Aug. 21, 1934. T. H. DE SPAIN 1,970,994

SEWING MACHINE

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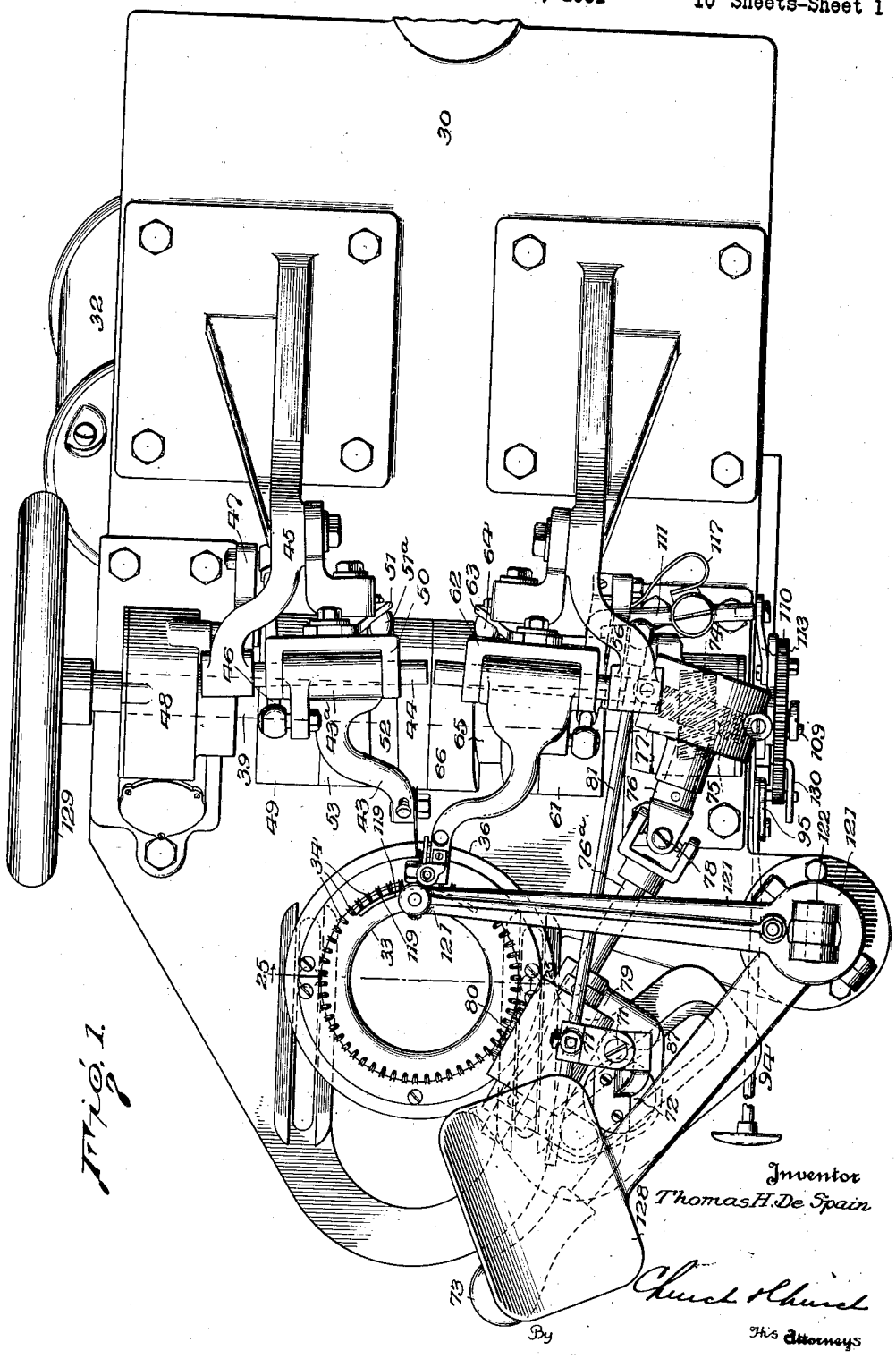


Fig. 1.

