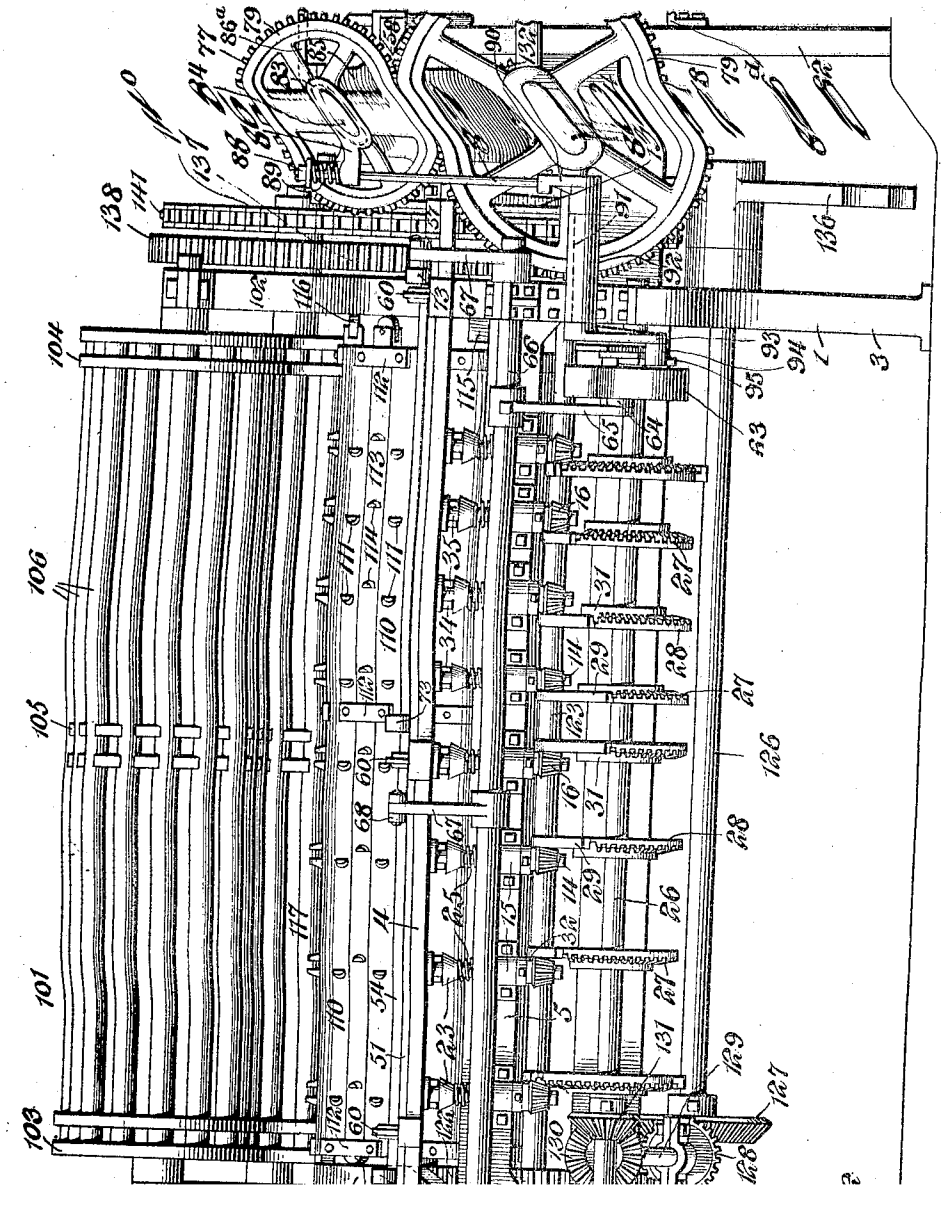
A. L. KITSELMAN.

WIRE FABRIC MACHINE.

APPLICATION FILED SEPT. 17, 1906.

1,353,346. **Patented Sept. 21, 1920.**

7 SHEETS—SHEET 1.



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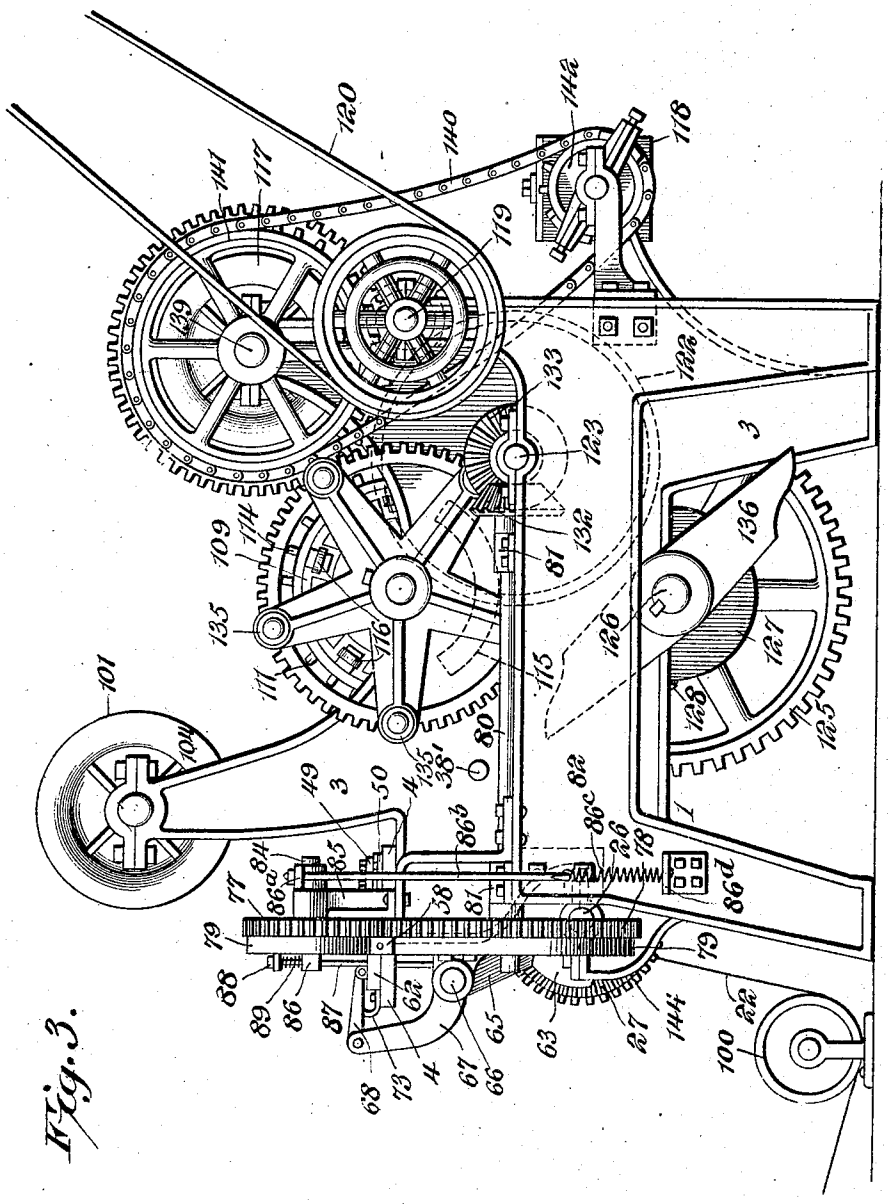


Fig. 3.

Witnesses

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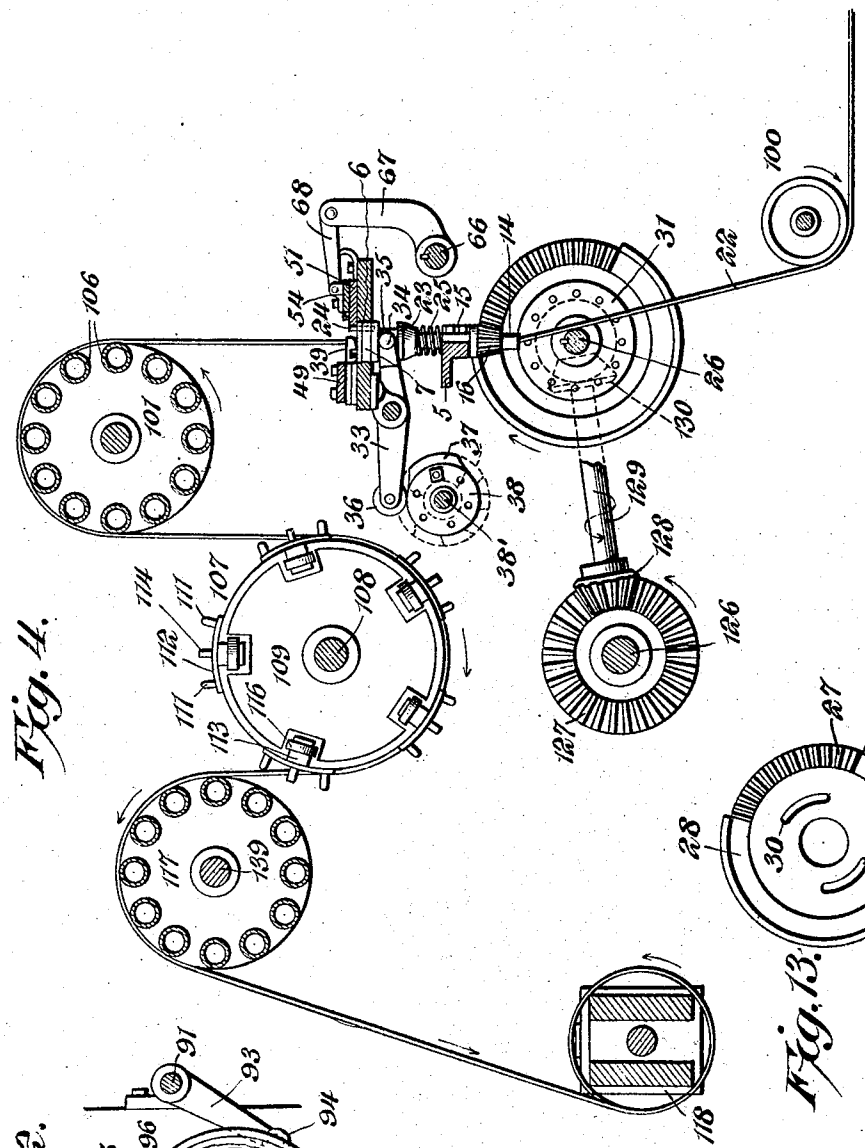


Fig. 4.

