Oct. 10, 1939. W. H. BLOUNT ET AL 2,175,426

WIRE-COILING MACHINE

Filed Dec. 1, 1938 5 Sheets-Sheet 1

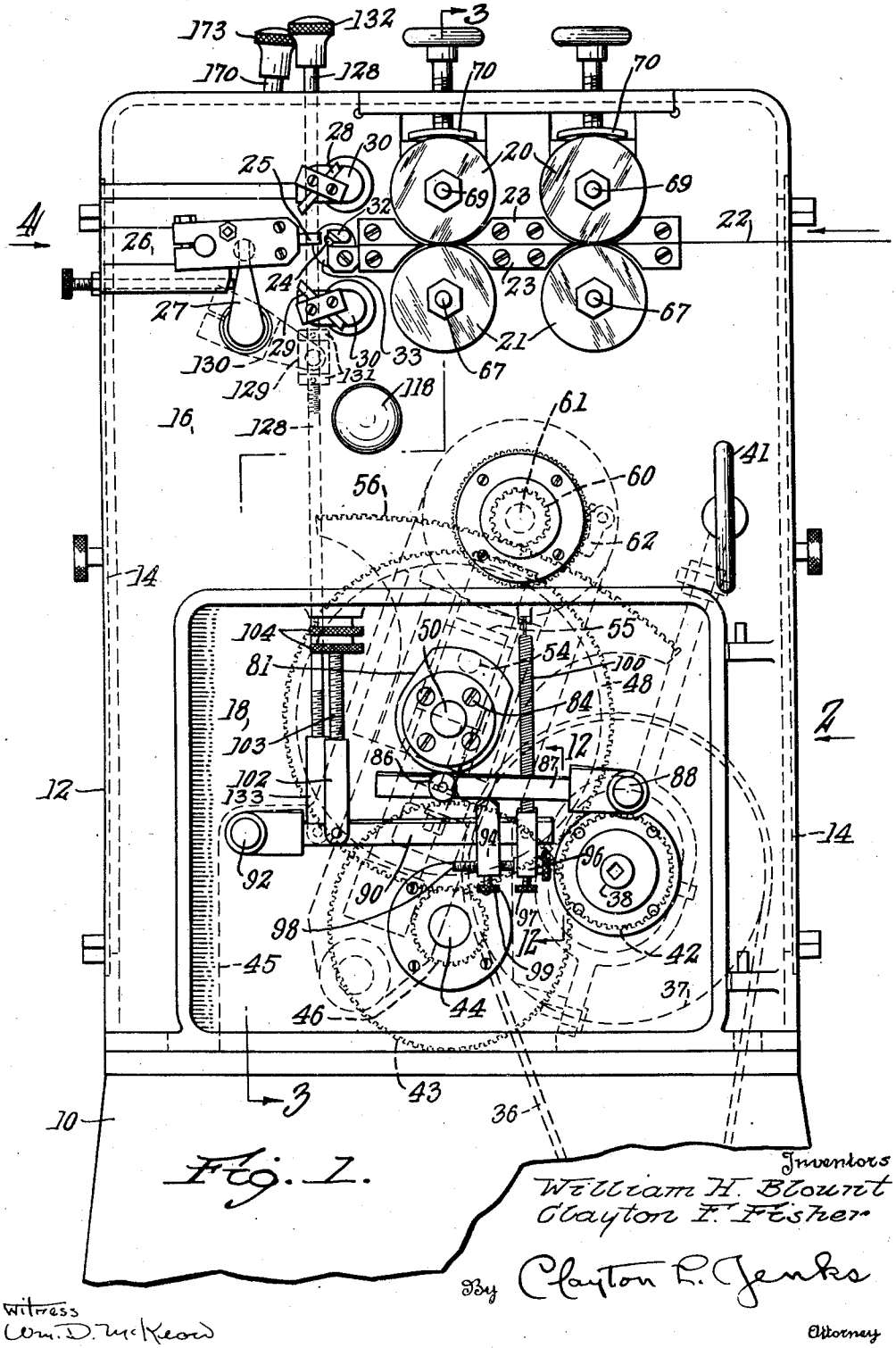


Fig. 1.

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WIRE-COILING MACHINE

Filed Dec. 1, 1938 5 Sheets-Sheet 2

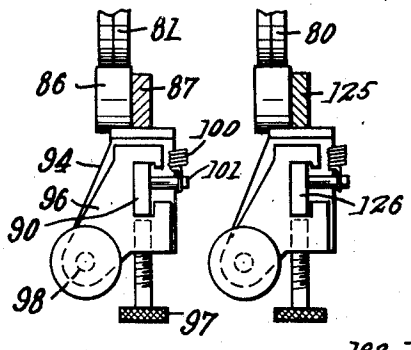


Fig. 12.

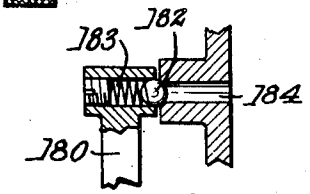


Fig. 14.

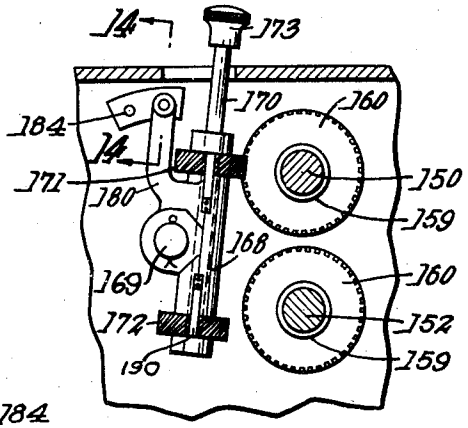


Fig. 13.

