, 1948 2,441,541

UNITED STATES PATENT OFFICE

2,441,541

WIRE CUTTING MACHINE

Joseph F. Hidzick, San Francisco, Calif.

Application September 22, 1943, Serial No. 503,589

4 Claims. (Cl. 140—144)

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The present invention relates to improvements in wire cutting machines and has for its principle object to provide a machine of the character described which allows a spool of wire to be cut into desired lengths in one continuous operation.

A further object of the invention is to provide a machine of this character that is very compact and in which all the operative parts are assembled into one compact unit.

A further object of the invention is to arrange the feeding device of the wire in such a manner that it does not interfere with the wire cutter on its return from the cutting operation.

A further object of the invention is to combine into a compact unit with the wire advancing and cutting device, a means for straightening the wire from a spool before it is advanced and cut.

A further object of the invention is to provide means whereby the wire may be conveniently fed from a spool without any danger of twisting the individual turns of the spool.

A further object of the invention is to provide a convenient means, whereby the device may be readily changed for producing lengths of different sizes.

Further objects and advantages of my device will appear as the specification proceeds.

The preferred form of my invention is illustrated in the accompanying drawings in which:

Figure 1 is an end elevation of the wire dispensing device.

Figure 2 is a sectional elevation of the wire dispensing device.

Figure 3 is a top plan elevational view of the machine, partly in section.

Figure 4 is a side elevation of the machine.

Figure 5 is a side elevation taken from the opposite side to that of Figure 3.

Figure 6 shows a rear end view of my machine.

Figure 7 is an enlarged fragmentary sectional detail view showing the cutting device from the rear as seen from line 7—7 of Figure 4.

Figure 8 is a schematic end view of the straightening device.

Figure 9 is an enlarged sectional view of a bearing taken along lines 9—9 of Figure 6.

Figure 10 is an enlarged fragmentary sectional view taken at right angles to that of Figure 7.

Figure 11 is a detailed side elevational view of the adjustable pulley which is attached to one of the wire straightening units.

Figure 12 is a detailed side elevational of the means by which the shaft carrying the upper wire feeding pulley is slightly elevated away from the wire so as to allow the wire to remain stationary until the cutter has been removed from the cutting die.

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Figure 13 is a plan elevational view of the wire cutter.

Figure 14 is a side elevational view of the wire cutter.

Figure 15 is a side elevational view of a wire receiving device.

Figure 16 is an end elevational view of the wire receiving device.

While I have shown only the preferred form of the invention I wish to have it understood that various changes or modifications may be made within the scope of the claims attached hereto without departing from the spirit of the invention.

In its preferred form my device comprises three units, namely; the wire dispensing device illustrated in Figures 1 and 2, the wire straightening advancing and cutting unit illustrated particularly well in Figures 3 to 14 and the wire receiving device illustrated in Figures 15 and 16.

The wire dispensing device comprises a hollow cylindrical core 1 terminating at the top in a beaded edge 1a and extending at the bottom into cylindrical socket 2 which is permanently attached to the supporting base 3. Frame standards 4 project upwardly from base 3 in spaced relation about core 1 and have a plurality of dogs 5 pivoted thereto in such a manner that the dogs lie against the core in an upwardly slanting position. An annular recess 6 is formed in the base about the core and dimensioned to co-act with the dimension of a spool 7 of wire W so as to allow it to lay in the recess and permit the dogs 5 to substantially maintain the individual turns of the spool 7 in an operative relation and prevent disorganization of the individual turns of the spool as the wire is drawn from the spool.

Standards 4 are provided with a cross member 8 above the core 1 to which is attached a bracket 9 which supports a grooved pulley 10. The bracket 9 is shaped to conform in part with the periphery of the pulley 10 thus preventing the wire from leaving the pulley except in the proper direction; a depending tube T guiding the wire onto the pulley. A second pulley 11 is mounted in the frame structure substantially at the height of the cutting device to be described hereinafter, and is provided with a wire guide 12 arranged so that the wire W is fed horizontally from said pulley.

The main machine of this invention comprises three main features, namely, a wire straightening device, a wire advancing device and a wire cutting device. These devices are arranged in the order named and are mounted in a common frame which includes upstanding side members 13 and 14 and front and rear end members 15 and 16.

The wire straightening device comprises a plu-

rality of units arranged in a straight line between end member 15 and the pulley 11 of the wire dispensing apparatus, and arranged to engage the wire being drawn from said pulley in as many planes 120° apart. For purposes of illustration three of these wire-straightening units S, S' and S^2 are shown.

Each wire-straightening unit comprises a supporting plate 17 having a pair of grooved pulleys 18 arranged along one edge thereof, and a third pulley 19 opposed to pulleys 18 in a position intermediate the same as plainly shown in Figure 3. The three pulleys of the three units are arranged so that a wire passing between and engaged by all the pulleys will be horizontal.