Fig. 13.

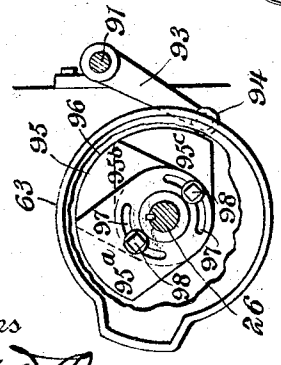


Fig. 12.

Witnesses

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7 SHEETS—SHEET 5.

Fig. 6.

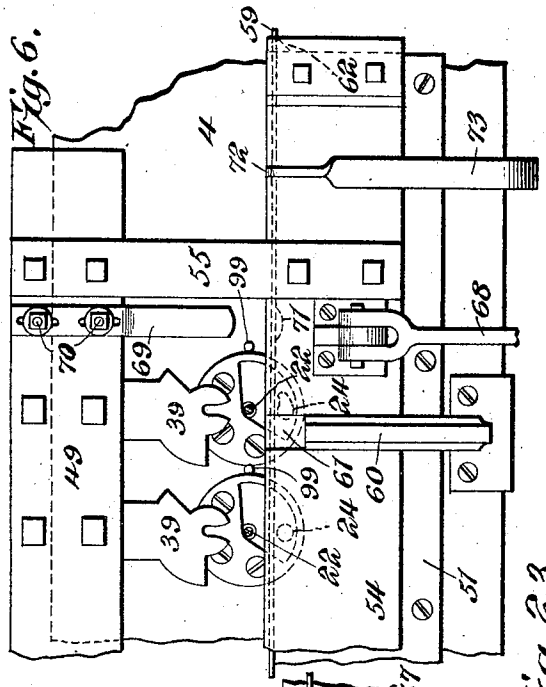


Fig. 22.

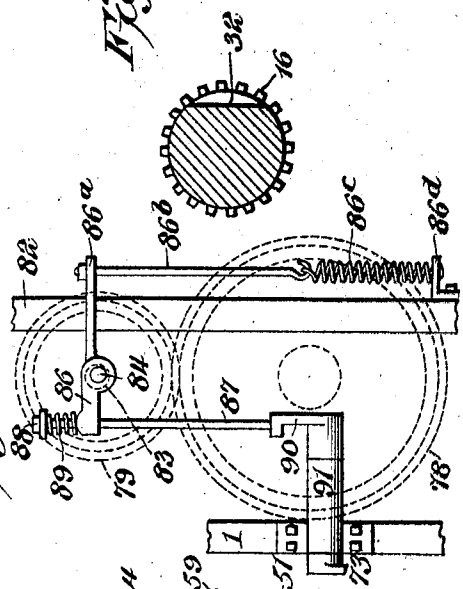


Fig. 23.

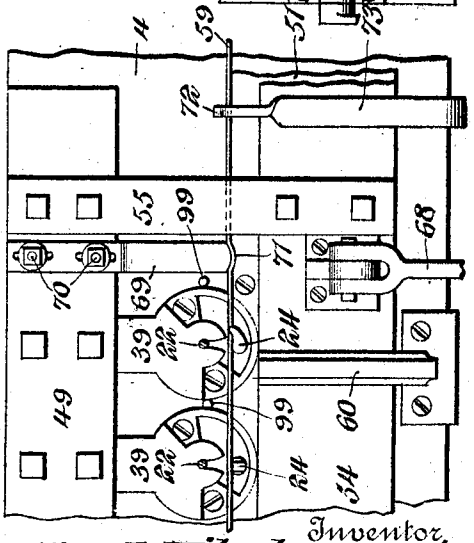


Fig. 5.

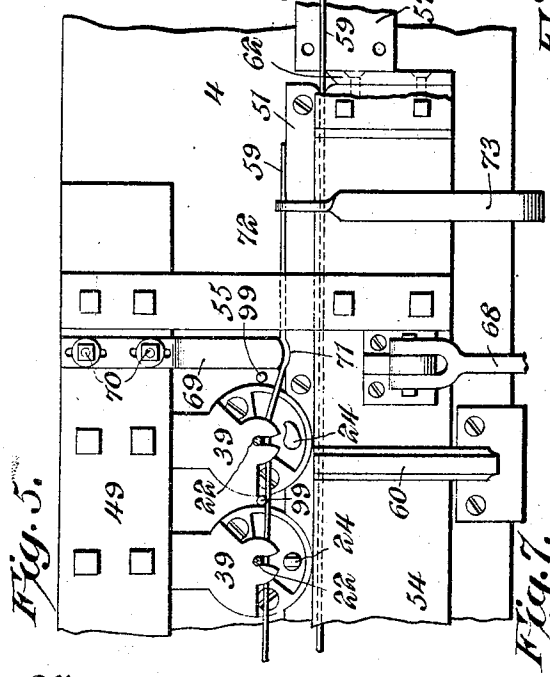


Fig. 7.

Witnesses

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WIRE FABRIC MACHINE.

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7 SHEETS—SHEET 6.

Fig. 8.

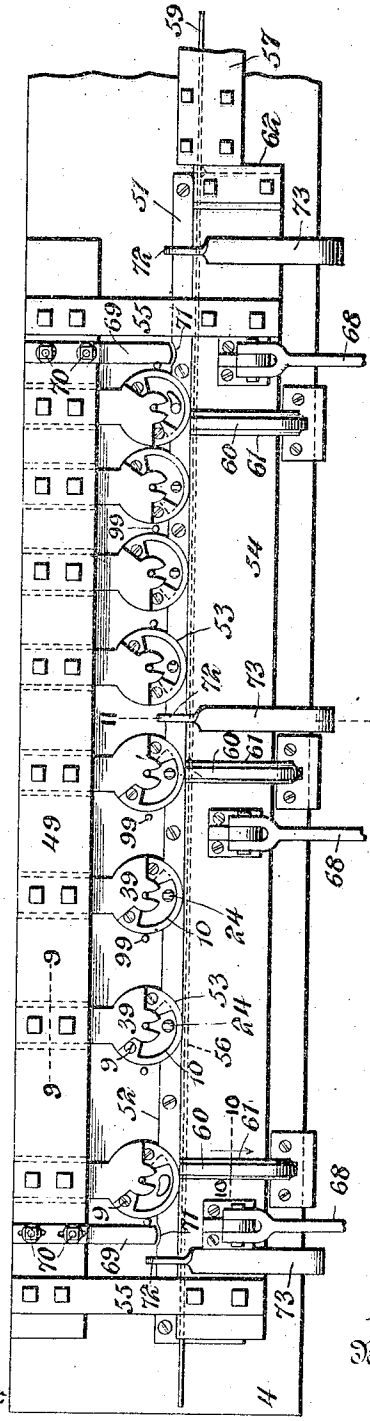


Fig. 11.

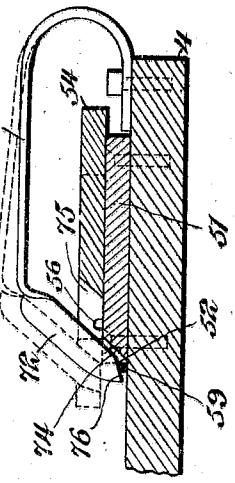


Fig. 10.

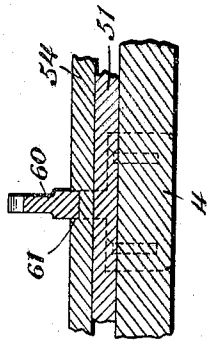
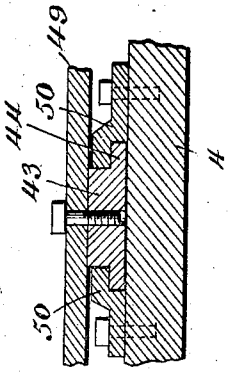


Fig. 9.



