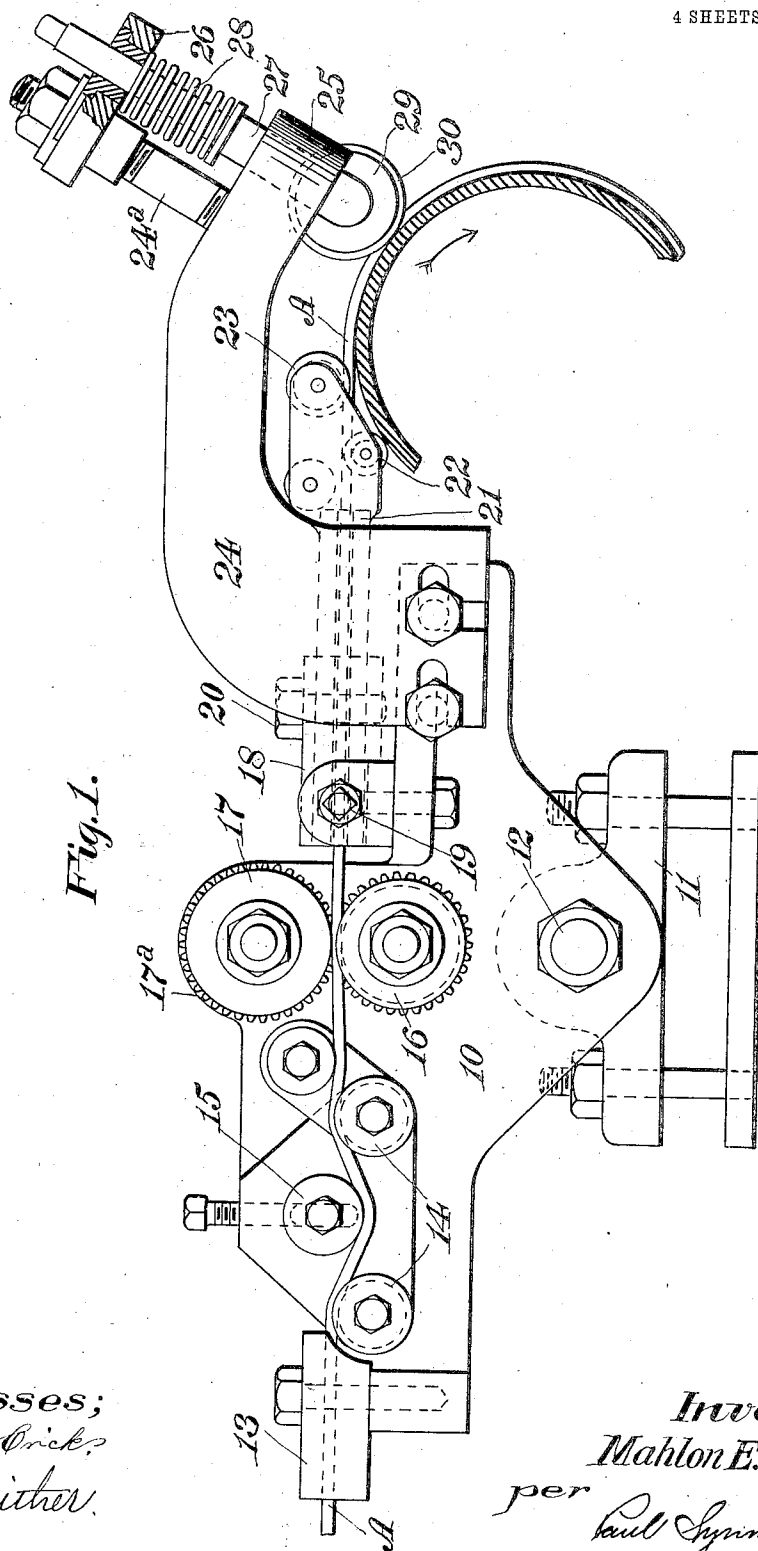


No. 820,507.

PATENTED MAY 15, 1906.

M. E. LAYNE.
WIRE WINDING MACHINE.
APPLICATION FILED MAY 20, 1906.

4 SHEETS—SHEET 1.



Witnesses;
Cyril C. Crick,
F. E. Gaither.