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T. H. DE SPAIN

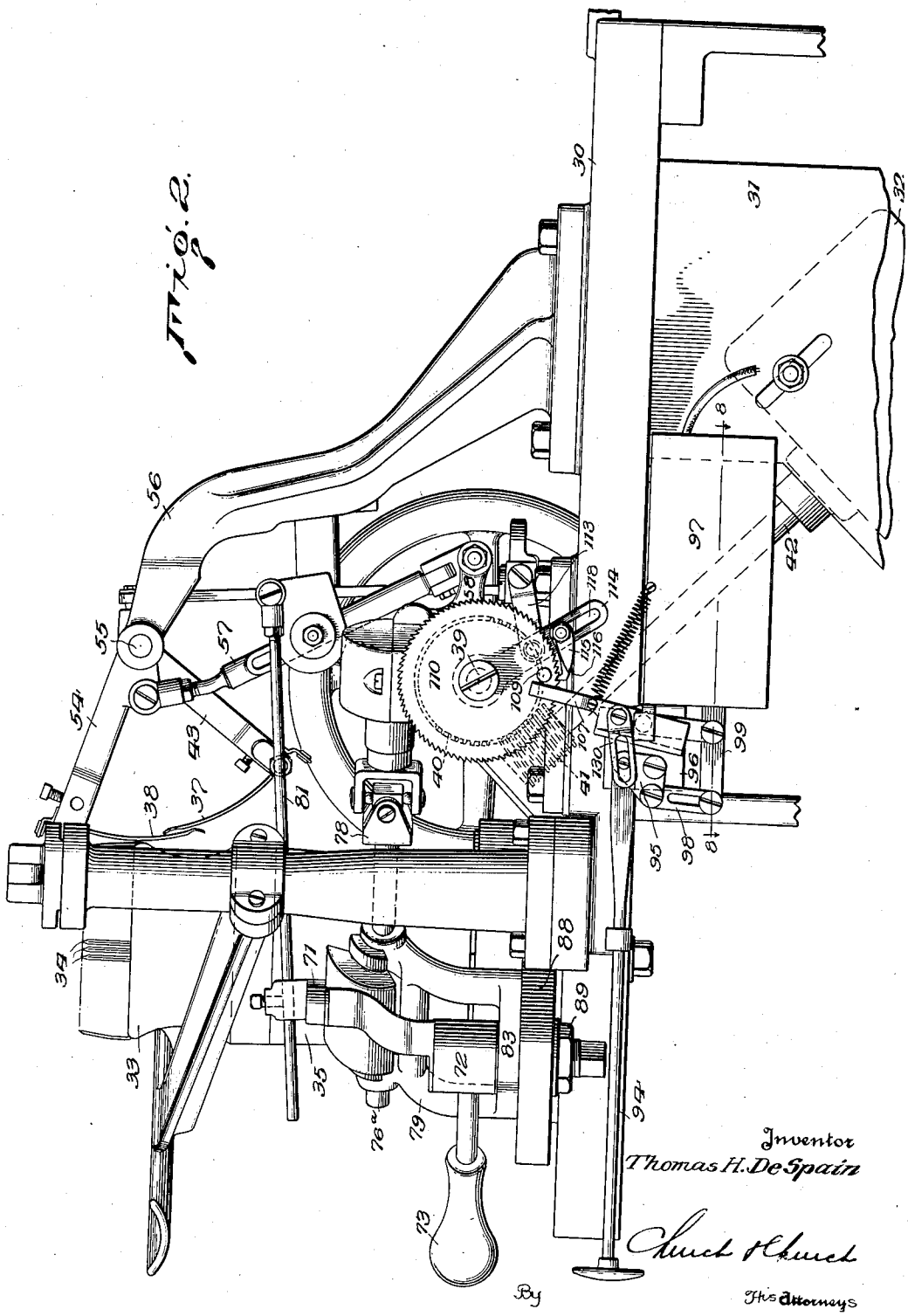
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Fig. 2.