Witnesses

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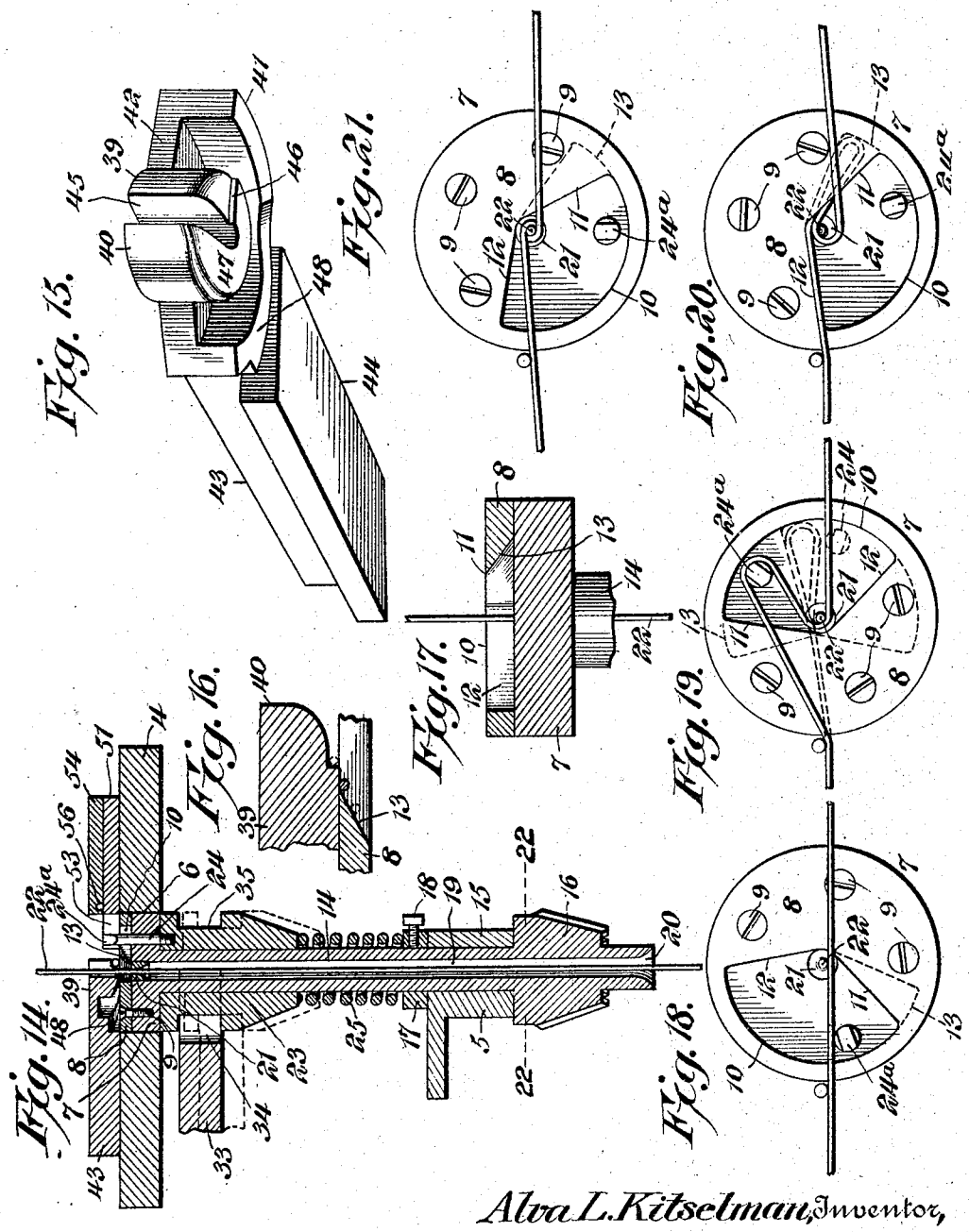
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7 SHEETS—SHEET 7.



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Witnesses

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Louis G. Julihn.

UNITED STATES PATENT OFFICE.

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WIRE-FABRIC MACHINE.

1,353,346. Specification of Letters Patent. Patented Sept. 21, 1920.

Application filed September 17, 1906. Serial No. 334,947.

To all whom it may concern:

Be it known that I, ALVA L. KITSELMAN, a citizen of the United States, residing at Muncie, in the county of Delaware and State of Indiana, have invented a new and useful Wire-Fabric Machine, of which the following is a specification.

This machine relates to a machine or loom for making wire fabric of that type known as "square mesh" fencing. The machine is of that class disclosed in Patent No. 745,801, issued December 1, 1903, to John W. Dwiggins, but involves a substantially different organization constituting a greatly improved construction.

The Dwiggins machine embodies means for intermittently feeding a series of parallel line wires, and means for carrying stay wires across the line wires in the manner of a woof shuttle, the stay wire being looped and the loop wrapped around each line wire as the several line wires are reached in succession during the feeding of the stays across the series thereof. The looping and wrapping or twisting devices are operated successively in one direction by a reciprocatory carriage as the latter moves across the machine to convey or feed the stay wire, and are then successively operated in the reverse direction as the carriage returns to its normal position and incidentally feeds another stay wire across the series of line wires. In the Dwiggins machine, therefore, the application of a stay is effected by twisting the stay wire around the line wires one at a time. In addition to the time consumed by these successive twisting operations, further time is also required for the feeding of the stay between two line wires after each twisting operation. Thus, the time consumed in applying a stay is equal to the time consumed by a single twisting operation multiplied by the number of twists required plus the time consumed in feeding a stay across the series of line wires.

The primary object of my invention is to greatly increase the capacity of the machine by reducing the time required for the application of each stay. In pursuance of this primary object, further objects are:

1. To provide for the feeding of the stay wire across the series of line wires while the stay previously fed is being connected to the line wires.

2. To provide for the simultaneous twisting of the stay wire around a plurality of line wires.

3. To secure positive and prompt action of the various mechanisms by minimizing the number of reciprocating or intermittently operating parts.

Subordinate objects are to improve the stay wire feeding and cutting mechanisms; to provide novel mechanism for moving the stay laterally to the line wires after it is fed across the same; and to simplify and render more effective the stay wire twisting or wrapping mechanism and the operating connections thereof.

To the accomplishment of the objects stated, and various others which will presently appear, the preferred embodiment of the invention resides in that construction and arrangement of parts to be hereinafter described, illustrated in the accompanying drawings, and succinctly defined in the appended claims.

In said drawings—

Figure 1 is a front elevation of the loom.

Fig. 2 is an elevation of the right side of the same.

Fig. 3 is an elevation of the opposite or left side thereof.

Fig. 4 is a vertical section of the machine with the frame work and most of the operating connections omitted.

Fig. 5 is a plan view of a section of the front portion of the machine, showing the positions assumed by certain of the parts during the feeding of the stay wire across the series of line wires.

Fig. 6 is a similar view, showing the parts shifted to sever a stay from the stay wire and to move the severed stay laterally into position to be twisted upon the line wires.

Fig. 7 is a similar view, showing the parts returned to normal position with the new stay held in place and ready to be applied to the line wire.

Fig. 8 is a more extensive plan view of the front portion of the machine, showing the whole complement of twisters and the parts associated therewith.

Fig. 9 is a section on the line 9—9 of Fig. 8.

Fig. 10 is a section on the line 10—10 of Fig. 8.

Fig. 11 is a section on the line 11—11 of Fig. 8.

Fig. 12 is a detail view of the cam for

The twister rotating mechanism.

The mechanism for rotating the twisters 7 constitutes one of the primary features of the present invention, the distinguishing characteristic of this mechanism residing in the provision of means broadly, whereby the twisters, instead of being operated in succession from one end of the series to the other, will be operated in series the operation of corresponding twisters of different series being simultaneous, and successive twisters of each series being brought into action successively, without, however, allowing each twister of a series to complete its operation before the operation of the next twister is inaugurated. Thus, while the corresponding twisters of different series will be the only ones operating in complete coincidence, several or all of the twisters of both series may be operating at the same time, since the last twisters of said series may come into action before the first twisters thereof have completed their operation, whether this is true or not, depending, of course, upon the number of twisters embraced by each series.

Mounted below the pinions 16 and journaled in the side frames 2 and 3 is a twister driving shaft 26 upon which are mounted a series of segmental driving gears 27 produced by forming a segmental series of gear teeth upon the side face of a circular plate 28 loosely mounted on the shaft 26 and provided with a segmental locking flange 29 terminating at the opposite ends of the gear 27, and having a pair of arcuate slots 30 arranged to receive bolts extending laterally from a disk 31 keyed to the shaft 26, see Figs. 1, 4 and 13. The slots provide for the adjustment of the gear, the latter after its adjustment being rigidly secured to the shaft by its attachment to the disk 31 keyed upon the latter. Each of the gears 27 is arranged to mesh with one of the twister pinions 16 during a given period of a rotation of the shaft 26 and during the remaining period of such movement, the twister operated by said pinion is held against rotation by the engagement of the locking flange 29 with a flat locking face 32 formed on the hub of the adjacent pinion 16.

It will be noted, by reference to Fig. 1, that the twister driving gears 27 are arranged in two series, the four gears at the right facing toward the right side of the machine and the four gears at the left facing toward the left side of the machine. Thus the two series of gears may be said to be oppositely disposed and obviously operate the two corresponding series of twister pinions 16 in opposite directions, so that the four twisters at the right hand side of the machine will rotate in one direction and the four twisters at the opposite end of the machine will rotate in the opposite direction.

It will also appear, by reference to Fig. 1, that the several gears of each series are graduated as to their moments or periods of operation, the gear at the inner end of the series having the most advanced position and therefore coming into action first, and the gear at the outer end of the series being the least advanced and coming into action last. By reason of this arrangement, the several gears of a given series will come successively into coöperative relation with the adjacent pinions so that the operation of the twisters of either series will be inaugurated one after another to enable each twister to produce sufficient slack in the stay wire for the performance of its function, before the next twister begins to operate. Therefore, while the several twisters of the series may be operating at the same time, their periods of operation will not be coincident. The two series of gears are identical, however, except for their opposite disposition. This results in the coincident operation of corresponding members of the respective series. Thus, the inner end members of the two series of gears or the two middle members of the entire complement of gears coincide, while the corresponding gears to the right and left respectively, of these middle gears, are in similar coincidence, and so on, throughout the two series. Thus, while the gears of each series come into action in succession, corresponding gears of the respective series are brought into action simultaneously. Therefore, accordingly as the arrangement is viewed, it may be said to include a series of twisters brought into action successively, or two series of twisters having coincident operation, or a series of pairs of twisters, the twisters of each pair operating in coincidence and the several pairs coming into action in succession. Furthermore, the entire complement of twisters constitutes a series, the members of which, located at opposite sides of an intermediate point, are brought into action successively toward the outer ends of the series from such point, attention being drawn to these various aspects in which the structure may be viewed in order that the claims directed to these various aspects of the invention may be clearly distinguished and fully comprehended.