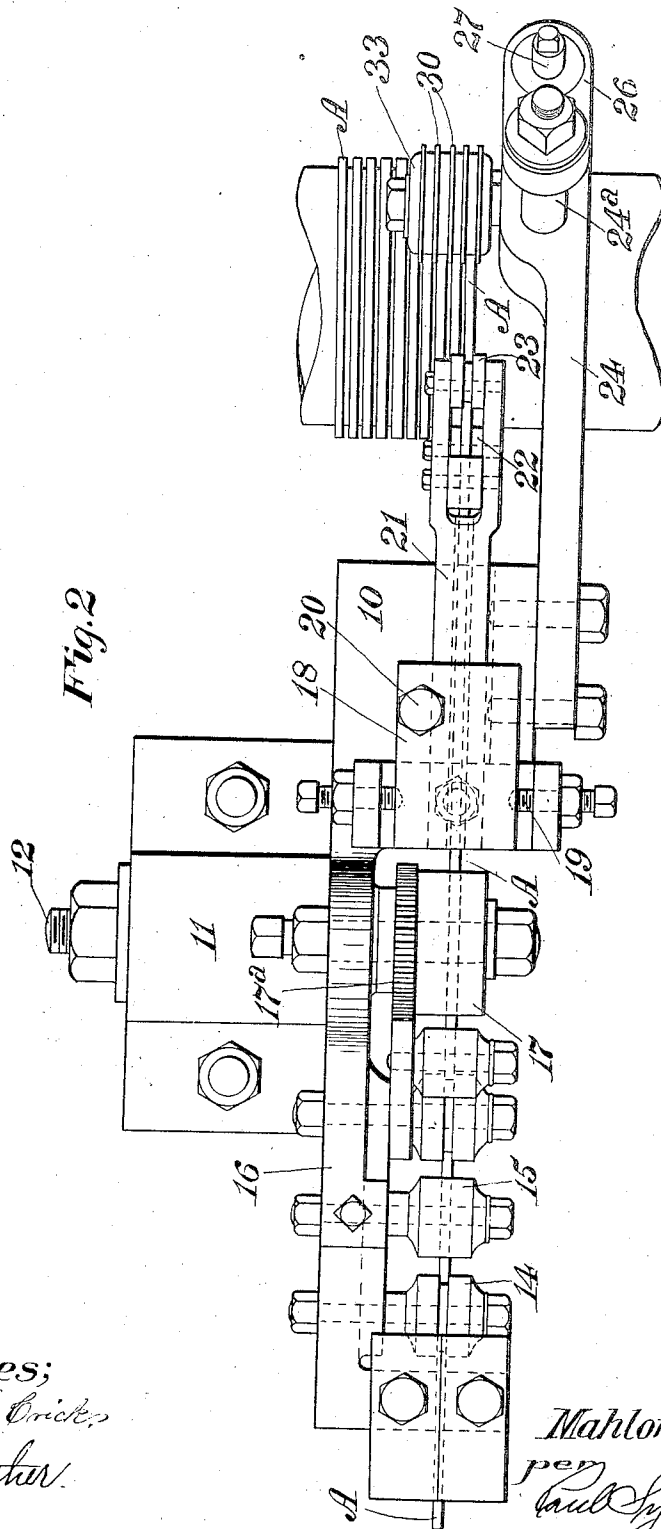
Inventor;
Mahlon E. Layne.
per Paul Synnestvedt
Att'y.

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4 SHEETS—SHEET 2



Witnesses;
Pyrril C. Crick,
J. E. Gaithor.