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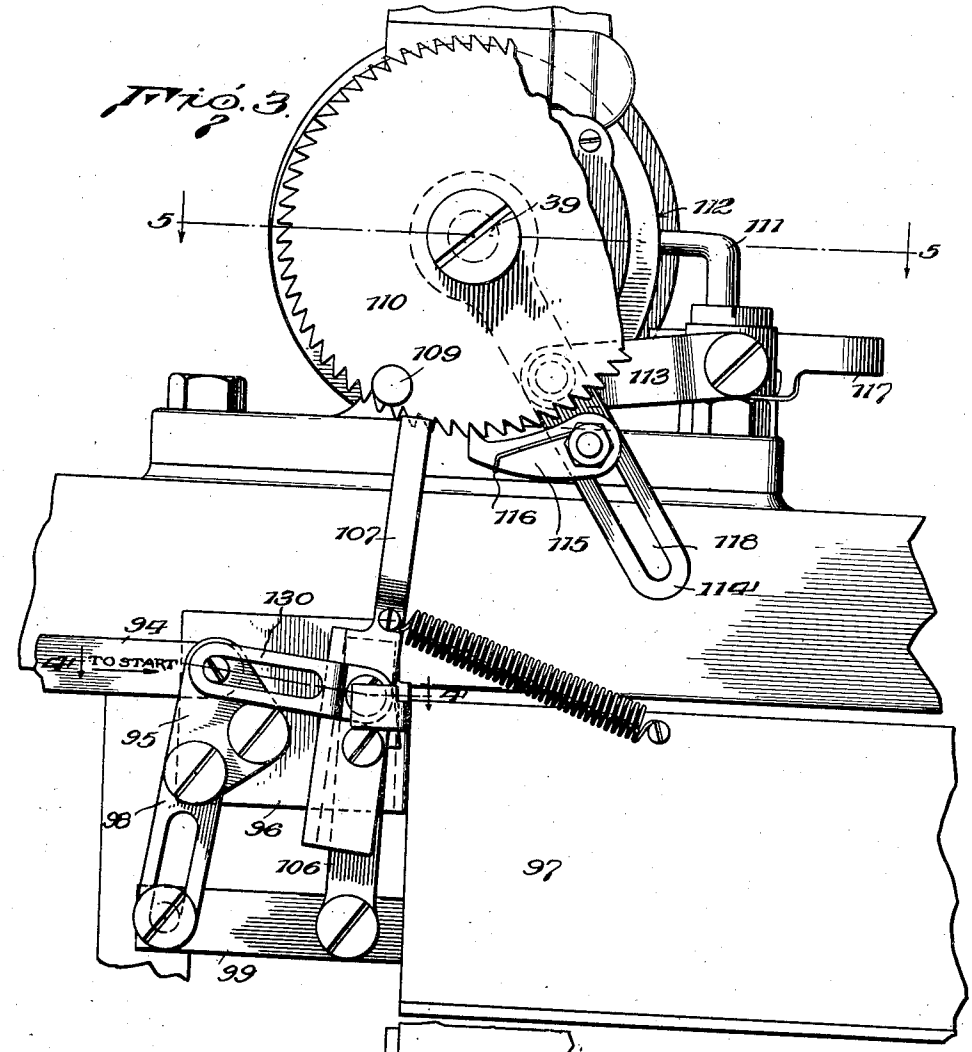
By Church & Church

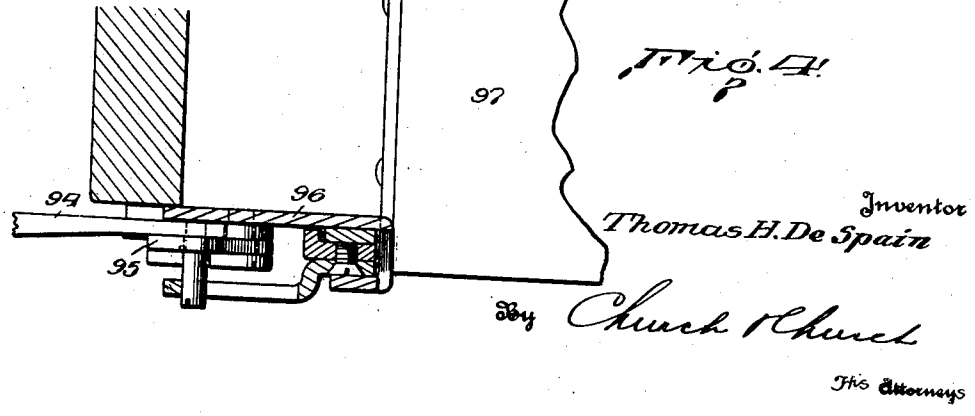
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SEWING MACHINE

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SEWING MACHINE

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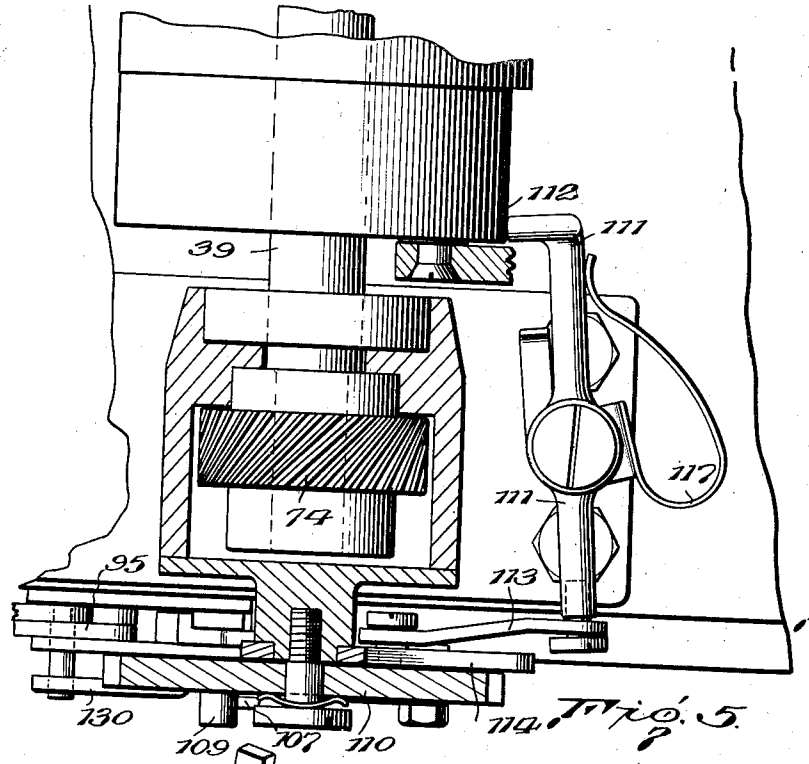


Fig. 5.