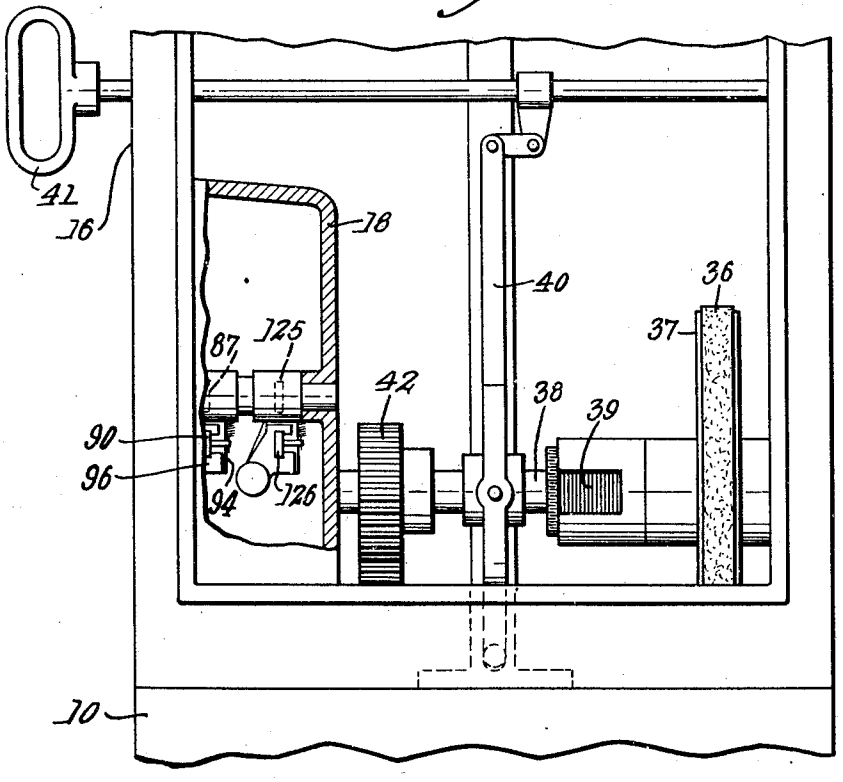


Fig. 2.

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WIRE-COILING MACHINE

Filed Dec. 1, 1938 5 Sheets-Sheet 3

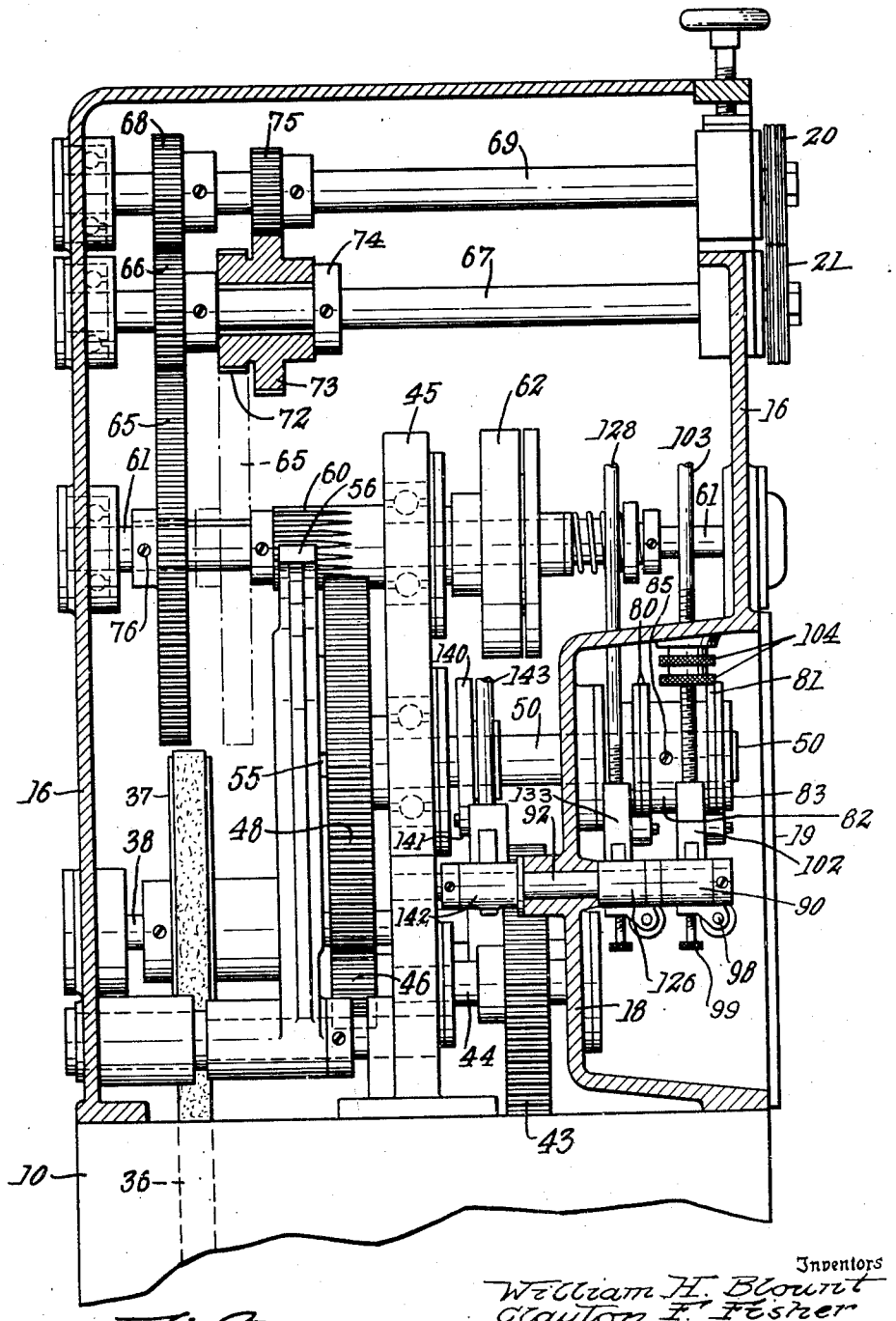


Fig. 3.