During the rotary movement of the twisters, their looping and wrapping pins 24, see Fig. 14, are withdrawn from their normal positions and subsequently restored to such position. To effect the performance of this function at the proper time, a series of cam levers 33, see Figs. 4 and 14, are fulcrumed at the rear edge of the twister table 4 with their bifurcated front ends 34 engaging peripheral grooves 35 in the collars 23. The rear ends of the levers 33 carry

rollers 36 disposed in coöperative relation with two graduated series of cams 37 adjustably mounted on disks 38 keyed or otherwise secured to a cam-shaft 38′ journaled at its opposite ends in the side frames 2 and 3 of the machine. The graduation of the cams 37 correspond with the graduation of the gears 27, for the reason that the period of operation of each pin 24 with respect to the period of rotation of its twister head is the same, and therefore each cam 37 must have the same relation to the corresponding gear 27.

At a predetermined point in the rotary movement of the twister, its pin is drawn down against the resistance of the spring 25 by the oscillation of the lever 33 and the consequent depression of the collar 23 as a cam 37 contacts with and elevates the roller 36 carried by the lever. While the cam is riding under the roller, the pin remains depressed, but is immediately elevated by the spring 25 as soon as the cam has passed beyond the roller. Normally, the pins 24 are located at the front sides of the twisters, as shown in Figs. 4 and 8.

Associated with each twister and normally located above the same is a presser foot 39 comprising a hub 40 partially surrounded by an arcuate flange 41 disposed concentric with the hub, see Fig. 15, the hub and flange being connected by a top wall 42 and the foot as a whole being formed at the outer end of a shank 43 provided on its under side with a slide 44. The hub 40 is provided with a radial slot or line wire seat 45 opening toward the front and having its outer end slightly flared, see Fig. 5. The inner end of the slot or seat 45 is normally disposed concentric with the line wire 22 passing up through the adjacent twister and through the slot of the presser foot, see Fig. 14. At one side of the slot 45 the under side of the hub 40 is cut away to produce a stay wire abutment or seat 46 disposed transversely of the foot, and from the lower edge of this abutment the bottom wall of the hub is gradually inclined upwardly to form a loop depressing cam 47 substantially coinciding with which is a second loop depressing flange 48 produced by inclining a portion of the under face of the flange 41 in substantial coincidence with the inclination of the cam 47. The several shanks 43 of the presser feet are connected by what may be termed the presser foot bar 49 disposed lengthwise of the twister table 4 at the rear edge thereof, see Fig. 8. The slides 44 of said shanks are mounted to reciprocate in unison between guides 50 secured to the table, see Figs. 8 and 9. The presser feet normally occupy the positions shown in Figs. 4 and 5, and assist, as will presently appear, in the wrapping of the stay around the line wires 22. After the stay has been connected with the line wires however, the presser feet are withdrawn rearwardly to the position shown in Fig. 6 in order to permit the line wire and the attached stay to be advanced or elevated in order that the succeeding stay may be applied, the presser feet being then returned to normal position to aid in the application of said succeeding stay.

Extending across the twister table adjacent to the front side thereof is a stay wire table 51, Figs. 4 to 8, the upper surface of which is flush with or slightly above the upper ends of the pins 24 when the latter are in their elevated positions. The rear edge 52 of the table 51 is located in rear of the positions occupied by the pins 24, see Fig. 8, to permit which the rear edge of the table is indented by arcuate recesses 53 concentric with and having a radius substantially equal to the radius of the adjacent twisters. Supported above the stay-wire table 51 is a combined stay-wire guide and feed-bar 54 connected to the presser-foot-bar 49 by end plates 55, the bars 49 and 54 and the connecting end plates 55 constituting a transversely reciprocatory frame disposed above the twister table. In the under side of the stay wire feed bar 54 is formed a stay wire guide or groove 56 which, in the normal retracted position of the feed bar, is disposed opposite a stationary stay wire guide 57 fixed to the twister table 4 beyond the right hand end of the feed bar, see Figs. 1 and 8.

Beyond, and in spaced relation to the guide 57 is another stay-wire guide 58 through which a stay wire 59 is led from a suitable source (not shown) to the guide 56 in the feed-bar 54. The feed-bar 54 is guided in its transverse movement by overhanging guides 60 secured at their front ends to the twister table 4, see Fig. 8, and engaging transverse grooves 61 in the feed bar.

At the right-hand end of the feed-bar is disposed a stay-wire cutter 62 arranged to pass across the inner end face of the guide 57 and thus sever the stay from the wire 59 as the bar 54 moves rearwardly to carry the stay to the twisters. The movement of the feed bar 54 and the presser feet 39 transversely of the twister table 4 is effected through the instrumentality of a cam 63 keyed to the twister driving shaft 26 and engaged by a roller 64 carried at the lower end of an arm 65 secured to a rock shaft 66, see Figs. 1 and 4, said rock shaft being equipped with several additional arms 67 connected by links 68 to the bar 54. The cam 63, moving with the twister driving shaft 26, serves at the proper time to rock the shaft 66 and thus reciprocate the frame including the presser foot bar 49 and the stay wire feed bar 54, as heretofore stated.

Extending forwardly from the presser foot bar 49 are tension members 69 adjust-

ably secured to the bar by bolts 70 and having their front ends disposed opposite shallow notches or depressions 71 in the rear face of the stay wire table 51, see Fig. 8. These tension devices or bars 69 are designed to clamp the stay wire against the rear face of the stay wire table for the purpose of placing the same under sufficient tension to facilitate the operation of the twisters in a manner to be described. Also associated with the table 51 are a plurality of stay wire depressions 72 in the form of inclined blades carried at the rear ends of spring shanks 73, the front ends of which are curved back, as shown in Fig. 11, and bolted to the twister table 4. To accommodate the depressors 72 the stay wire table 51 and the feed bar 54 are provided at their rear edges with open-ended slots or notches 74 and 75. The bottom face 76 of the depressor 72 is slightly inclined from the horizontal in order that as the stay wire is depressed it will also be urged forwardly into engagement with the front face of the table 51.

The various mechanisms which directly contribute to the application of the stays to the line wires have now been described, with the exception of the means for feeding the stay wire longitudinally to the feed-bar 54 from the spool. This mechanism will therefore now be described, and the operation of applying a stay will then be recited in detail.

This stay-wire feeding mechanism includes upper and lower spur-gear wheels 77 and 78 having annular rims 79 between which the stay wire is designed to be clamped at a point between the guides 57 and 58, see Figs. 1 and 3. The lower wheel 78 is carried by a shaft 80 journaled in suitable bearings 81 carried by an extension 82 of the main frame. The shaft 80 is continuously driven, in a manner to be described, and therefore the stay wire will be continuously fed longitudinally, unless provision is made to the contrary. Therefore, the upper wheel 77 is mounted on an eccentric 83 formed on a stub shaft 84 journaled in a bracket 85 supported by the machine frame. At the front end of the shaft 84 is fixed an arm 86 through the outer end of which is passed a vertical draw-bar 87 provided at its upper end with a nut 88 between which and the arm 86 is interposed a spring 89. The lower end of the bar 87 is connected to an arm 90 at the outer end of a rock shaft 91 journaled in a bearing 92 secured to the side frame 3. The shaft 91 is provided at its inner end with an arm 93 provided at its extremity with a roller 94 arranged to be engaged and operated by a cam 95 carried and operated by the twister driving shaft 26, see Figs. 1, 3 and 12.

The cam 95 is of laminated form comprising a series of plates, preferably three in number, 95^a, 95^b, and 95^c, designed to be adjusted upon the shaft 26 as an axis, for the purpose of lengthening or shortening the length of the dwell 96 formed by their outer edges which are concentric with the shaft. The adjustability of the several plates comprising the cam 95 may be effected in a variety of ways, but by preference, one of the plates is keyed to the shaft 26, as shown in Fig. 12, and certain or all of the plates are provided with arcuate slots 97 for the accommodation of clamping bolts 98 designed to clamp the plates together in a rigid structure for rotation by the shaft 26 after the plates have been properly adjusted. Also extended laterally from the shaft 84 is a second arm 86^a, from which depends a hook 86^b attached at its lower end to a spring 86^c secured to a bracket 86^d bolted to the member 82. The arms 86 and 86^a extend in opposite directions from the shaft, and the spring 86^c tends constantly to draw down the arm 86^a for the purpose of rotating the shaft 84 to a position which will elevate the eccentric 83. Normally, the wheels 77 and 78 are ineffective to feed the stay wire longitudinally, for the reason that the upper wheel is held in an elevated position by reason of the elevated location of the eccentric 83. At a predetermined period in the movement of the shaft 26, however, the cam 95 engages the roller 94 at the outer end of the arm 93, thus swinging the latter and rocking the shaft 92 for the purpose of depressing the arm 90. The depression of the arm 90 depresses the arm 86 through the medium of the draw-bar 87 thus rotating the shaft 84 sufficiently to lower the eccentric 83 and thus lower the upper wheel 77 into position to clamp the wire between the two feeding wheels. As soon as this clamping action on the wire is effected, the rotation of the wheels 77 and 78 effects the longitudinal feed of the stay wire to the feed bar 54. By reason of the fact that the spring 89 is interposed between the arm 86 and the nut 88, the upper wheel 77 may yield against the resistance of the spring 89, as may be necessary to accommodate slight irregularities or bends in the stay wire.