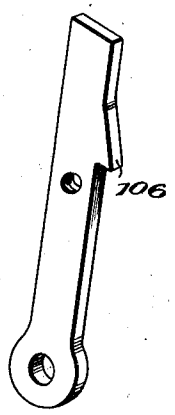


Fig. 7.

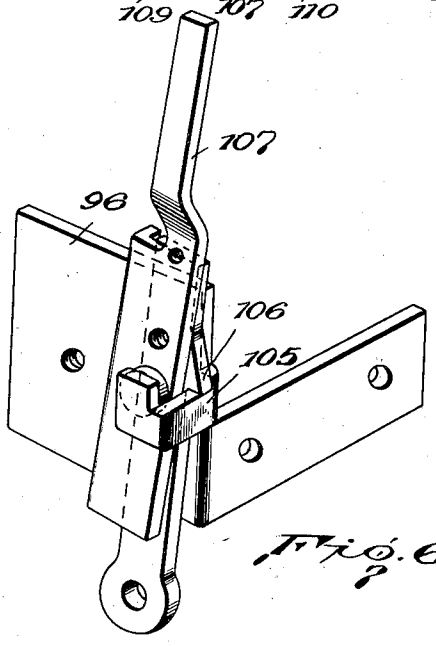


Fig. 6.

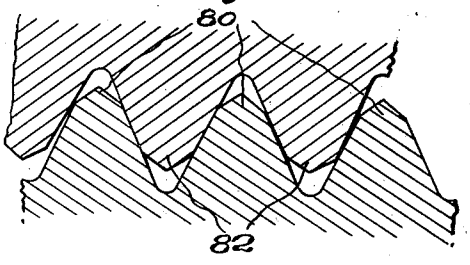


Fig. 26.

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SEWING MACHINE

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Fig. 8.

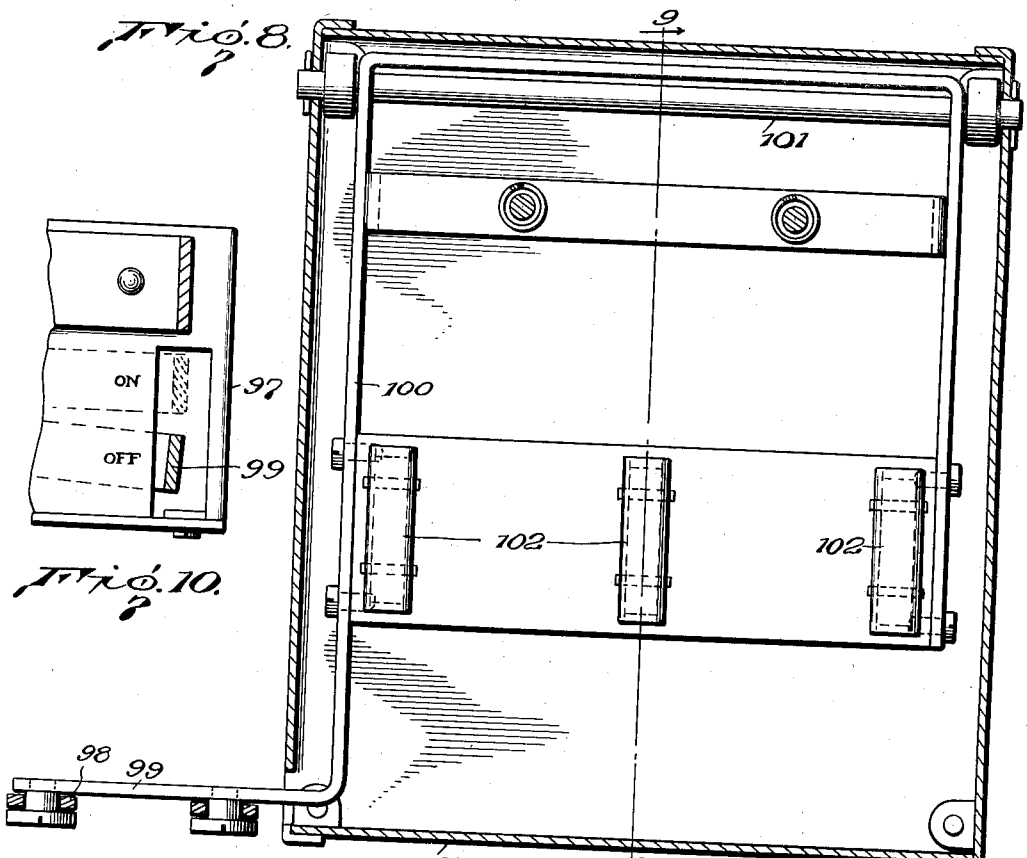


Fig. 10.