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WIRE-COILING MACHINE

Filed Dec. 1, 1938 5 Sheets-Sheet 4

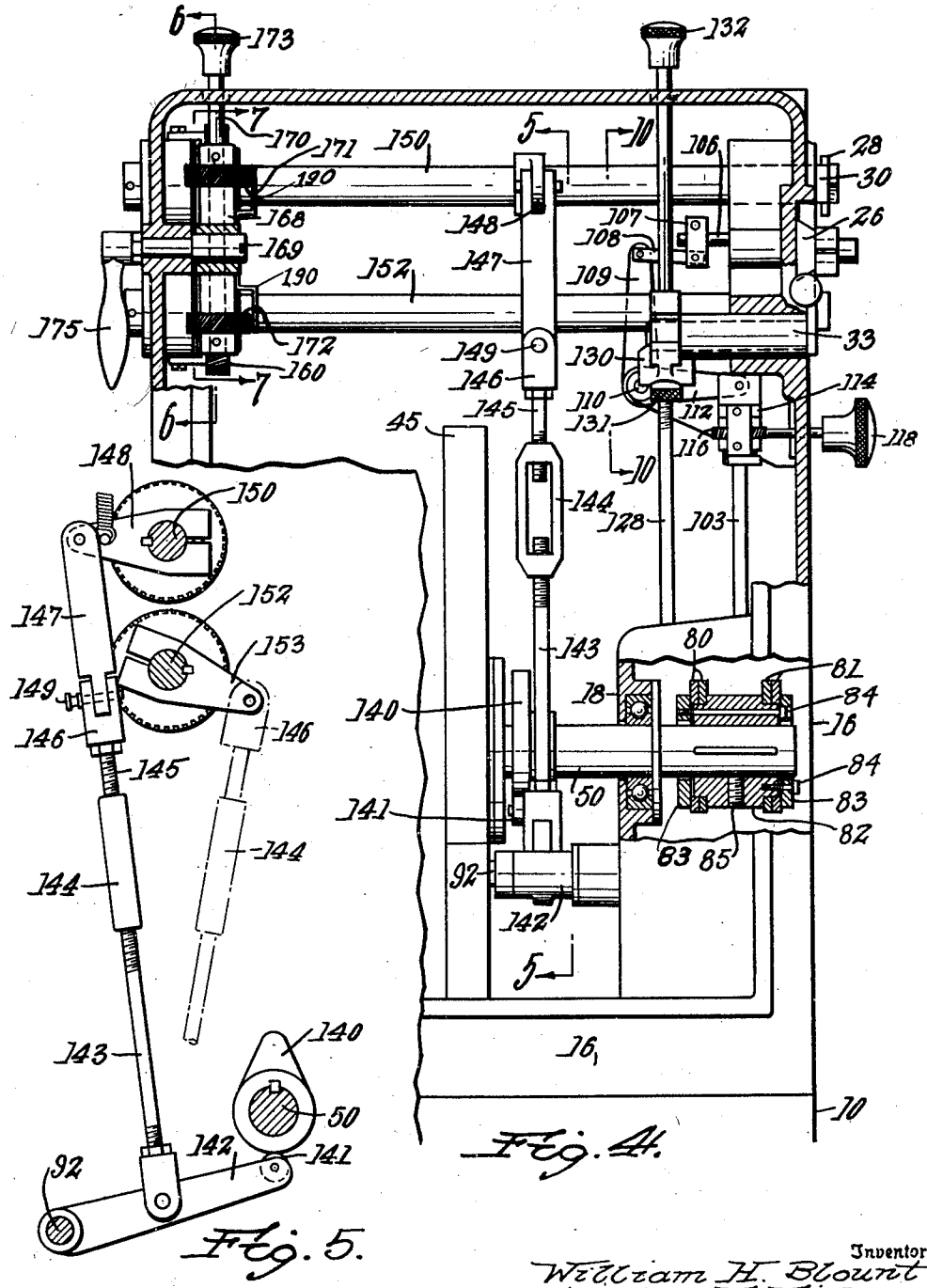


Fig. 4.

Fig. 5.

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WIRE-COILING MACHINE

Filed Dec. 1, 1938 5 Sheets-Sheet 5

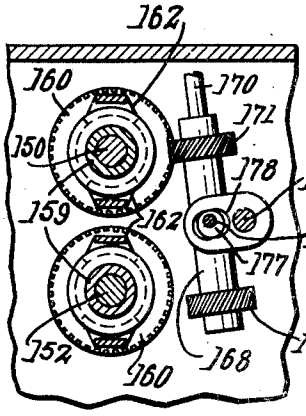


Fig. 7.

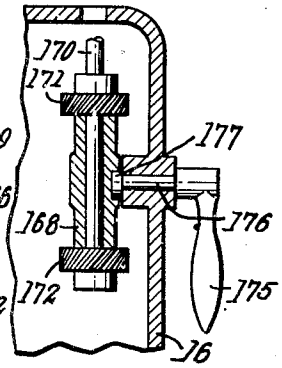


Fig. 8.

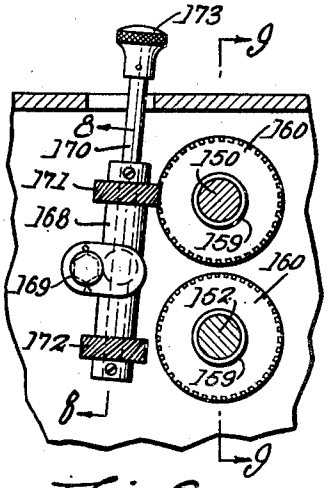


Fig. 6.