The operation of the mechanism thus far described is as follows:

A stay having been applied to the line wires 22 and the stay wire having been fed longitudinally to the feed bar 54, during the application of such stay, the cam 63 will operate in the manner heretofore described through the medium of the rock shaft 66 to shift the feed bar 54 and the presser foot bar 49 rearwardly from the position shown in Figs. 5 and 8 to that shown in Fig. 6. This operation will withdraw the presser feet 39 from the line wires and the applied stay, so as to permit the upward advance of

the line wires for the purpose of raising the previously applied stay from the twisters and to present the line wires in position for the application of the next stay. As the presser feet are moved rearwardly to permit the feed of the line wires in the manner stated, the feed bar 54 will also be moved rearwardly, which movement will serve first to sever the stay from the stay wire 59 by the movement of the cutter 62 across the left-hand end of the guide 57, see Figs. 5 and 6, and continuing for the purpose of advancing the stay guide 56 in the bar 54 to a position immediately beyond the rear edge of the stay wire table 51. As the lower side of the guide 56 opens through the bottom of the feed bar 54, the stay when presented beyond the edge of the table 51 will drop from the guide, unless frictionally retained therein. It is for the purpose of insuring the dropping of the stay from the guide 56 and its proper location directly upon the twister table at the rear edge of the stay wire table 51, as shown in Fig. 11, that the depressors 72 are provided. It will be noted, by reference to said figure, that as the feed bar 54 moves back, those portions of the stay extending across the notches 75 in said bar will engage the front inclined edges of the depressors 72, thus elevating the latter against the resistance of the spring shanks 73 until the stay is moved beyond the rear edge of the stay table 51, at which time the stay will be located below the inclined faces 76 of the depressors. The stay being now unsupported will be forced out of the guide 56 by the depressors 72, the inclination of the faces 76 of which will serve to cause the stay to be retained closely adjacent to the rear face of the table 51, see Figs. 6 and 11. In this position of the stay, which is that shown in Fig. 7, it will extend across the several twisters 7 in rear of the looping and wrapping pins 24. By the time the stay is thus located in position to be applied to the line wires, the latter will have advanced the applied stay to a position above the plane of the presser feet 39 and the cam 63 will retract the feed bar 54 and the presser foot bar 49 to normal position. This will restore the guide 56 in position to receive another stay, and will, at the same time, restore the presser feet 39 in normal coöperative relation with the twisters. The forward movement of the bar 49 will also cause the tension devices 69 to clamp the stay against the rear side of the stay table 51 beyond the opposite ends of the complement of twisters, see Figs. 7 and 8. The twisters will now be operated to apply the stay thus positioned, and during such application, the mechanism for feeding the stay wire 59 longitudinally will operate to present another stay to the feed bar, so that, as soon as the application of the new stay is completed, another stay may be immediately advanced laterally to the twisters in the manner just described.

The order in which the twisters operate has already been described. The operation of a single twister will therefore be detailed at this point, and it will be understood that the description will apply to any twister, since their operations, while not coincident in point of time, are the same in point of function.

When the stay has been properly positioned in rear of the pins 24, the gears 27 of the two middle twisters of the complement will engage the twister pinions 16, and the twisters will begin to rotate in opposite directions. The pins 24, moving with the twisters, will engage the stay and move the same rearwardly, until the latter is arrested by the guide pins 99 one of which, see Fig. 8, extends upwardly from the table 4 at the outer side of each twister, the series of pins being preferably arranged substantially in a line intersecting the axes of the twisters. This initial movement of the twister will present the parts substantially in the positions indicated in Fig. 18, the stay wire being abutted against a pin 99 at one side of the axis of the twister and against the stay wire abutment 46 formed on the presser foot, at the opposite side of said axis. Thus further rearward movement of the stay will be resisted by fixed abutments at opposite sides of the pin, the line wire 22 being located adjacent to one end of the abutment 46 and in a plane slightly in rear thereof. Continued movement of the twister will therefore cause the pin 24 to flex rearwardly that portion of the stay lying between the two abutments and as the rearward movement of the pin continues, that portion of the stay carried back will assume the form of a loop, as shown in Fig. 19, the slack for the formation of said loop being provided by the indrawing of the stay from one end thereof. Attention is directed to the fact, however, that as two twisters are operating simultaneously in opposite directions, the slack required for the formation of the two loops will be provided by the indrawing of the stay from opposite ends thereof. Before returning to the operation of the twister, attention may also be directed to the fact that when the twister has approximately reached the position shown in Fig. 19, it will have taken the slack required for the formation of its loop, and it is therefore at about this point in the operation of the twister that the next twister of the series may begin its operation, since it is only necessary that the intervals, between the inauguration of the operations of the several twisters, shall be of sufficient extent to allow one twister to accumulate sufficient slack in the stay for the formation of its loop before the next

adjacent twister toward the outer end of the stay begins its operation. Returning now, to the operation of the selected twister, which we left in the position shown in Fig. 19, continued rotation will cause the looped or doubled portion of the stay to be urged downwardly by the depressing cams 47 and 48 on the under side of the presser foot, so that, by the time the sharpened edge 11 of the opening 10 in the twister reaches a position slightly in rear of and practically parallel with the abutment 46, the looped portion of the wire will have been sufficiently depressed, see Fig. 16, to cause the edge 11 to ride over the looped portion of the wire. This position of the parts is shown in dotted lines in Fig. 19, and at this point in the operation of the twister, the pin retracting cam 37, see Fig. 4, comes into action, swinging the adjacent lever 33 and depressing the collar 23 to withdraw the pin 24 in a downward direction to the dotted position indicated in Fig. 14. As the pin moves down, its frictional engagement with the loop causes the latter to be drawn down into the opening or recess 10. Thus, the loop depressing cams 47 and 48 on the presser foot, and the pin 24 coöperate in drawing the loop down below the upper surface of the twister so that said loop will be caused, by the continued rotation of the twister, to pass under the beveled or undercut edge 11 of the opening 10, as shown in Fig. 20, after the pin has been completely withdrawn from the loop.

The loop, having been formed and depressed below the surface of the twister, will now be located in a plane where it may be passed under the straight portions of the stay wire and wrapped around the line wire by the continued rotation of the twister. Thus, the positions of the parts shown in Fig. 20 are those assumed when the twister has made practically a complete rotation, the loop having been formed and depressed preparatory to being wrapped upon the line wire. In Fig. 21 the parts are shown in the positions they assume after the twister has made another complete rotation, which, it will be noted, has restored it to normal position and has wrapped the loop of the stay wire tightly around the line wire, it being observed that the cam 37 retains the pin 24 in its depressed position until the operation of the twister reaches a point which will permit the elevation of the pin without danger of its interfering with the stay as the twister rotates. At such time the cam passes beyond the roller on the adjacent lever 33, and the spring 25 elevates the collar 23 and restores the pin to its normal elevated position, shown in Fig. 14. As soon as the last pair of twisters, to-wit those at the extreme ends of the complement, complete their operations, the application of the stay to the line wires will be complete, and the presser feet will be withdrawn rearwardly in the manner heretofore described to allow the line wires to advance, a new stay being placed across the twisters by the feed bar 54 advanced simultaneously with the withdrawal of the presser feet, as described. The presser feet and feed bar will then return to their normal positions, and the new stay will be applied in the manner described, the application starting at the center of the stay and progressing outwardly toward the ends thereof, instead of proceeding from one end to the other of the stay in the usual manner.

Having now described the mechanism wherein the fundamental novelty of my invention resides, I will next proceed to describe the mechanism whereby the line wires are guided to the twisters, the various drums contributing to the proper feeding and storage of the completed fabric, and the driving mechanism and gear connections whereby the various parts are operated in the proper sequence and in the periods of time required for the performance of the various functions which have been described.

In advance of the machine is located rotary guiding means 100, see Fig. 2, in the form of a single roller, or a series of rollers, under which the line wires 22 are passed to the lower ends of the twister spindles, Fig. 4. These spindles guide the line wires vertically and as the fabric is completed by the application of the stays to the line wires, it passes over what may be termed the front drum 101 journaled between the upper ends of standards 102 rising from the main frame of the machine. The drum 101 comprises end heads 103 and 104 and an intermediate head 105, said heads being preferably double and serving to retain a circular series of bars or tubes 106 over which the fabric passes, as shown in Fig. 4. This form of drum is desirable for the reason that while its form is approximately cylindrical and does not crimp the line wires, the engagement of said wires at separated points by the bars or tubes 106 serves to secure an effective frictional contact between the fabric and the drum and avoids the slipping of the fabric which would be incidental to the employment of a drum having a smooth cylindrical surface.

Located in a plane below and in rear of the drum 101 is a crimping drum 107 around the under side of which the fabric passes from the drum 101. The crimping drum is mounted on a shaft 108 journaled at the upper edges of the side frames 3 and 4. The purpose of this crimping drum is to crimp the line wires of the fabric to provide for the contraction and expansion of the fence when set up, and its construction and operation are substantially disclosed in

Patent No. 745,801 to Dwiggins, hereinbefore identified.

Extending between the heads 109 of the crimping drum at the periphery thereof, are fixed bars or slats 110 having coincident series of radially extending pins 111. Intermediate of the fixed slats or bars 110, which are held rigid by bridge plates 112, are disposed reciprocatory crimping bars 113 provided with crimping pins 114. Each of the movable crimping pins 114 is in staggered arrangement with the adjacent stationary pins, as shown in Fig. 1, to permit the line wires of the fabric to pass between said pins in an obvious manner. After the line wires have been engaged by the pins, the rotation of the drum will cause the crimping bars to be reciprocated in succession by fixed cams 115 secured to the frame of the machine at opposite ends of the drum and disposed to be engaged by rollers 116 on the opposite ends of the crimping bars. As the stationary pins constitute separated abutments for the line wires, the reciprocation of a crimping bar will cause the pins thereon to pass between the adjacent pairs of stationary pins and thus crimp the wire, the bar being subsequently retracted in an obvious manner to present the pins in normal position.