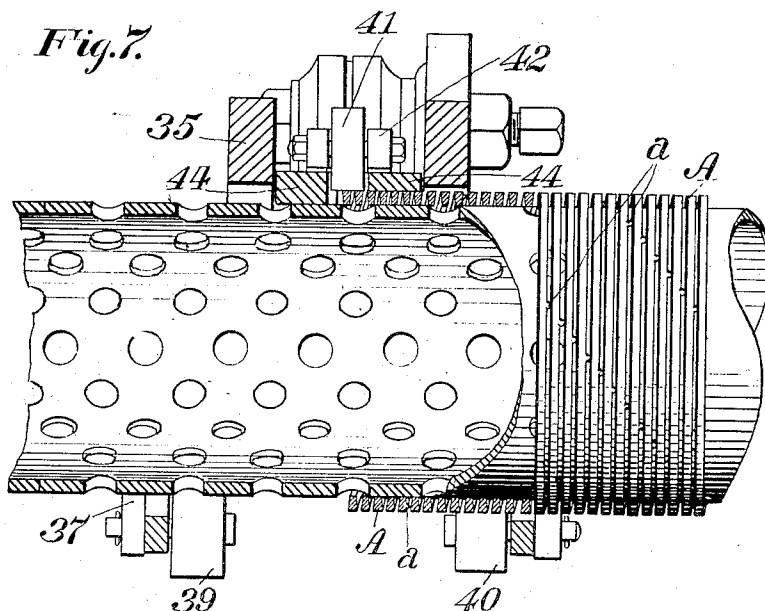
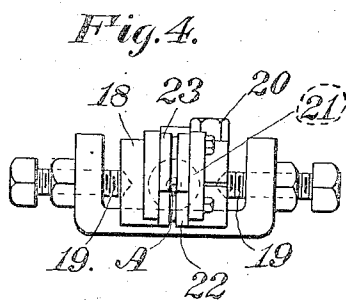
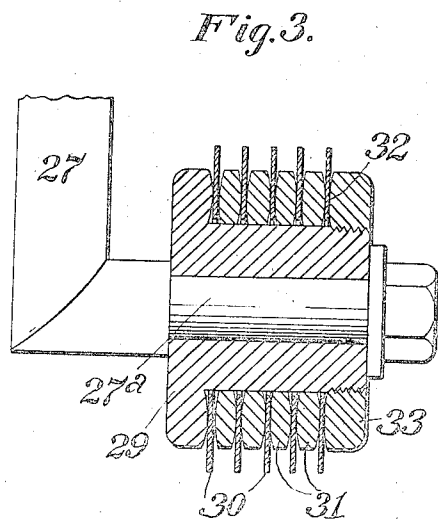
Inventor,
Mahlon E. Layne.
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Atty.

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4 SHEETS—SHEET 3



Witnesses;
Cyril C. Brick,
F. E. Gaither.