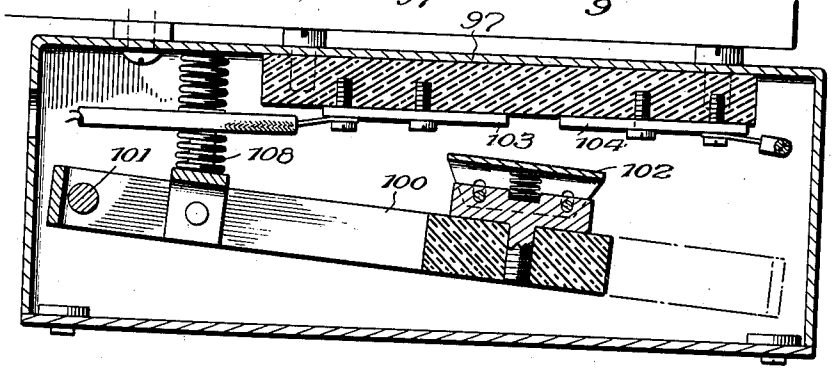


Fig. 9.

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SEWING MACHINE

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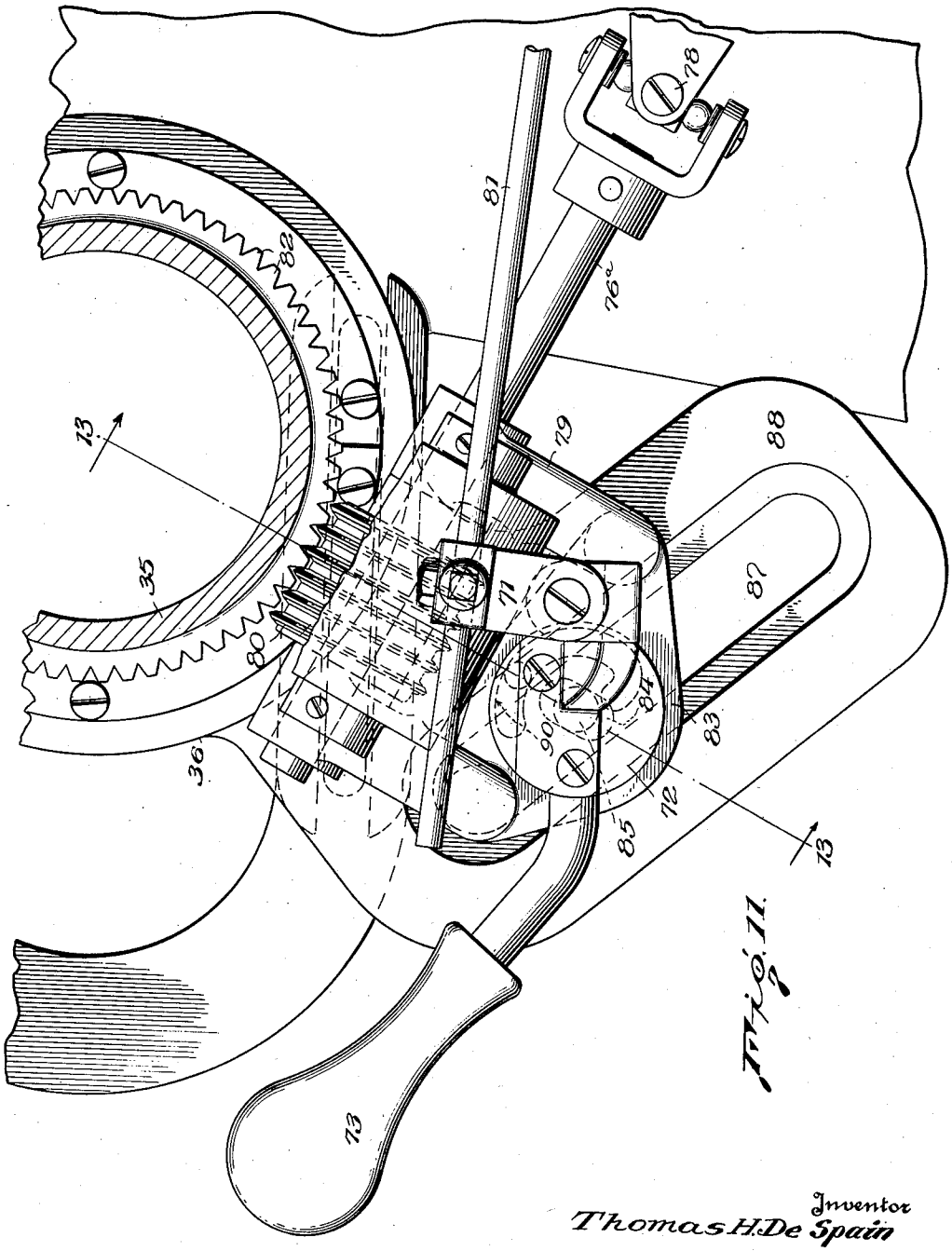


Fig. 11.