From the crimping drum 107 the fabric passes over a rear drum 117 constructed and mounted in a manner identical with the construction and mounting of the front drum 101, but located in a slightly lower plane, shown in Figs. 2 and 4. From the rear drum 117 the fabric finally passes to the usual reel 118 journaled in the rear side of the frame at a point considerably below the rear drum.

The driving connections will now be traced. The main driving shaft 119 of the machine is journaled at the rear side of the frame, as shown in Fig. 2, and power is applied thereto in any suitable manner, as for instance by a belt 120 extending to a line shaft or other suitable source of power not shown. Keyed or otherwise fixed to the driving shaft is a pinion 121 meshing with a comparatively large gear wheel 122 keyed to a shaft 123 extending between the side frames 2 and 3. Also mounted on the shaft 123 is a pinion 124 meshing with a large gear wheel 125 keyed to the left hand end of a shaft 126 journaled at the lower edges of the side frames.

Keyed to the shaft 126, just inside of the side frame 2, is a beveled gear wheel 127, see Figs. 1 and 4, meshing with a beveled pinion 128 at the rear end of a countershaft 129 provided at its front end with a pinion 130 meshing with a similar pinion 131 on the twister driving shaft 26. It will thus be seen that a gear connection is established between the continuously operating driving shaft 119 of the machine and the twister driving shaft 26, which latter therefore rotates continuously. It is to be understood, however, that I do not consider this particular form of gearing to be essential, as any other mode of transmitting motion to the shaft may be substituted in lieu thereof.

Continuous motion is also transmitted to the mechanism for feeding the stay wire longitudinally. This is accomplished by providing a pinion 132 at the rear end of the shaft 80 and in mesh with a pinion 133 on the shaft 123, see Fig. 3. It will be remembered that the feed of the line wires and fabric is intermittent, since the line wires must be stationary during the actual application of the stays thereto. To secure this intermittent feed, star wheels 134 are fixed to the opposite ends of the shaft 108 of the crimping drum and are provided with rollers 135 disposed to be engaged by tappet arms 136 fixed to the shaft 126 adjacent to the opposite ends of the latter, see Figs. 1, 2 and 3. As the shaft 126 rotates, the tappet arms thereof will effect the intermittent rotation of the star wheel 134 in an obvious manner, thus effecting the intermittent rotation of the crimping drum, the movement of the latter being inaugurated as soon as the twisters have completed the application of a stay, and continuing until the stay wires have been fed a sufficient distance for the application of the next stay.

The front drum 101 is an idle member and is rotated by the drawing of the fabric thereover. The rear drum 117, however, is positively driven and is intended to assist the crimping drum and reel in the feed of the fabric. To attain this end, the shaft 108 of the crimping drum is provided at the right hand side of the machine with a large spur-gear 137 meshing with a similar gear 138 fixed to the shaft 139 of the rear drum 117. Motion is transmitted from the shaft 139 of the rear drum to the reel 118 through the medium of sprocket chains 140 passed around sprocket wheels 141 keyed to the shaft 139 and around sprocket pinions 142 keyed to the shaft of the reel 118. Motion is transmitted to the cam shaft 38′ from the twister operating shaft 26 through the medium of gear wheels 143 and 144 keyed to the left hand end of said shafts and meshing with an intermediate pinion 145, see Fig. 2.

It will appear from what has been said that the line wires are intermittently advanced, that during the intervals of rest the stays are applied, and that during the intervals of movement succeeding portions of the completed fabric are stored upon the reel. It will further appear that the operation of the machine is entirely automatic, that a stay is presented to all the twisters simultaneously, that the operations of corre-

sponding twisters of different series are completely coincident, and that the operation of each succeeding twister of a series is only retarded sufficiently to allow the twister next preceding to take sufficient slack for the formation of its loop. From this it necessarily follows that the capacity of the machine is greatly increased beyond the capabilities of machines of this type heretofore devised, and that the machine is rendered more durable and efficient by the elimination of the reciprocating carriage upon the operation of which this type of machines has heretofore depended.

It is thought that from the foregoing, the construction and operation of the machine constructed in accordance with my invention will be clearly comprehended; but, while the illustrated embodiment is thought at this time to be preferable, I reserve the right to effect such changes, modifications, and variations of the illustrated structure as may come fairly within the scope of the protection prayed.

What I claim is:—

1. A wire fabric loom, including means for connecting a stay to a series of line wires beginning with a wire located at an intermediate point of the series and ending with the outer wires thereof.

2. A wire fabric loom, including a series of wire connecting devices arranged to connect the same stay to a series of wires, said devices operating in pairs certain of which have non-coincident periods of operation and each device operating to connect the stay to one of the wires.

3. A wire fabric loom, including wire connecting devices operative in pairs and all of said pairs operating to connect the same stay to a series of wires, and means for bringing said pairs of devices into action successively to effect the application of said stay.

4. A wire fabric loom, including wire connecting devices arranged to connect the same stay to a series of wires, said devices operating in pairs, and certain of said pairs operating at the same time but in non-coincidence.

5. A wire fabric loom, including wire connecting devices operating in pairs to connect the same stay to a series of wires, and means for bringing said pairs of devices into action in succession, each pair coming into action during the operation of another pair.

6. A wire fabric loom, including series of wire connecting devices arranged to connect a stay to a series of line wires, the devices of each series coming into action in succession and each device except the first of any given series coming into action during the operation of the preceding device.

7. A wire fabric loom, including a complement of wire connecting devices arranged to connect the same stay to a series of wires, and operating means serving to cause certain of the wire connecting devices to operate in complete coincidence with each other but in non-coincidence with certain other of said devices.

8. A wire fabric loom, including two series of wire connecting devices operative to connect the same stay to a series of wires, the devices of a given series coming into action in succession and certain of the devices of each series operating in coincidence with certain devices of the other series.

9. A wire fabric loom, including two series of wire connecting devices operative to connect the same stay to a series of wires, the device of each series coming into action in succession and corresponding devices of said series having coincident operation.

10. A wire fabric loom, including two series of wire connecting devices operative to connect the same stay to a series of wires, and means for operating said devices in pairs, each pair including a device of each series and said pairs coming into action in succession.

11. A wire fabric loom, including two series of wire connecting devices, and means for operating said devices in pairs, each pair including corresponding devices of the two series, and means for bringing said pairs of wire connecting devices into action in succession beginning with the devices at the inner ends of the two series and ending with the devices at the outer ends of said series.

12. A wire fabric loom, including two series of wire connecting devices arranged to connect a stay to a series of line wires, corresponding devices of said series operating in pairs, and means for bringing said pairs into action successively beginning with the devices at the inner ends of the two series, each pair of devices coming into action during the operation of the next preceding pair.

13. A wire fabric loom, including two series of twisters arranged to twist the same stay around a series of wires, corresponding twisters of said series operating successively and in pairs.

14. A wire fabric loom, including a complement of twisters all operative to apply the same stay to a series of line wires, said twisters operating in pairs having non-coincident periods of operation.

15. A wire fabric loom, including a series of twisters operating in pairs to effect the application of the same stay to a series of wires, and means for bringing the several pairs of twisters into action successively to apply the stay.

16. A wire fabric loom, including two series of twisters arranged to effect the

application of the same stay to a series of wires, said twisters acting in pairs and each pair including a twister of each series, and means for bringing the several pairs of twisters into action successively.

17. A wire fabric loom, including two series of twisters acting in pairs to effect the application of a stay to a series of line wires, each of said pairs including corresponding twisters of the respective series, and means for bringing said pairs of twisters into action successively beginning with the twisters at the inner ends of the two series.

18. A wire fabric loom, including two series of twisters for effecting the application of the same stay to a series of wires, and means for bringing the twisters of each series into action in succession, certain twisters of one series operating during the operation of certain twisters of the other series to apply the stay.

19. A wire fabric loom, including a series of twisters arranged to apply a stay to a series of line wires, and twister operating means arranged to bring two of the intermediate twisters simultaneously into action and to bring the other twisters into action subsequently.

20. A wire fabric loom, including a series of combined loopers and twisters arranged to form a series of loops in the stay and to twist said loops upon a series of line wires, and means for operating said devices in pairs.

21. A wire fabric loom, including a series of combined loopers and twisters arranged to form a series of loops in a stay and to twist said loops about a series of line wires, and means for bringing a plurality of said devices into action simultaneously and for subsequently bringing other of said devices into action.

22. A wire fabric loom, including a series of combined loopers and twisters operating in pairs to apply a stay to a series of line wires, and means for bringing said pairs of twisters into action in succession.

23. A wire fabric loom, including a series of combined loopers and twisters operating in pairs to apply a stay to a series of line wires, and means for bringing said pairs of twisters into action in succession, said means causing each succeeding pair of twisters to come into action during the operation of the pair last brought into action.

24. A wire fabric loom, including two series of combined loopers and twisters arranged to apply a stay to a series of line wires, and means for bringing the twisters of the respective series into action successively beginning with the twisters at the inner ends of said series.

25. A wire fabric loom, including two series of combined loopers and twisters arranged to apply a stay to a series of line wires, and means for operating said devices in pairs, each pair including corresponding devices of the respective series.

26. A wire fabric loom, including several pairs of oppositely moving twisters each arranged to place a portion of the same stay around one of a series of line wires, and means for effecting the simultaneous operation of the twisters of any given pair.

27. A wire fabric loom, including a pair of oppositely moving combined loopers and twisters arranged to form loops in a stay and to twist said loops in opposite directions around a pair of line wires, and means for operating said devices simultaneously to form the loops by indrawing the opposite ends of the stay and to wrap said loops upon the line wires.