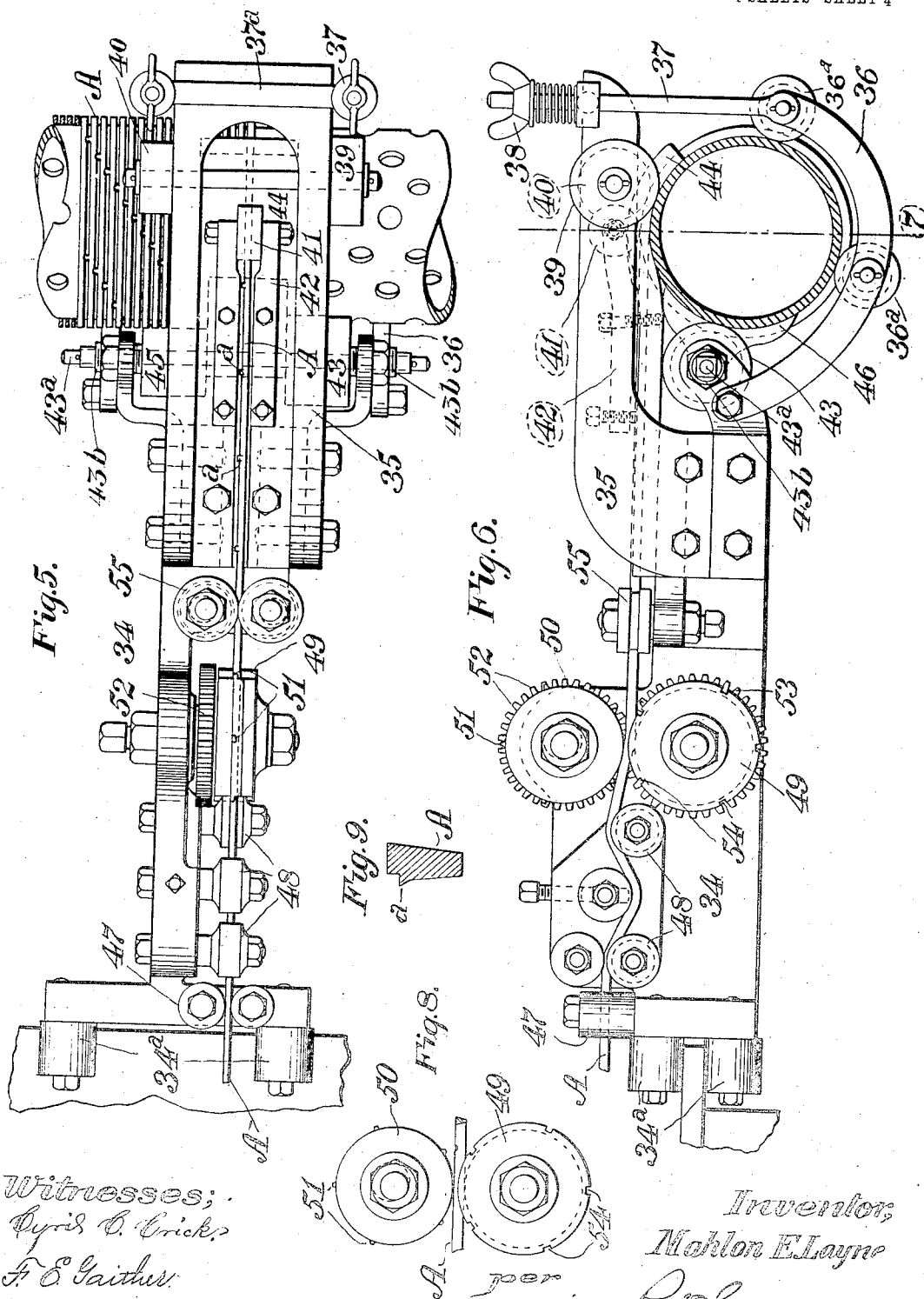
Inventor,
Mahlon E. Layne.
per Paul Symmestock
Att'y.

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APPLICATION FILED MAY 20, 1905.

4 SHEETS—SHEET 4



Witnesses;
Cyril C. Crick,
A. E. Laithwaite.

Inventor;
Mehlon E. Layne
Paul Symonds
Att'y

UNITED STATES PATENT OFFICE.

MAHLON E. LAYNE, OF HOUSTON, TEXAS.

WIRE-WINDING MACHINE.

No. 820,507.

Specification of Letters Patent.

Patented May 15, 1906.

Application filed May 20, 1905. Serial No. 261,324.

To all whom it may concern:

Be it known that I, MAHLON E. LAYNE, a citizen of the United States, residing at Houston, in the county of Harris and State of Texas, have invented certain new and useful Improvements in Wire-Winding Machines, of which the following is a specification.

My invention relates particularly to machines for winding such wire as is used in well screens and the like, and designed to place the wire upon a support such as a perforated pipe or frame in such manner as to properly set and space it uniformly for making well screens for straining fluids. The objects of the invention will appear from the description hereinafter; it is shown in preferred forms in the accompanying drawings wherein—

Figure 1 is a side elevation of the preferred form of winding machine shown as engaging a section of a pipe and winding the coil of wire thereon;

Figure 2 is a top plan view of the machine of Figure 1;

Figure 3 is a partial central section of the guide roller used for spacing in the machine of Figure 1;

Figure 4 is a front elevation of the guide 21 shown in Figure 2;

Figures 5 and 6 are respectively a top plan view, and a side elevation, of a modified form of the machine for use in winding a wire provided with spurs for spacing;

Figure 7 is a partial section and partial front elevation, the section being taken on line (7) in Figure 6;

Figure 8 is a detail showing the rollers for punching the wire to form the spacing spurs, and

Figure 9 is an enlarged cross-section of the wire used with the machine illustrated in Figures 5 and 6.