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SEWING MACHINE

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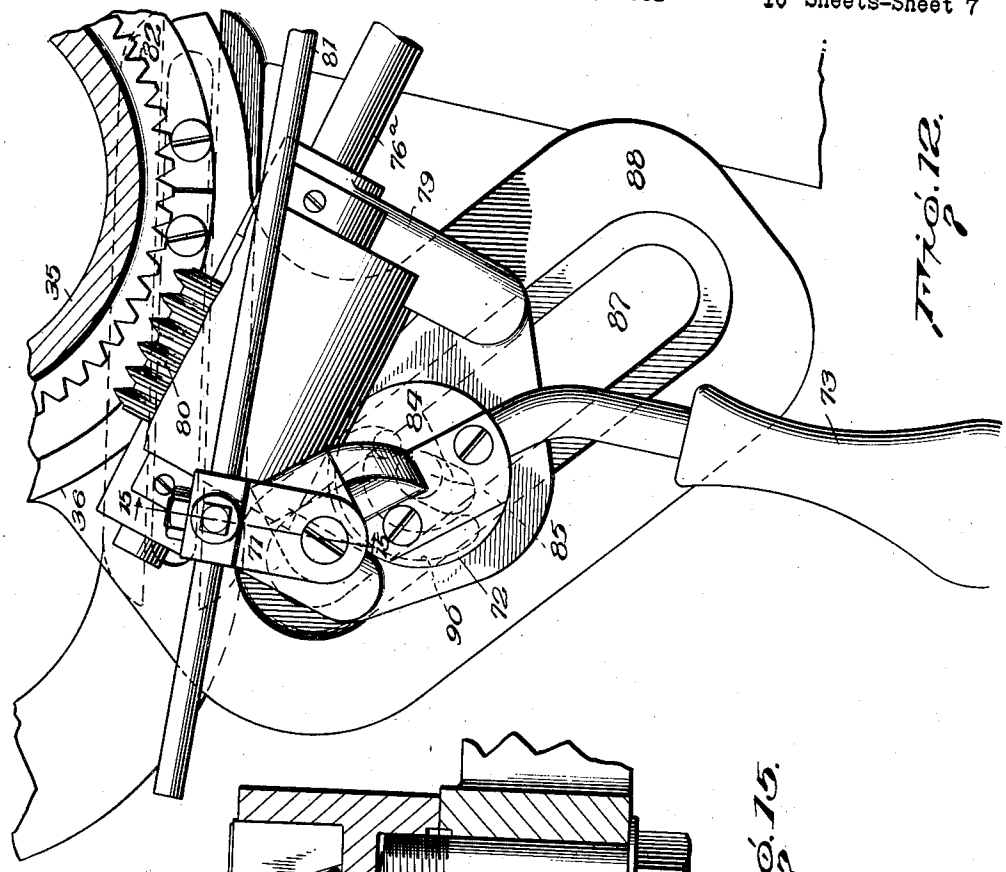


Fig. 12.

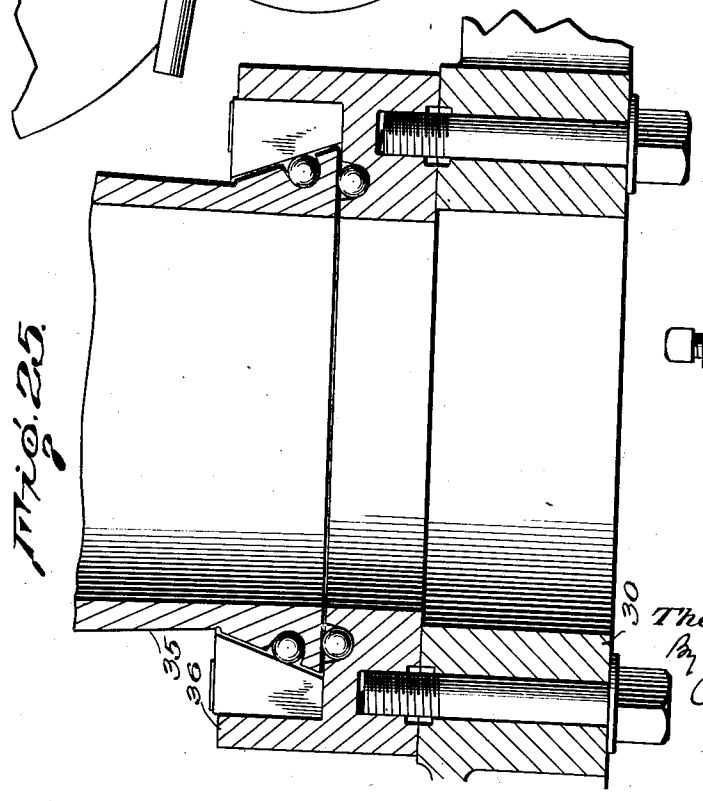


Fig. 25.