28. A wire fabric loom, including means for forming a loop at an intermediate point of a stay and for thereafter forming other loops in the stay at opposite sides of the loop first formed, and means for wrapping the loops around line wires.

29. A wire fabric loom, including means for simultaneously forming a plurality of loops in a stay and for wrapping said loops around line wires, the material for said loops being supplied by the indrawing of the opposite ends of said stay.

30. A wire fabric loom, including means for forming two series of loops in a stay, said means operating to form the loops of each series successively beginning at the inner end of the series, whereby the material for each loop will be formed by the indrawing of one end of a stay without affecting the loop or loops previously formed and means for wrapping the loops about line wires.

31. A wire fabric loom, including means for forming two series of loops in a stay and for wrapping said loops about line wires, the loops of each series being formed successively and corresponding loops of said series being formed simultaneously.

32. A wire fabric loom, including means for forming two series of loops in a stay, each series of loops being formed successively beginning with the innermost loop of the series, and corresponding loops of the two series being formed simultaneously by effecting the indrawing of the opposite ends of the stay to supply material for said loops, and means for wrapping certain of said loops about line wires while certain other of said loops are in process of formation.

33. A wire fabric loom, including guiding means for a series of line wires and for a stay, and mechanism for performing the following functions, to-wit, the formation of two series of loops in the stay, the loops of

each series being formed successively beginning at the inner end of the series, and the wrapping of each loop about a line wire.

34. A wire fabric loom, including a series of twisters, and oppositely graduated series of twister-operating gears, each arranged to operate a different twister, the graduation of the gears causing those of each series to come into action successively.

35. A wire fabric loom, including a series of twisters operative to apply a single stay to a series of wires, and twister operating means including two oppositely graduated series of gears, corresponding gears only of said series having coincident periods of action.

36. A wire fabric loom, including two series of oppositely rotating stay twisters all arranged to twist the same stay upon a series of wires.

37. A wire fabric loom, including two series of twisters all arranged to twist the same stay upon a series of wires, and twister operating means arranged to rotate the twisters of one series in a direction opposite to the direction of rotation of the twisters of the other series and to bring the twisters of each series into action in succession.

38. A wire fabric loom, including two series of twisters all arranged to effect the application of the same stay to a series of line wires, and twister operating means arranged to operate each series of twisters in a different direction, to bring the twisters of each series into action in succession, and to effect the simultaneous operation of corresponding twisters of said series.

39. A wire fabric loom, including two series of twisters all arranged to effect the application of the same stay to a series of line wires, and twister operating mechanism including two oppositely graduated and oppositely disposed series of twister operating gears, whereby the twisters of each series are brought into action successively and are rotated in a direction opposite to the direction of rotation of the twisters of the other series.

40. A wire fabric loom, including two series of twisters all arranged to effect the application of the same stay to a series of line wires, and twister operating mechanism including two oppositely graduated and oppositely disposed series of twister operating gears, the periods of action of corresponding gears of said series being coincident with each other and non-coincident with the periods of action of the other twisters.

41. A wire fabric loom, including a twister having a head provided with a recess in the face thereof, one edge of said recess being undercut in an angular direction to provide a flange having a sharp edge designed to pass over the looped portion of a wire to facilitate the depression of the latter into the recess.

42. A wire fabric loom, including a series of twisters each provided with a wrapping pin movable relatively thereto, pin operating means including a cam shaft and a series of rotary cams mounted thereon, and driving means common to said shafts to insure the operation of the pins at the proper points in the movements of the twisters.

43. A wire fabric loom, including a rotary twister and a loop depressing cam associated with the twister and arranged to urge the loop into engagement with the latter.

44. A wire fabric loom, including a rotary twister, a loop forming device associated therewith, and a loop depressing cam arranged to urge the loop into engagement with the twister as the loop is carried across the face of said cam by the loop forming device.

45. A wire fabric loom, including a twister having a recess in its face, a loop forming pin movable with the twister as the latter rotates, and a stationary loop depressing cam coöperating with the pin to depress the loop into the recess in the twister as the latter rotates.

46. A wire fabric loom, including a rotary twister, means associated with said twister for forming a loop in a stay, and a presser foot associated with the twister and provided with a loop depressing cam.

47. A wire fabric loom, including a twister formed in its face with a recess having an undercut edge, and a loop depressing cam associated with the twister and coöperating with the latter to depress a loop into position to be engaged by the undercut edge of the recess.

48. A wire fabric loom, including a twister and a movable presser foot associated therewith and provided with a line wire guide and a loop depressing cam.

49. A wire fabric loom, including a twister and a presser foot associated with the twister and having a line wire guide, a stay wire abutment, and a loop depressing cam.

50. A wire fabric loom, including a series of twisters, a series of presser feet associated therewith and having a line wire guide and a loop depressing cam, and means for simultaneously moving the presser feet toward or from the line wires.

51. A wire fabric loom, including a series of devices for twisting intermediate and end portions of a single stay about intermediate and marginal line wires, said devices being adapted to have the line wires extend longitudinally thereof and having pins spaced from the line wires, and movable means having a path of movement transversely of the twisting devices and line

wires for carrying a single stay laterally of itself and transversely of the line wires and twisting devices to present said stay between the pins and line wires.

52. A wire fabric loom, including a series of rotary stay twisters adapted to be associated with margin wires and intermediate line wires and having means for engaging a stay to twist the same about said line wires, a stay guide, means for feeding a stay to said guide in spaced relation to the line wires, and means for moving said guide laterally to a position above the twisters to carry the stay into engagement with the line wires and present said stay simultaneously to the engaging means of all of said twisters.

53. A wire fabric loom, including two series of combined looping and twisting devices, means for simultaneously feeding a stay to all of said devices, and means for operating the two series of devices in opposite directions to form loops in the stay and to wrap said loops about the line wires.

54. A wire fabric loom, including a series of loopers and twisters for forming loops in a stay and twisting the same about line wires, a feed bar having a longitudinal stay guide, and means for moving the bar laterally to a position to present said stay to the loopers and twisters.

55. A wire fabric loom, including a series of stay twisters, a laterally reciprocatory feed bar having a longitudinal stay guide in its under side, means for feeding a stay to said guide, and means for moving the feed bar to present the stay guide above the twisters.

56. A wire fabric loom, including a series of twisters, means for feeding a stay to said twisters, and tension devices engaging the stay beyond the opposite ends of the series of twisters.

57. A wire fabric loom, including a series of stay applying devices, stay feeding means movable toward and from the applying devices, and tension devices movable with the stay feeding means and arranged to engage the stay after the latter has been fed to the applying devices.

58. A wire fabric loom, including a series of stay applying devices, a series of presser feet associated therewith, and movable into and out of operative position, and a stay feeding device movable with the presser feet.

59. A wire fabric loom, including a series of stay applying devices, a presser foot bar and a stay feeding bar connected for movement in unison, a series of presser feet carried by the presser foot bar and associated with the stay applying devices, and means for moving the feed bar to present a stay to the applying devices and to withdraw the presser feet from the latter.

60. A wire fabric loom, including a series of twisters, a series of line wire guides movable in unison toward and from the line wires, and tension devices movable with the line wire guides and arranged to engage the stay when the line wire guides are advanced toward the line wire.

61. A wire fabric loom, including a twister table, a series of twisters mounted therein, a stay table located above the twister table, a laterally movable stay guide movable over the stay table and arranged to move a stay to the twisters, and a stay depressing device coöperating with the stay guide to present the stay to the twisters.

62. A wire fabric loom, including a series of stay applying devices, a stay wire guide movable to the applying devices, and means for urging the stay laterally out of said guide and into position to be engaged by the applying devices.

63. A wire fabric loom, including a stay table, a feed bar having a stay wire guide opening through its under side and movable to a point beyond the edge of the stay table, and means for urging the stay out of the guide when said stay is advanced to the edge of the table.

64. A wire fabric loom, including a twister table, a series of twisters mounted therein, a stay table carried by the twister table, a laterally movable feed bar mounted on the twister table and having a longitudinal recess in its under face constituting a stay guide, and an ejecting device yieldingly retained in position to urge the stay out of the guide and against the surface of the twister table at the edge of the stay table.

65. A wire fabric loom, including a series of stay applying devices, a table in which said devices are mounted, a stay guide located above the table, and a series of spring urged depressors arranged to urge the stay out of the stay guide and to hold the same upon the table.

66. A wire fabric loom, including a laterally movable stay wire guide, means for feeding a stay wire longitudinally to said guide, means for cutting a stay length from the wire, means for moving the stay guide laterally and means for forcing the stay out of the guide.

67. A wire fabric loom, including a laterally reciprocatory stay guide, means for feeding a stay wire longitudinally to said guide, and a stay wire cutter movable with the guide.

68. A wire fabric loom, including a series of stay twisters associated with margin wires and intermediate line wires, a feed bar having a longitudinal wire guide, means for feeding a stay wire longitudinally to the feed bar, means for severing a stay length from the stay wire, and means for moving the feed bar laterally to present the stay length simultaneously to all of said twisters.

69. A wire fabric loom, including a series

of twisters, a twister operating shaft geared to the twisters, stay wire feeding wheels operative to feed the stay wire, a cam carried by the twister operating shaft, an eccentric upon which one of the feeding wheels is mounted, and means operated by the cam to turn the eccentric and thus effect relative movement of the feeding wheels.

70. A wire fabric loom, including a series of twisters, a shaft, a series of twister operating gears and a cam movable with the shaft, a pair of stay wire feeding wheels, an eccentric supporting one of said wheels, and means operated by the cam to shift the eccentric and thus move one of the feeding wheels toward the other.