The intermediate pulley 19 is mounted for lateral adjustment relative to the other pulleys by the following arrangement, shown particularly in Figure 11.

The spindle 20 of the pulley projects thru a lateral slot 21 in the plate 17 and is secured in a bar 22 under plate 17 and which is slidable on a lug 23 fixed on and depending from plate 17, and itself having a depending boss 24. The bar at one end has a depending flange 25 opposed to boss 24. A pin 26 is threaded in the boss and slidably projects thru the flange 25; a compression spring 27 being about the pin between the boss and flange. A handle 28 is pivoted on the pin beyond the flange, and has a head arranged so that turning of the handle to an alined position with the pin, moves the bar 22 and the pulley 19 toward the other pulleys 18. By turning the handle in a direction to rotate the pin, the distance between pulleys 19 and 18 may be accurately adjusted as may be necessary. The plate 17 may be a single element for the three devices, twisted where necessary to the proper angles as shown in Figure 3.

The wire advancing device, by which the wire W is pulled thru the straightening unit and then fed to the cutting device, comprises a pair of grooved pulleys 29 of equal diameter, arranged one over the other and having contacting grooved peripheries adapted to receive and grip the wire therebetween. The wire after leaving the wire straightening device being guided to the pulleys 29 thru a tube 30.

The lower pulley is mounted on a transverse shaft 31 journaled in frame members 13 and 14, and the upper pulley on a transverse shaft 32. This shaft is mounted for vertical adjustment to allow for wires of different diameters being gripped between the pulleys, and also permit upward movement of the topmost pulley, so as to disengage it from the lower pulley, and thereby interrupt feeding movement of the wire.

This shaft mounting is shown in Figures 9 and 10, and comprises, for each end of the shaft, a split bushing 33 about the shaft, which is seated in a vertically elongated bore 34 in a supporting bracket 35 on the corresponding side member of the frame. The bushing is engaged on top by a block 36 having a depending lug 37 countersunk in the bushing and preventing rotation of the same. The block slides in a vertical passage 38 in the bracket, said passage being closed by a plug 39. A compression spring 40 is sealed in the passage between the plug and block, and lubricant may be fed to the shaft thru passages 41 drilled thru the plug and block.

The pulleys 29 are driven from a motor 42, preferably below the wire straightening device as shown in Figures 3 and 5, by a train of gears 43 as shown in Figure 4 and arranged so that the pulleys turn in opposite directions with their adjacent peripheral portions turning away from the front end of the machine and the wire straightening device.

After the wire W leaves the feed pulleys, it passes thru an opening in a transverse member 44 (Figure 3) mounted between frame members 13 and 14 for free rocking motion, after which the wire passes thru a close fitting opening 45 in the end member 16, and which forms what may be considered the fixed cutting edge of the cutting device now to be described.

This cutting device, which functions to intermittently cut the wire at opening 45, is particularly shown in Figs. 6 and 7 and comprises a transverse lever 46 pivoted intermediate its end on a pin 47 mounted in frame member 16 and a bracket 48; this pin being to one side of opening 45 and on a higher level. A cutting dog 49 is pivoted on the frame side of the lever between pin 47 and opening 45, and is formed on its lower end with diverging legs 50, forming a V notch 51 the edges of which are sharpened in reversed relation so that the dog may be reversed on the lever; the edge in use at any time being the one nearest member 16 and opening 45.

A horizontally disposed spring pressed plunger 52 mounted on the lever engages the dog on the side furthest from the wire, and normally maintains the dog angled in the direction of the wire and so that the leg is across the vertical plane of the wire.

The lever is actuated in a wire cutting direction, or so that the dog descends past the wire from a position above the same, by a heavy adjustable vertical compression spring 53 suported at its lower end from bracket 48, as shown in Figure 6 and at its upper end bearing against a plunger head 53', which latter is engaged with the underside of the lever adjacent its end. The spring is intermittently loaded and the other portion of the lever raised by a revolving cam 54 (see Figure 5) driven as hereinafter set forth and engaging a depending arm 55 on the corresponding end of the lever. When the lever is thus raised, the wire which projects from opening 45, deflects the adjacent leg of the dog against the resistance of the plunger 53' so that said leg moves above the wire, the plunger spring 53 then returning the dog to its original position or with the cutting edge of said leg directly above the wire. The cam then moves from under arm 55 and the lever suddenly drops, by the action of spring 53 so that the dog cuts thru the wire. The shock of dropping is cushioned by a spring mounted bumper B.

The cam 54 is mounted in connection with a gear 56 engaging a pinion 57 mounted for adjustment along an arcuate slot 58 concentric with the axis of gear 56. Pinion 57 meshes with a gear 59 removably mounted in driving relation on one of the shafts 60 of the gear train 43. The slot 58 enables the pinion 59 to assume different positions relative to shaft 60 while remaining in mesh with gear 56, so that gears of different sizes, as indicated in Figure 5, may be mounted on shaft 60 and thus give different speeds to gear 56. By so doing, the actuating time of the cam and lever relative to the wire feeding device may be altered so that wire lengths of different dimensions may be cut.