In the making of well screens by forming a helix of wire which is supported upon a base such as a perforated pipe or a frame made of bars, it is often necessary that the wire be spaced very close together and in all cases the spacing shall be made with extreme uniformity. It is highly desirable to use a wire of the general form of Figure 9, in which the greatest strength of the wire is provided in a radial direction to oppose the pressure of the fluid upon the screen, and it is of course necessary that this wire be placed upon a frame in its correct upright position. In my ma-

chine I use the surface of the previously wound turns of wire as a screw for advancing the guiding frame along the support as the winding progresses, and the guide for spacing the wire in the preferred form of the machine is made to engage several of these turns of wire, so as to have the advance motion correspond with the average surfaces of the previously wound turns, avoiding variations due to irregularities in the shape of the wire. For this purpose a principal part of my invention is the form of the guide which engages the previously wound helix, to be hereinafter described. The devices herein shown are designed to be used upon any such machine as an ordinary lathe where there is provision for rotating the screen frame, and in the illustrations I have shown a pipe upon which to wind the screen; but it will be understood of course that the same devices for winding may be used with a collapsible mandrel or upon any other form of supporting frame adapted to be carried by and revolved by the lathe.

In the machine as shown in Figures 1 and 2 especially, it will be seen that I have provided a rocking frame 10 which is provided with a clamp 11 by means of which it can be secured to the tool rest of an ordinary lathe, the clamp being pivoted by the bolt 12 to the frame 10. It will be apparent that the frame 10 may be fed along entirely by the spacing guide heretofore referred to, or, if desired, by the feed mechanism of the tool rest acting in conjunction with the spacing means to take the main strain of the feed from such spacing means. The entire device may therefore be slid laterally or parallel with the axis of the frame upon which the wire A is being wound. This wire A, enters the rear end of the machine through a tension block 13, and then passes between a series of tension rollers 14, 15, of which the latter roll may be pressed down to regulate the tension by means of a screw. The wire passes through a set of adjusting rolls 16, 17, which are geared together by the gear 17^a in order to move in unison, and from this point the wire passes through the center of a hollow guide arm 21 set in the slotted block 18 which is pivoted for vertical movement by means of pointed screws 19 so that the frame 21 may rise and fall to follow any radial unevenness in the screen frame. The front jaw of the guide arm 21 is provided with a lower grooved roller 22 made to fit the bottom por-

tion of the wire such as shown in Figure 9, and with an upper roll 23 to engage the top portion. The arm 21 is maintained in the block 18 against rotation therein by means of a clamping screw 20, and it will be observed that by loosening this screw the rod 21 may be laterally rotated in its support or twisted as desired and thereby the wire passing through the rolls 22 and 23 may be tilted in order to allow for any unevenness in its shape and force it to come in contact with the revolving pipe or frame in a vertical position.

The forward end of the frame or carriage 10 is provided with an adjustable extension arm 24 attached thereto by bolts in slots as shown in Figure 1, and in the front end 25 is provided an upright strut 24^a which carries a socket 26 for reciprocation of the stem 27 of the guide roller 29. Shaft 27 is kept pressed downward by the coil spring 28, and as is shown more clearly in Figure 3, it has a laterally projecting arbor 27^a which forms the journal of the guide roller 29. The guide roller is formed with a series of flexible steel disks 30 which are loose upon the hub 29 and compressed against one another by the rings 31. These rings 31 are given a rounded contour as shown in Figure 3 so that they engage the surfaces of the flexible steel disks 30 only at one point, as 32 in said figure. The whole set of disks 31 and rings 30 are clamped together and maintained upon the hub by means of a nut 33 or in any desired manner. This construction it will be observed provides lateral flexibility of the guide disks 30 so that each of them may engage both sides of the wire which is being wound and in case of any unevenness in the wire may give laterally in order to accommodate the same. Also it will be observed that the position of the entire guide roll and its engagement with the screen in advancing the work is governed by the mean position of the surfaces on the wound wire and therefore the guide does not vary in movement by any unevenness in any single turn of wire. This function I find to be of great importance in winding screens so that the continuous slits between the coils of the helix may be very regular and therefore the screen will stop the same size of sand at all parts of its length. It will be understood of course that when the space between the wires is to be changed, a different set of the guide disks 30 may readily be applied to the roller, or several thinner disks may be built up and may engage both of the contiguous wires without interference with each other. As the winding of the screen proceeds it will be seen of course that the guide roller will advance the frame by the reaction upon the jaw 24 carrying with it the guide arm 21 and the whole carriage.