71. A wire fabric loom, including a series of twisters, a twister operating shaft common to the twisters, normally inoperative stay wire feeding mechanism, a wire guide disposed to receive the stay from the feeding mechanism and movable to carry the stay to the twisters, and mechanism operated by the twister operating shaft to bring the stay wire feeding mechanism into action and to subsequently move the wire guide to the twisters.

72. A wire fabric loom, including stay wire feeding mechanism, said mechanism comprising a pair of feeding wheels, an eccentric shaft carrying one of said wheels, an arm extended from said shaft, a rock shaft, a connection between the rock shaft and the arm, said connection including a spring, and a cam for operating the rock shaft.

73. A wire fabric loom, including a series of stay twisters, stay wire feeding means, a laterally movable stay guide arranged to receive the stay endwise from the feeding means, a stay wire cutter, a twister operating shaft provided with a series of twister operating gears, cams also carried by said shaft, and means operated by said cams to bring the stay wire feeding means into action, and to thereafter operate the cutter and move the stay guide to the twisters.

74. A wire fabric loom, including a series of twisters, a twister driving shaft, and operating connections between said driving shaft and the twisters, each of said connections comprising a twister operating gear adjustable to determine its period of action.

75. A wire fabric loom, including a series of twisters, a twister driving shaft, and operating connections between the driving shaft and the twisters, said connections including a series of segmental driving gears independently adjustable upon the driving shaft to determine their relative periods of action.

76. A wire fabric loom, including a twister having a head provided with a recess in the face thereof and having a transversely tapered flange designed to pass over the looped portion of the wire to facilitate the depression of the latter into the recess.

77. A wire fabric loom including a series of combined stay loopers and twisters, and operating means arranged to bring certain of said combined loopers and twisters into action successively beginning with a looper and twister located at an intermediate point of the series, to cause the formation of loops in the stay and the twisting of said loops about line wires.

78. A wire fabric loom inculding a complement of combined stay loopers and twisters arranged in a line across the width of the fabric, and operating means for said combined loopers and twisters, said operating means serving to operate different sets of said loopers and twisters in different directions and to operate the several loopers and twisters of each set in succession beginning with a looper and twister located at a point intermediate of the ends of the complement.

79. A wire fabric loom including two series of rotary stay twisters, each twister being operative to wrap a different portion of the same stay about one of a series of wires, and twister operating mechanism constructed and arranged to rotate the twisters of one series in one direction and the twisters of the other series in the opposite direction.

80. A wire fabric loom including two series of rotary stay twisters, each twister being operative to wrap a different portion of the same stay about a different one of a series of wires, the two series of twisters extending in opposite directions from a point between the ends of the stay, and twister operating mechanism constructed and arranged to rotate the twisters of one series in one direction and the twisters of the other series in the opposite direction.

81. A wire fabric loom including two series of twisters, each twister being operative to twist a different portion of the same continuous single strand stay around a different one of a series of wires, and twister operating mechanism constructed and arranged to simultaneously operate certain twisters of different series without operating the others.

82. A wire fabric loom including two series of twisters, each twister being operative to twist a different portion of the same continuous single strand stay around a different one of a series of wires, and twister operating mechanism constructed and arranged to operate the twisters of one series in one direction and the twisters of the other series in the opposite direction.

83. A wire fabric loom including two series of twisters, each of said twisters being operative to twist a different portion of the same continuous single strand stay around a different one of a series of wires, and

twister operating mechanism constructed and arranged to operate the twisters in pairs, the twisters of each pair operating in coincidence but in opposite directions and including a twister of each series and the several pairs of twisters having non-coincident periods of operation.

84. A wire fabric loom, including a series of stay twisters, line wire guides movable into and out of coaction with line wires associated with the twisters, stay feeding means, and means for moving the line wire guides out of coaction with the line wires when said stay feeding means is operated to present a stay to the twisters.

85. A wire fabric loom, including a plurality of stay applying devices, stay feeding means movable toward and from the same, tension devices arranged to engage the stay after the latter has been fed to the applying devices, and means for operating the tension devices, said means being actuated by the stay feeding means.

86. A wire fabric loom, including a series of stay twisters, a laterally reciprocatory feed bar having a longitudinal stay guide that opens through one side of said bar, means for feeding a stay longitudinally into said guide, and means for moving the stay laterally out of said guide through the open side thereof.

87. In a wire fabricating machine, in combination, a support including a table having openings therein, rotatable spindles having wrapping heads disposed in said openings, said wrapping heads having openings therethrough, sleeves slidably mounted on said spindles, a pin carried by each sleeve and adapted to be projected through the opening in its wrapping head, cam wheels one for each spindle, levers one for each spindle, said levers pivoted beneath said table and engaging said sleeves and said cam wheels, whereby said pins are actuated by said cam wheels, and means for rotating said spindles.

88. In a wire fabricating machine, in combination, a support including a table having openings therein, rotatable spindles having wrapping heads disposed in said openings, said wrapping heads having openings therethrough, a sleeve slidably mounted on each spindle, a pin carried by each sleeve and adapted to be projected through the opening in its wrapping head, a cam wheel for each spindle, a lever for each spindle, and brackets secured to said table, each lever being pivoted to said brackets and engaging a sleeve and its corresponding cam wheel whereby said pins are actuated by said cam wheels, and means for rotating said spindles.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

ALVA L. KITSELMAN.

Witnesses:
O. L. BARBER,
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A. KLINGBACK.

POWER HAMMER.

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1,353,347.

Patented Sept. 21, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

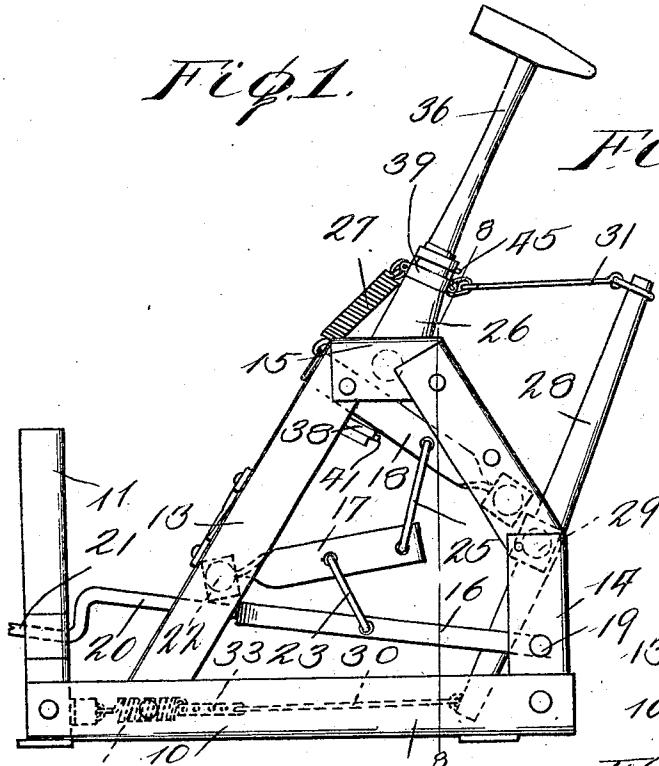


Fig. 3.

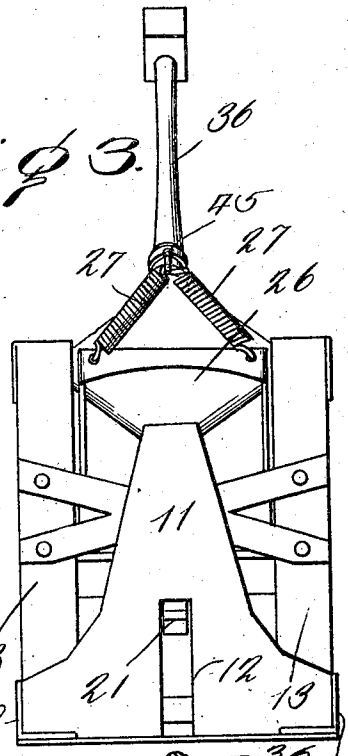


Fig. 2.

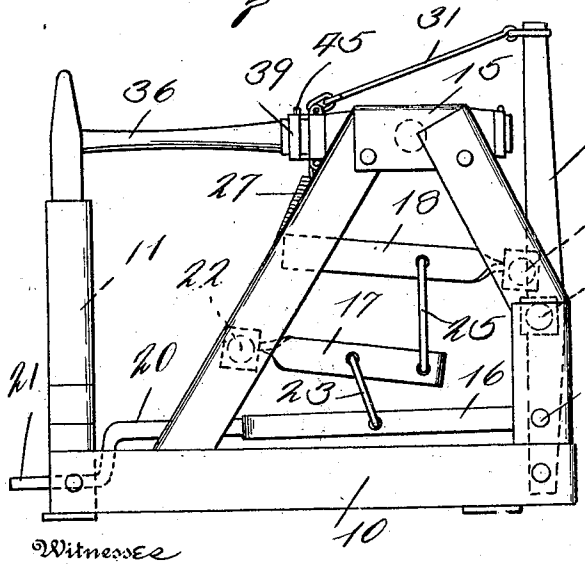
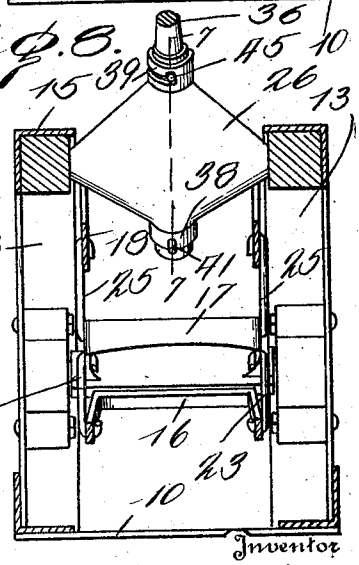


Fig. 8.



Witnesses

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