It is desirable that the feeding of the wire be discontinued while the lever is being lowered and until said lever has assumed its clear position. The following device is therefore provided to elevate the upper pulley 29 from driving engage-

ment with the wire during this period. This device comprises a pair of transversely spaced levers 61 pivoted as at 62 slightly back of and under shaft 32 between the shaft bearings and rockably supporting shaft-bearing cradles 63 engaging shaft 32 from below. The levers at their rear ends are rigidly connected by a cross bar 64. An adjustable screw 65 is mounted on a lug 66 projecting radially forward from a transverse shaft 67 supported in brackets 68 mounted on the frame of the machine. An arm 69 depends from the shaft 67 between gear 56 and the frame and rearwardly of its shaft as shown in Figure 12. This arm is adjustable as to length, being formed of two overlapping sections connected by clamping bolts 70. A cam lug 71 is mounted on gear 56, eccentric to the axis thereof, in position to engage the lower end of the lever at about the time cam 54 (fixed with gear 56) engages arm 55. As the lever is swung back by the rotating lug, moving up, the screw 65 is lowered, depressing the bar 64 and the adjacent end of levers 61. This raises cradles 63 and shaft 32, raising the upper pulley 29 from driving engagement with the wire, while still maintaining the gears of these pulleys in mesh. At the proper time in the rotation of the gear 56 and the operation of the cam 54, the lug 71 clears the lever and drops into a recess 72 formed therein, which immediately causes the pulley shaft to resume its lowered position and again advance the wire.

The wire as it projects from the machine and is advanced by the feeding thereof passes into the upper guard 73 of a wire receiving trough 74 (see Figures 15 and 16), which is supported on standards 74A. This unit is of course mounted in alinement with the machine in proper position to receive the wire.

From the above description it will be seen that if a wire is initially withdrawn from the spool and threaded thru the straightening device to and engaged with pulleys 29, the machine if then started will automatically straighten, advance and then cut the wire into pieces of predetermined and equal lengths and such pieces will be deposited in the receiving trough 74 ready for tying in bundles or otherwise packaged for shipment or use. The machine is supported by a heavy central standard 75.

I claim:

1. A wire cutting machine of the character described having in combination a frame provided with an opening therein, a pair of complemental wire-feeding pulleys for feeding wire through said opening, shafts for rotatively supporting said pulleys, one of said shafts being supported so as to be radially adjustable with respect to the other shaft, a supporting bracket carried by said frame, a lifting member pivotally supported by said bracket and having a portion engaging said adjustable shaft, means carried by said bracket for limiting movement of said lifting member, a rotatively mounted cam member, means operated by said cam member for intermittently actuating said shearing member, and other means actuated by said cam for operating said lifting member independently of but in timed relation with respect to movements of the shearing member.

2. A wire cutting machine of the character described having in combination a frame provided with an opening therein, a pair of complemental

wire-feeding pulleys for feeding wire through said opening, shafts for rotatively supporting said pulleys, one of said shafts being supported so as to be radially adjustable with respect to the other shaft, a supporting bracket supported by said frame, a lifting member pivotally supported at one end in said bracket, and having means at its other end to engage said adjustable shaft, an adjustable stop mounted in said brackets and positioned to limit upward movement of said lifting member, a rotatively mounted cam member, means operated by said cam member for intermittently actuating said shearing member, and other means actuated by said cam for operating said lifting member independently of but in timed relation with respect to movements of the shearing member.

3. A wire cutting machine of the character described having in combination a frame provided with an opening therein, a pair of complemental wire-feeding pulleys for feeding wire through said opening, shafts for rotatively supporting said pulleys, one of said shafts being supported so as to be radially adjustable with respect to the other shaft, a supporting bracket carried by said frame, a lifting member pivotally mounted in said bracket and having a portion engaging said adjustable shaft, an actuating arm for said lifting member, a rotatively mounted cam member, means operated by said cam member for actuating said shearing member, and means carried by said cam member for moving said actuating arm in timed relation with respect to the movements of said shearing member.

4. A wire cutting machine of the character described having in combination a frame provided with an opening therein, a pair of complemental wire-feeding pulleys for feeding wire through said opening, shafts for rotatively supporting said pulleys, one of said shafts being supported so as to be radially adjustable with respect to the other shaft, a bracket supported by said frame, a lifting member pivotally mounted in said bracket and having a pair of laterally disposed arms, a cradle movably supported by said arms and engaging said adjustable shaft, an actuating arm connected with said lifting member so as to be movable therewith, a rotatively mounted cam member, means operated by said cam member for actuating said shearing member, and means carried by said cam member for moving said actuating arm in timed relation with respect to the movements of said shearing member.

JOSEPH F. HIDZICK.

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