The above described machine is especially adapted to the use of wire having a smooth side. But it will be understood that it can

be used with any wire. In Figures 5, to 8 are shown details of a modified machine in which the slight variations are designed to accommodate the improved wire for well screens, which has laterally projecting spacing spurs formed thereon, whereby the wire is spaced properly by bringing the spurs in contact with the next preceding helix of wire. In this instance also I have shown a different means for mounting the frame. From Figures 5 and 6 especially it will be seen that the frame 34 engages a guide bar by means of a set of wheels 34^a at the rear end, and the forwardly projecting end of the frame has a jaw 35 extending over the top of the screen which is being wound and also has a downwardly looped removable jaw 36 which is provided with rollers 36^a to engage the screen frame and the already wound screen upon the two respective sides. The pivoted jaw 36 is provided with a link 37 and bar 37^a to engage the top of the jaw 35 and held thereon by a nut 38 and regulated by pressure of a coil spring, as will be well understood from the figures.

Journalled in the forwardly projecting jaw 35 I have provided a shaft having two steady-ing wheels 39 and 40, the former one of which engages the pipe or frame on which the screen is being wound and the latter engaging the already wound screen as will be observed from Figures 5 and 6. The wire A is pressed down firmly upon the screen by means of a roll 41 mounted in a spring arm 42, and passes through a slit in the bifurcated plate 44 attached to the top of the frame 34. A supplementary set of guiding rollers 43 and 45 may be provided in the forward end of the frame 34 and they are preferably mounted upon a transverse shaft 43^a, one of said rollers resting upon the pipe or frame and the other upon the previously wound screen. Between them is mounted a pivoted guide block 46 which engages the last turn of the helix of wire already wound as shown in Figure 6, and serves to push the entire carriage forward as the winding proceeds. The shaft 43^a is supported at its ends in bearing blocks 43^b, and is held in position by means of a cotter key through each end as shown in Figure 5. The blocks 43^b are tapped into the sides of the frame 34, and bear with their inner ends against the outer faces of the rollers 43 and 45, thus holding the rollers and block 46 in position and allowing them to be adjusted to aline properly with the wire previously wound.

The wire, which in this instance has a section shown at Figure 9 and is to be provided with laterally projecting spacing spurs *a* as shown therein, first enters the rollers 47 and after passing between the tension rollers 48 passes over a slotted roller 49 and under a smooth roller 50 which is provided at points along its surface with sharp teeth 51 which serve to compress the top of the wire and

cause the spreading of the same to form the laterally projecting spurs *a* as shown more clearly in Figures 8 and 9. The lower roll 49 is provided with lateral slots 54 to accommodate the projecting spurs. The rollers are geared together at the rear side by the gears 52 and 53 so that they revolve together. In order to provide for a slight adjustment of the distance between the rolls 49 and 50 the latter is mounted upon an eccentric stud as shown by dotted lines in Figures 6 and 8. The rolls 55 are also adjustably mounted in a similar manner. After passing through another pair of guide rolls 55 the wire proceeds through the slot in the plate 44 and under the roller 41 and is pressed firmly into its place by means of the spring arm 42, as shown in Figure 6. The lateral spurs *a* upon the wire of course engage the surface of the previously wound turn of the helix and properly space the wires apart so that the screen having been wound it is fixedly spaced without the necessity of soldering it to its frame or providing other means for maintaining the correct spacing.

It will be understood that when desired, the guide block 46 and the bifurcated plate 44 of this alternate form of the machine may be omitted and the guide roller of the machine of Figure 1 may be used to advance the carriage along the screen, by simply altering the distance of the disks 30 from the support so that they engage the wire above the projecting spurs *a*. In this case again, the form of the resilient guide roll is of particular importance since it will be observed that punching the spurs *a* may often make the wire of variable width on top, and since all the disks do not engage the spurs upon the wire at the same time, some one of the disks 30 will be in constant engagement with some one of the spurs from the wire on one side and therefore the average or mean position of the previously wound turns of the helix of wire would govern the carriage of the machine along the screen. The guide roller is applicable to wire of any form, and wire either plain or having spurs thereon, and in all cases the flexibility of the engaging disks and the fact that there are a number of them, enables the machine to be governed by the mean position of the previously wound turns of the helix and to advance according to the average progress of the wires along the screen and not to be varied by unevenness in any one particular turn of the wire. Various other advantages of these devices will readily occur to those familiar with the art.