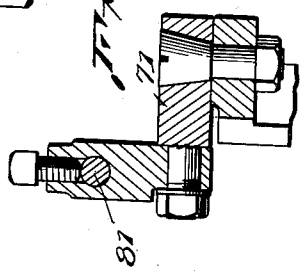


Fig. 15.

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SEWING MACHINE

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Fig. 14.

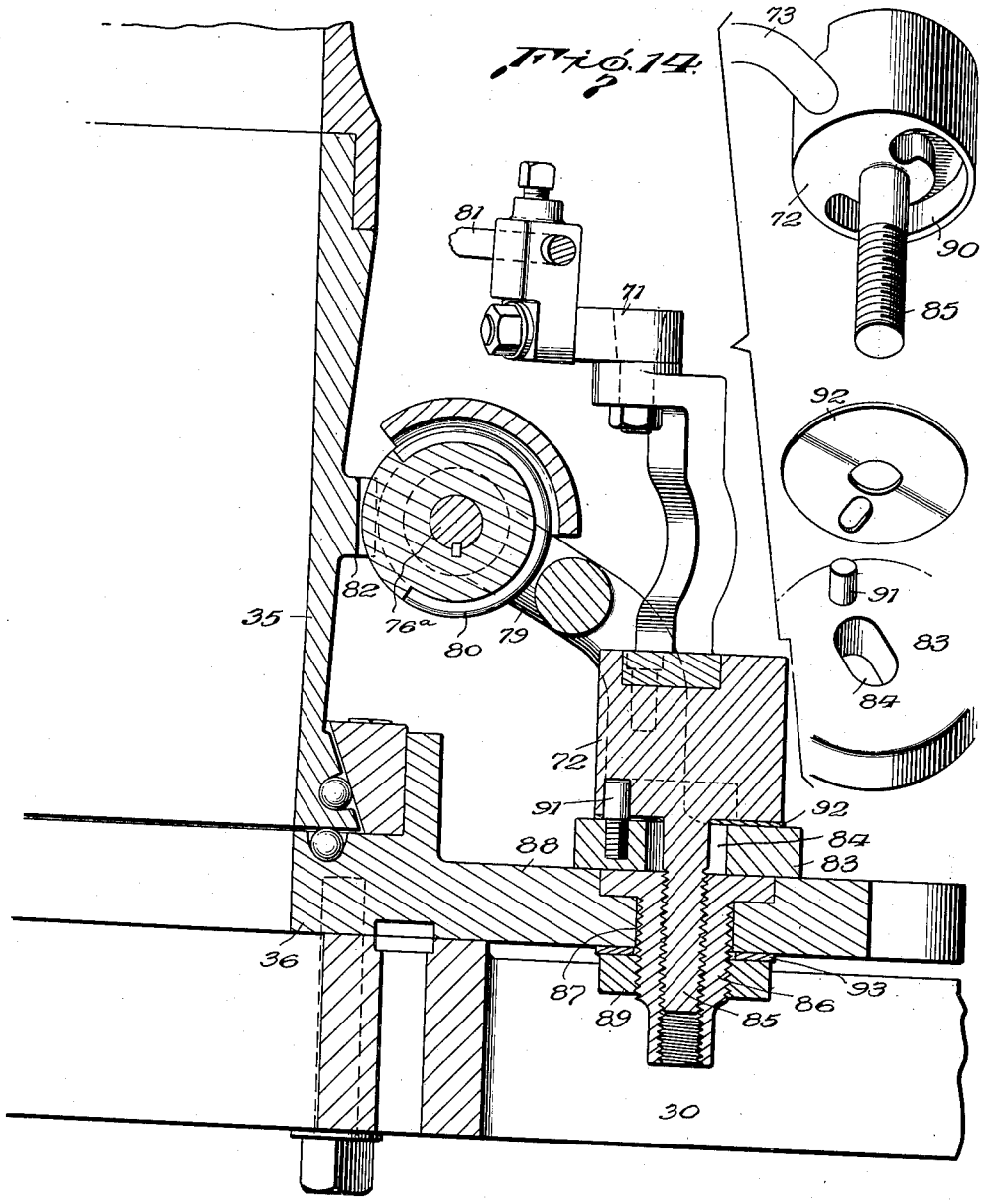


Fig. 13.