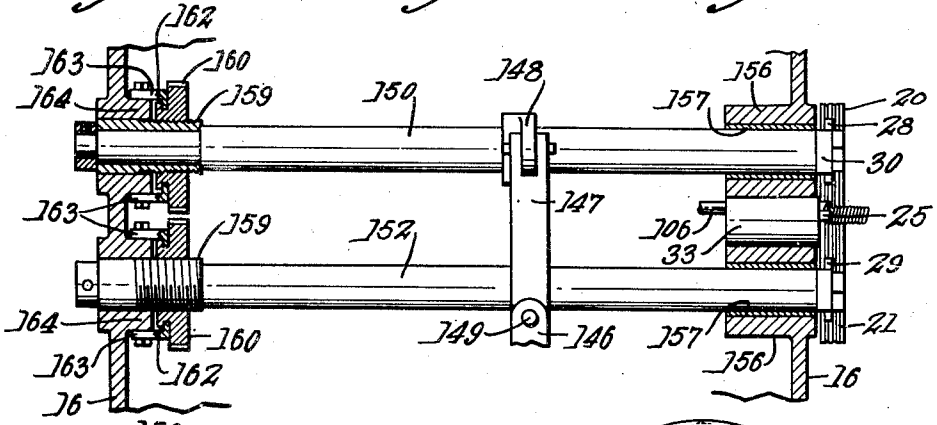


Fig. 9.

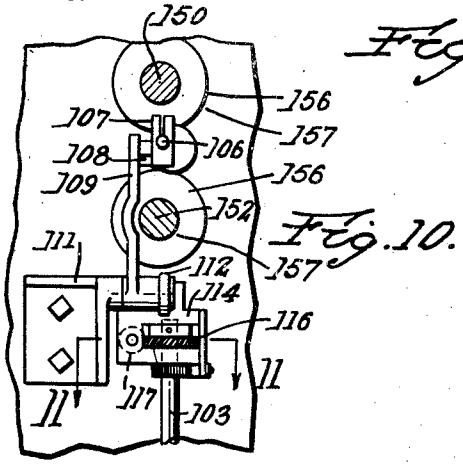


Fig. 10.

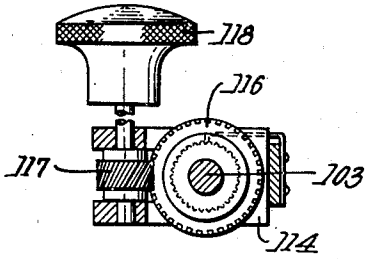


Fig. 11.

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Patented Oct. 10, 1939

2,175,426

UNITED STATES PATENT OFFICE

2,175,426

WIRE-COILING MACHINE

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Application December 1, 1938, Serial No. 243,350

15 Claims. (Cl. 153—65)

This invention relates to a wire coiling machine, and more particularly to improvements in machines of the types shown in the patents to Sleeper, No. 1,266,070 dated May 14, 1918, and Blount, No. 2,096,605 of October 19, 1937.

Wire coiling machines of this type shown by Sleeper comprise wire feeding rolls driven intermittently by a reciprocating gear segment, and the pitch and the diameter of the coil are determined by separate cams. In that machine, as well as in a clutch controlled machine of the type shown by Blount which has a clutch automatically operated by suitable cam mechanism, the wire is severed while the feeding rollers are stationary. In such constructions, adjustable double cams have been used to provide for variation in the pitch and diameter of the coil, but the controlling cams have been located within the box-like frame of the machine and have not been readily accessible, thus requiring that one adjust the cams in confined spaces and cut and try in order to make the required adjustments. As shown in the Sleeper patent, these machines have heretofore comprised cam operated compound lever arms having an adjustable fulcrum connection therebetween, so as to vary the length of stroke imparted by the pitch and diameter controlling cams and thus vary these characteristics of the coiled wire. This lever and cam mechanism has also been located within the machine frame and in positions which have made it difficult for adjustment, thus requiring considerable delay on the part of the operator in the use of the machine.

It is accordingly one object of this invention to so construct such machines that one or more of the cams and their associated levers may be readily adjusted and replaced from readily accessible positions and particularly from the outside of the machine or from a position where the operation of the wire coiling mechanism as well as the control cams may be observed.

A further object is to provide a construction whereby the pitch and diameter control cams may be relatively adjusted and then removed from the machine and later replaced in the same operative relationship without requiring further adjustment.

Other objects are to provide an efficient cam mechanism for the pitch and diameter control devices which may be readily adjusted and held in required arrangements, and which comprise fine motion or micrometer mechanisms for making the adjustments.

The wire coil is severed by a cutter mechanism operated by a cam which is moved in timed relationship with the wire coiling mechanism. It is necessary to adjust this wire cutter in accordance with the sizes of the wire and the coil to be made and to insure that its cam controlled operation be made at the right time. Two cutting tools are required, one for a lefthanded pitch and the other for a righthanded pitch of the coil. Only one of these wire cutters is used at a time, but it is necessary to make the required adjustment so as to throw the proper cutter into play.

Other objects of the invention are therefore to provide a mechanism which is readily accessible and may be easily employed for making a fine adjustment of the cutter mechanism and which will selectively bring the right cutter into use.

Other objects are to make a simply constructed, easily adjusted and operated machine which may be used for making a large number of types of wire coils economically and efficiently. Other objects will be apparent in the following disclosure.

Referring to the drawings which illustrate a preferred embodiment of this invention and which satisfies all of the above objects:

Fig. 1 is a front elevation of the machine, partly broken away, and with parts in dotted outline;

Fig. 2 is a fragmentary elevation looking in the direction of the arrow 2 on Fig. 1;

Fig. 3 is a vertical elevation, partly in section, taken on the line 3—3 of Fig. 1;

Fig. 4 is a vertical fragmentary elevation looking in the direction of the arrow 4 of Fig. 1, and with the frame of the machine partly broken away;

Fig. 5 is an elevation on the line 5—5 of Fig. 4;

Fig. 6 is a fragmentary elevation on the line 6—6 of Fig. 4;

Fig. 7 is a similar elevation on the line 7—7 of Fig. 4;

Fig. 8 is a section on the line 8—8 of Fig. 6;

Fig. 9 is a section on the line 9—9 of Fig. 6;

Fig. 10 is a fragmentary section on the line 10—10 of Fig. 4;

Fig. 11 is a fragmentary section on the line 11—11 of Fig. 10;

Fig. 12 is a section on the line 12—12 of Fig. 1;

Fig. 13 is a fragmentary elevation showing a modification of the device shown in Fig. 6; and

Fig. 14 is a detail in section on the line 14—14 of Fig. 13.