Having thus described my invention and illustrated its use, what I claim as new, and desire to secure by Letters Patent, is the following:

1. The combination with a revolving support, of a wire winding machine provided with means thereon for engaging several

turns of the already wound helix of wire and thereby advancing the machine along the helix by contact with said turns, substantially as described.

2. In a wire winding machine, a spacing and actuating means serving to advance the machine along the helix as it is wound, said device engaging several turns of the helix, substantially as described.

3. A wire winding machine comprising a movable carriage having tension rolls and guiding rolls thereon for direction of the wire upon a revolving support, and a spacing device adapted to advance the machine along the helix and engaging several turns of the previously wound wire.

4. In a wire winding machine, a spacer comprising a flexible disk engaging the helix of wire.

5. In a wire winding machine, a guide adapted to advance the carriage along the helix of wire and having duplicate laterally yielding devices for engaging several turns of the helix of wire.

6. A guide roll for wire winding machines comprising a series of flexible disks engaging the helix of wire, substantially as described.

7. In a wire winding machine, a spacing guide adapted also to advance the carriage, and comprising a series of disks having provision for lateral resiliency, substantially as described.

8. In a wire winding machine, a guide roller comprising a series of resilient disks and blocks for holding them in position engaging them along a single circumferential line of their surface, substantially as described.

9. In a wire winding machine, a guide roll comprising a series of flexible disks mounted upon a hub and spaced apart by rings which have a rounded contour in a radial direction, substantially and for the purpose described.

10. In a wire winding machine, a spacer comprising the flexible disk 30 held in position by the rounded rings 31 engaging the disk along a single circumferential line, substantially as described.

11. In a wire winding machine, a feed guide for placing the wire upon its support, comprising a jaw having rollers to engage the wire and said rollers being mounted so that they may be laterally rotated in its supporting socket in order to twist and place the wire upon the support in any desired angular position, substantially as described.

12. The combination with a rocking carriage, of a series of tension rolls thereon, and a feeding guide pivotally mounted and having means to rotate it in a plane parallel with the axis of the helix of wire, whereby to twist the wire as it is fed to the support of the helix, substantially as described.

13. In a wire winding machine, the feeding guide-arm 21 pivotally mounted upon its sup-

port and having means to rotate it in its support for twisting the wire to direct it upon its support, substantially as described.

14. In a wire winding machine, the feeding guide 21 having grooved rollers in its jaws to engage the wire and being mounted for vertical oscillation and capable of adjustment in a rotary direction around the axis of the wire as it is being fed upon its support, substantially as described.

15. In a wire winding machine, the combination with a vertically adjustable feeding guide, and a spacer engaging the previously wound turns of the helix of wire adapted to advance said guide with the mean position of several turns of wire, substantially as described.

16. The combination in a wire winding machine, of rolls having means for punching and spreading spacing spurs upon the wire, substantially as described.

17. In a wire winding machine, the combination with means for forming lateral spurs upon the side of the wire as it is being fed to its support, and a guide to advance the carriage along the helix adapted to engage the wire upon several of its turns and advance the machine by the mean position of said turns, substantially as described.

18. A wire winding machine having a guiding feed-jaw provided with means for vertical movement and resilient lateral movement in placing the wire upon the support of the helix, whereby to allow for the unevenness of the shape of the wire, substantially as described.

19. In a wire winding machine, the combination with feeding means and tension mechanism and spacing devices, of a guiding jaw to place the wire upon its support having a resilient lateral pressure upon the previously wound turns of the helix, and means to advance the machine thereby, substantially as described.

20. In a wire winding machine, a spacer comprising a laterally yielding rotary disk for engaging a helix of wire.

21. In a wire winding machine, a spacer comprised of a plurality of parallel resilient rotary disks for engaging a helix of wire.

In testimony whereof I have hereunto signed my name in the presence of the two subscribed witnesses.

MAHLON E. LAYNE.

Witnesses:

THOS. MUAT,

CHAS. W. PLOWDEN.