This machine comprises a base 10 of suitable construction which carries driving mechanism of the type shown in the Blount patent. Removably

mounted on this base is a boxlike casing 12 having back, top, side and end plates forming the various sides of the casing. Doors 14 are provided on the two ends of the machine to permit ready access to the mechanism therein. The front of the machine is specially shaped, as shown particularly in Fig. 3, to provide a side plate portion 16 and a recessed or boxlike plate or wall 18 projecting into the machine for a sufficient distance to hold the cams and associated mechanism for controlling the pitch and the diameter of the coil. If desired, a cover plate 19 may be employed to enclose the mechanism within this recess, but the wall 18 is to be considered as forming an outside wall at the front of the machine. Hence, certain mechanism may be located on what is to be considered the outside of the machine, although it does not project beyond the main line of the base.

The wire coiling mechanism may be of suitable construction, such as that shown in the patent to Sleeper, to which reference may be had for a detailed description thereof. This mechanism comprises a pair of upper rollers 20 and a pair of lower rollers 21 which are driven by power and arranged to draw a wire 22 from a suitable source of supply and force it through a passage formed between two guide plates 23 and then under or over the arbor 24 and against a coiling point 25. This coiling point consists of a steel member having a grooved face so shaped, as described in the prior patent, that when the wire is forced thereagainst, it will be bent into a coil whose radius is determined by the distance of the coiling point 25 from the arbor 24. The diameter of the coil is varied by mounting the coiling point 25 on a slide 26, which may be moved to a desired position by a mechanism including a rock arm 27 riding in a groove in the side of the slide and which may be operated in timed relation with the other associated coiling members.

Cooperating with the arbor 24 is a pair of cutters 28 and 29 which are adjustably and removably mounted on a pair of rocking heads 30 so that either one of the cutters may be forced to cut the wire against the arbor 24. The pitch of the coiled wire is determined by the adjustable pitch tool 32 slidably mounted in an opening in the tool holder 33, which is shaped as a cylindrical body having openings therein arranged to carry both the arbor 24 and the pitch tool 32, as described in said Sleeper patent. The pitch tool is shaped as a cam or wedge, and its shape is to be varied in accordance with the type of wire coil to be formed; hence different pitch tools may be mounted in the tool holder for this purpose. The function of this pitch tool is to deflect the wire after the coil has been started and to cause it to be spaced from the incoming wire and thus determine the distance between the convolutions of the helix.

The various mechanisms are driven by means of a belt 36 coming from a variable speed power driven device of suitable construction mounted in the base and driven by a motor, such as shown in the Blount patent. This belt passes over a pulley 37 on a shaft 38, the pulley 37 being connectable to the shaft by means of a suitable clutch 39 of the disk type (Fig. 2). This clutch is shifted by means of a lever 40 pivoted to the frame at its lower end which is moved by an operating handle 41 projecting on the outside and front of the machine. The shaft 38 carries a gear 42 keyed thereon and meshing with a gear 43 (Fig. 3) on a short shaft 44 mounted at one end in suitable bearings supported by the recessed housing 18 and near its other end in an upright wall 45 centrally disposed within the casing of the machine. This shaft projects through the wall 45 and has a gear 46 on its left hand projecting end, which in turn meshes with a large gear 48 carried on the cam shaft 50. The shaft 50 is mounted in suitable bearings supported by the wall 45 near one end, and it projects through the recessed wall 18 and is supported by bearings carried thereby. The wall 45 is in reality a short stand having a foot secured on the top of the base 10, and this serves as an intermediate support for the shafts within the casing, thus creating greater rigidity of structure.

As shown in the Sleeper patent, the gear 48 (Figs. 1 and 3) has a pin 54 extending into a sliding block 55 mounted adjustably on the side of a gear segment 56, these parts being so arranged that the throw of the gear segment may be varied. The teeth of the gear segment mesh with a gear 60 loosely mounted on a shaft 61 mounted within the two end walls and the stand 45. The shaft 61 carries a pawl and ratchet drive mechanism 62 of the type shown in the Sleeper patent or in the application of Blount Serial No. 134,255 filed April 1, 1937. The power of the driving gear 60 is transmitted through the ratchet mechanism to rotate the shaft 61 in a wire coiling direction and to permit recoil of the tensional wire coil after the driving segment has passed dead center. The shaft 61 is connected to a large gear 65 which drives two gears 66 located on the shaft 67 carrying the lower driving rollers 21. The two gears 66 also mesh with upper gears 68 on the shafts 69 which carry the upper rollers 20. The upper shafts 69 are so mounted that the upper rollers 20 may be held under the pressure of manually adjustable springs 70 to provide the desired gripping and driving action on the wire.

The speed of rotation of these driving rollers 20 and 21 may be changed relative to the speed of the main driving belt and associated mechanism by means of the shiftable gear mechanism shown particularly in Fig. 3. As there indicated, the gear 65 is pivotally keyed on the shaft 61 and may be shifted from a position where it meshes directly with the gears 66 to a position where it meshes with supplemental gears 72 which are part of a hub having further gears 73 thereon. These hubs are loosely mounted on the shaft 67 and are suitably held against the hubs of the gears 66 by means of collars 74 pinned to the shafts 69. These gears 72 have substantially one-half the diameter of that of gears 73, so as to give a speed ratio of 1 to 2, whereas the gears 66 and 68 provide a 1 to 1 ratio. Hence, the speed imparted to the feed rolls may be doubled by utilizing the change gears 72 and 73 and associated parts. It will be appreciated that the set of gears 72 and 73 may be further supplemented by other gears and associated change speed mechanism so as to give a greater number of different speeds. In this way one may vary the speed of the incoming wire relative to the rate of movement of the cam mechanism to be described. The speed of all of the parts may also be changed by the variable speed mechanism in the base of the machine, but this does not change the relative movement of the feeding rollers and the wire cutters, etc. The gear 65 may be manually shifted or by suitable mechanism as desired. In the present instance, the gear is shifted by hand and held in place by a set screw 76 passing through the gear hub engaging the

shaft. This gear 65 is readily accessible through the removable doors or plates 14 on the ends of the machine.

The cam shaft 50, which is mounted in suitable ball bearings in the stand 45 and carries the driving gear 48 overhung on the left hand side of that stand, passes through the recessed wall 18 and is supported in suitable ball bearings therein. The outwardly extending and overhanging right hand end of this shaft carries two sets of cams, one for controlling the diameter of the coil and the other for controlling the pitch.

The diameter and pitch control cams are so mounted on the cam shaft 50 that they may be removed and later replaced in their original relationship without further adjustment. It is preferred that they be mounted and removed as a unit for this purpose. Also, it is preferable that each cam be made of relatively adjustable parts so arranged that they may be set in desired arrangements, according to the type of coil required. All of these features are embodied in the form illustrated. As shown, the diameter control cam 80 (Figs. 3 and 4) and the pitch control cam 81 are each made up of two relatively adjustable U-shaped members of the type shown by Sleeper, which slip laterally over a hub or mount 82 removably keyed on the cam shaft 50 and held in place by collars 82 and 83. The two sets of bolts 84 serve to secure the back and front collars on the hub and permit either cam to be adjusted independently of the other by loosening the adjacent collar and rotating the cam parts relatively as required. The set screw 85 holds the hub and its relatively adjusted cams on the shaft and permits removal and replacement of the cams as a unit. Hence, one may have a set of hubs and adjusted cams in storage and use the one required for making a given coil, the exchange of cams being thus readily and quickly accomplished. Either cam may be adjusted without disturbing the setting of the other, and this is done from the front of the machine where the operator may simultaneously see the effect on the wire coiling operation. These adjustable cams may also be replaced by fixed cams or by any other suitable constructions which will serve to give the required adjustments.

The pitch control cam 81 has a high and a low surface portion adapted to engage a follower or roller 86 which is pivotally mounted on the side of the lever 87 (Fig. 1). This lever is in turn pivoted on a stud 88 extending outwardly from the inner wall of the recess 18, which also carries the roller lever for the diameter cams. The lever 87 operates a further lever 90 which is pivoted on a shaft 92 suitably supported in bearings in the recessed wall 18. This shaft 92 passes through to the central stand 45, where it has another bearing and serves to carry further mechanism for operating the cutters to be described. Slidably mounted on the lever 90 is a block 94 having a wedge shaped edge which engages the under surface of the lever 87 and thus forms an adjustable rocking fulcrum, whereby the downward thrust of the cam 81 against the lever 87 serves to move the lever 90 downwardly through a distance determined by the position of the wedge shaped fulcrum on the lever. This wedge block 94 is adjusted on the lever 90 by means of a further sliding block 96 which is held by a set screw 97 in any desired adjusted position. A screw 98 is rotatably mounted in the block 96 and threaded into the other block 94, so that by turning the knurled head of the screw 98, the fulcrum block 94 may be slid along the lever 90. A further set screw 99 in the block 94 is adapted to clamp against the under side of the lever 90 and hold this block in its adjusted position. These parts, therefore, form a fine motion or micrometer mechanism which serves for making accurate adjustments of the parts. A spring 100 is secured to a fixed point on the wall 18 so as to hold the lever 90 up against the upper lever 87 and the follower 86 on the latter in contact with its operating cam 81.

The lever 90 has a connecting link 102 pivotally secured thereon. This link 102 is connected to a rod 103 passing upwardly through two nuts 104 which are threaded on the rod and may be adjusted in their position. These strike against the underside of the top wall of the recess 18 and form an adjustable stop serving to limit the uppermost position of the lever 90 as moved by the impelling action of the spring 100. Thus, the lever 87 may be so positioned that its cam roller 86 engages the operating cam 81 only on the extreme outermost portion, if desired. Or, the nuts 104 may be adjusted for a position at which the cam 81 will not engage the roller 86 whatsoever, and a closed uniform pitch is made throughout the length of the coiled wire. If the cam 81 is permitted to operate the lever system, then it serves to change the pitch of the wire coil at a desired point in its length depending upon the cam adjustment. That serves particularly to make the ends of the coil perpendicular to the coil axis or close to the adjacent convolution.

The pitch controlling mechanism is shown particularly in Figs. 4, 9, 10 and 11. The pitch control tool 32 (Fig. 9) is slidably mounted on the arbor 106 which projects through the holder 33. This arbor 106 carries a clamp 107 (Figs. 4 and 10) which is pivotally connected to a link 108 in turn pivotally mounted on the rock arm 109 of a bell crank lever which is pivoted at 110 on the block 111 supported on the frame of the machine. The other arm 112 of the bell crank lever is pivotally connected to the block 114 (Fig. 11) which is hollowed out to carry a spiral gear 116 and the mating gear 117 suitably mounted therein. The gear 116 is secured on the upper end of the rod 103 which comes from the recessed casing 18. A knob 118 secured to the spiral gear 117 extends outwardly through the front 16 of the machine, thus providing an adjustment for the arbor 106 from the working side of the coiler. By turning the knob 118, the rod 103 is screwed up or down in the link 102 which connects with the lever 90, and this gives a fine adjustment of the position of that lever relative to the other lever 87.

The adjustable, two part diameter control cam 80 (Figs. 3 and 12) operates a set of levers 125 and 126 which are in behind the levers 87 and 90 and are similarly provided with follower rollers, an adjustable fulcrum and connections similar to the parts which control the pitch, as above explained. The lever 126 is connected through a rod 128 (Figs. 1 and 4) passing upwardly through the recessed wall 18 to a sleeve 129 on its upper end held between two check nuts. The lower forked end 130 of a bell crank is suitably connected to the sleeve 129 so that the bell crank is rocked by vertical motion of the rod 129. The bell crank is connected to swing the arm 27 which is pivotally connected by a link to the sliding block 26 carrying the diameter control tool 25. The rod 128 passes upwardly through the top of

the machine and terminates in a knurled knob 132, which serves for adjusting the position of the rod in the link 133 fastened to the lever 126, just as the link rod 103 is adjusted. By turning the knob 132, the diameter control tool 25 is moved in or out as desired.

The cutters adapted to cut off the wire coil are operated from a cam 140 mounted on the cam shaft 50 inside of the machine, which is made of suitable shape and substantially as shown in Fig. 5 of the drawings. The cam is adapted to engage a follower or roller 141 on the end of a rocking lever 142 pivoted on the stud 92. This lever 142 is pivotally connected to a rod 143 connected through a turnbuckle 144 with another rod 145 having a U-shaped yoke 146 on its upper end which is pivotally connected by a removable pin 149 to a link 147. The latter is in turn pivotally connected to a rock arm 148 on the shaft 150. Mounted below the shaft 150 is another shaft 152. The upper shaft carries the upper cutter head 30 and cutter 28 and the lower shaft carries the lower head and its cutter 29. Only one of these two cutters is operated at a time, depending upon whether the machine is set up for making a left hand or a right hand coil. If the lower cutter is to be employed, then the link 147 is disconnected and an arm 153 (Fig. 5) on the shaft 152 which is similar to the arm 148 is connected to the head 146 by the removable hand pin 149. It will be noted that the two rock arms 148 and 153 project on opposite sides of their respective shafts so that the downward pull on the rod 143 will turn one to the left and the other towards the right.

The wire feeding rollers 20 and 21 are provided with parallel grooves of different widths to take care of different wire sizes, and it is therefore necessary to adjust the cutter in or depending on which one of these grooves is used for feeding the wire forward to the coiling arbor. To this end, the operating shafts 150 and 152 are adapted to be moved longitudinally as well as axially. The front 16 of the machine has two inwardly projecting bosses 156 carrying sleeves 157. The two shafts 150 and 152 are mounted to slide and rotate in these sleeves as bearings. The opposite ends of the two shafts 150 and 152 have sleeves 159 which are fixed thereon and have threaded portions threaded in the gears 160. Each of these gears has a flange 162 forming an annular groove in which the clamping finger or dog 163 rides, these dogs being suitably secured to the integrally projecting bosses 164 on the machine wall. Hence, by rotation of the gears, which cannot move axially, the shafts are moved lengthwise. The head 30 of each of the cutters is suitably fixed on its supporting shaft 150 or 152, so that the rocking of the shaft will operate the cutter and the cutter will be moved lengthwise with the shaft.

The cutter adjusting gears 160 are adapted to be rotated by mechanism operated from the top of the machine, as shown in Figs. 6, 7 and 8, which is so constructed and arranged that either one or the other of these rock shafts 150 and 152 may be operated but not both of them simultaneously. To this end, a bracket 168 is pivotally mounted on an offset stud 169 supported on the frame of the machine. The bracket 168 is a hollow sleeve carrying a shaft 170 on which are mounted the two gears 171 and 172 meshing respectively with the upper and lower gears 160 on the shafts 150 and 152. A knurled head 173 on the upper end of the rod 170, which extends through an elongated slot in the top wall of the machine, serves for rotating this shaft 170 and thus adjusting the cutters laterally. A handle 175 on a stud 176 mounted on the back wall of the machine has an eccentric cam 177 which works in an elongated slot 178 in the bracket 168. These parts are so arranged that the upper gear 171 is in mesh with the gear 160 when the cam operating handle 175 is as located in Fig. 7. By rocking the handle 175, the eccentric cam 177 swings the bracket 168 around the stud 169 and thus throws the lower gear 172 into engagement with the corresponding gear 160 on the lower shaft 152. Thus either one of these shafts may be brought into operation merely by swinging the handle 175. It will be appreciated that this handle and associated mechanism may be located adjacent the front ends of the shaft 150 and 152, so that these parts may also be operated from the front of the machine.

A modification shown in Figs. 13 and 14 involves a simplified mechanism in which the shaft 170 with its knob 173 may be manually shifted by pushing directly on the knob 173 to rock one of the operating gears 171 and 172 into contact with the gear 160. The swinging bracket is held in either one of these two operative positions by means of the spring lock which comprises a lever arm 180 fixed to the bracket 168. The upper end of this lever arm carries a spring pressed ball 182 which tends to be thrust downwardly by a spring 183 against one of the two recesses 184 located in a boss on the wall of the machine. These recesses are so shaped that the ball tends to lock the swinging arm 180 in one of the two positions when the parts have been manually moved thereto. As a further modification, shown in Figs. 4 and 13, two springs 190 are secured to the bracket 168 and have their ends bent into contact with the teeth of the gears 171 and 172, so that these form locks which hinder movement of the gears but click over the teeth when manually rotated.

The operation of the mechanism has been fully explained above, and it will be appreciated that one may make coils of many types of widely variable diameter and pitch. It will also be appreciated that many mechanical equivalents may be substituted for the parts shown and that numerous modifications may be made. Hence, the above description is to be interpreted as illustrating the principles and a preferred embodiment of the invention and not as limitations thereon, except as required by the scope of the appended claims.

We claim:

1. A wire coiling machine comprising an arbor and mechanism including adjustable diameter and pitch controlling devices for winding a coil of variable diameter and pitch on the arbor, and mechanism for operating the pitch and diameter controlling devices including a cam for each device and means supporting the cams in relatively adjustable positions which provides for removal of the cams from the machine and subsequent replacement thereof and prevents their accidental replacement in a different timed relationship.

2. A wire coiling machine comprising an arbor, wire feeding rolls and adjustable pitch and diameter controlling devices arranged for making coils of variable pitch and diameter, mechanism including a rotatable shaft and separate adjustable cams mounted thereon for controlling the pitch and diameter of the coil, and means for holding the cams in an adjusted relationship which provides for removal of the cams from the machine

and their subsequent replacement in the same exact timed relationship without requiring further adjustment thereof.

3. A wire coiling machine comprising an arbor and mechanism for winding a coil of variable diameter and pitch on the arbor, which includes a pitch controlling cam and a diameter controlling cam and a mount for the cams providing for relative adjustment thereof, said mount and cams being removable as a unit from the machine and replaceable with the cams in the same timed relationship without requiring further adjustment.

4. A wire coiling machine comprising an arbor, positively driven wire feeding rolls and adjustable pitch and diameter controlling devices arranged for making coils of variable pitch and diameter, and mechanism for controlling the pitch and diameter devices comprising a shaft rotatable in timed relationship with said feeding rolls, a hub removably mounted on the shaft and separately adjustable cams mounted on the hub which control the pitch and the diameter of the coil, said hub and cams being removable as a unit from the shaft and replaceable without disturbing the cam relationship.

5. A wire coiling machine comprising a frame, an arbor mounted thereon, adjustable diameter and pitch controlling devices, and positively driven wire feeding rolls arranged for making a coil of variable pitch and diameter, a driven shaft mounted on the frame and projecting beyond the same, relatively adjustable cams removably mounted on the projecting end of said shaft and followers for said cams connected to operate said devices.

6. A wire coiling machine comprising a box-like frame having an outer wall, an arbor thereon, positively driven rolls for feeding wire to the arbor, adjustable pitch and diameter control devices associated with the arbor for making a coil which are located on the outside of said wall, a shaft operated in timed relationship with said rolls which projects to the outside of said wall and adjustable cams connected to operate said devices which are mounted on the outer end of the shaft in such locations that they may be adjusted by the operator from a point where he may observe the movement of said devices.

7. A wire coiling machine comprising an arbor and associated mechanism for coiling wire thereon, a pair of cutters arranged for cutting the wire of right and left hand coils on the arbor, mechanism including a member connectible to either one or the other of said cutters for operating the same and means for selectively connecting said member to either of said cutters so that one cutter only is operated at a given time.

8. A wire coiling machine comprising an arbor and associated mechanism for coiling wire thereon, a pair of cutters arranged on opposite sides of the arbor for cutting either a left hand or a right hand coil of wire thereon and mechanism for operating said cutters comprising a cam operated in timed relationship with the wire coiling mechanism, a follower operated by said cam and means for selectively connecting said follower to either one or the other of the cutters for operating the same without moving the other.

9. A wire coiling machine comprising an arbor and associated mechanism for coiling wire thereon, a pair of shafts, each of which has an operating lever and a cutter thereon arranged for cutting the wire on the arbor, cam mechanism driven in timed relationship with the wire coiling mechanism comprising a cam and a follower moved thereby, a connecting link between said follower and one of the operating levers and means whereby said link may be removably connected to the other of said levers for operating either one or the other independently.

10. A wire coiling machine comprising a box-like frame, an arbor and associated mechanism for coiling wire thereon, a pair of cutters located on opposite sides of the arbor and arranged for cutting either a left or right hand coil of wire, separate supporting shafts for said cutters, cam operated mechanism for rotating a cutter shaft to cut the wire and adjustable mechanism which is manually operable from outside of the frame for moving the shaft endwise to adjust the position of the cutter.

11. A wire coiling machine comprising an arbor and associated mechanism for coiling a wire thereon, a pair of cutters mounted for cutting either a right or left hand coil on the arbor, a pair of longitudinally movable and rotatable shafts which operatively support said cutters, cam controlled mechanism operated in timed relationship with the wire coiling mechanism for rotating a cutter shaft and causing a cutter to sever a wire coil and means for selectively moving either one or the other of said shafts longitudinally to adjust the position of the cutter without interfering with the other.

12. A wire coiling machine comprising a box-like frame, an arbor and associated power driven mechanism for coiling a wire thereon, a pair of cutters mounted for cutting either a right or a left hand coil on the arbor, a pair of longitudinally movable and rotatable shafts which support said cutters, cam controlled mechanism operated in timed relationship with the wire coiling mechanism for operating a cutter to sever a wire coil, and mechanism for moving either of said shafts longitudinally to adjust its cutter which includes a manually rotatable device accessible from outside of the machine frame and means for connecting the same with either one or the other of said shafts whereby either may be adjusted independently of the other.

13. A wire coiling machine comprising an arbor and associated power driven mechanism for coiling wire thereon, a pair of cutters mounted for cutting either a right or left hand coil of wire on the arbor, a pair of rotatable and longitudinal shafts supporting said cutters, a cam mechanism operated in timed relationship with the wire coiling mechaism which is arranged to operate a cutter and sever the coiled wire, manually adjustable selective mechanism for moving either of the cutter shafts longitudinally and independently of the other to adjust the position of its cutter, and means for holding the shaft in its adjusted position.

14. A wire coiling machine comprising an arbor, power driven wire feeding rolls and adjustable pitch and diameter control devices which are associated to make a coil of variable shape on the arbor, a shaft operated in timed relationship with said mechanism, an adjustable cam thereon, a follower moved by the cam, means including a rod connecting the follower with one of said devices for adjusting the same automatically in accordance with the cam movement and means including an adjustable stop on said rod which serves to hold the follower out of contact with a predetermined portion of the cam.

15. A wire coiling machine comprising a box-like frame, an arbor thereon, power driven wire feeding rolls and adjustable pitch and diameter

control devices which are associated to make a coil of variable shape on the arbor, a shaft operated in timed relationship with said mechanism, an adjustable cam thereon, a follower moved by the cam, means including a rod connecting the follower with one of said devices for adjusting the same automatically in accordance with the cam movement, means including an adjustable stop which serves to hold the follower out of contact with a predetermined portion of the cam and manually adjustable means operable from outside of the frame for relatively adjusting said rod and follower.

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