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SEWING MACHINE

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Fig. 16.

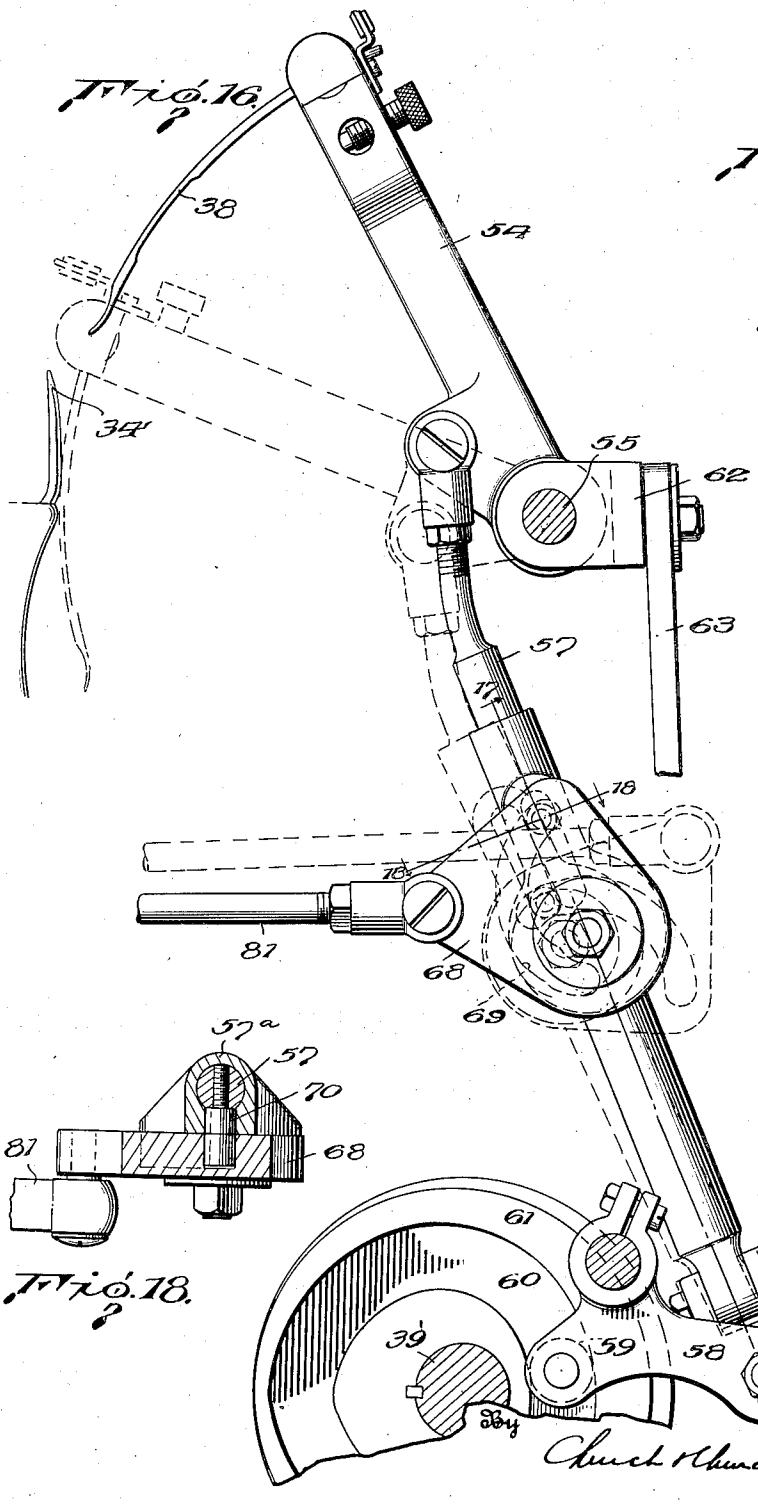


Fig. 17.

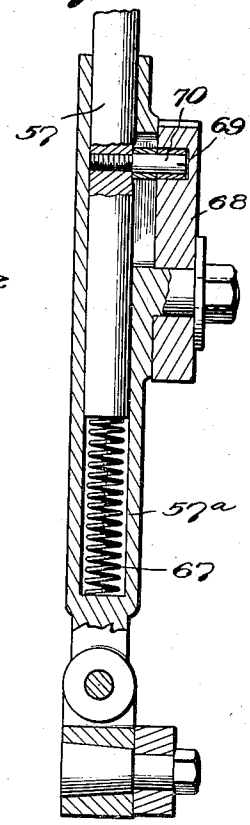


Fig. 18.

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SEWING MACHINE

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Fig. 19.

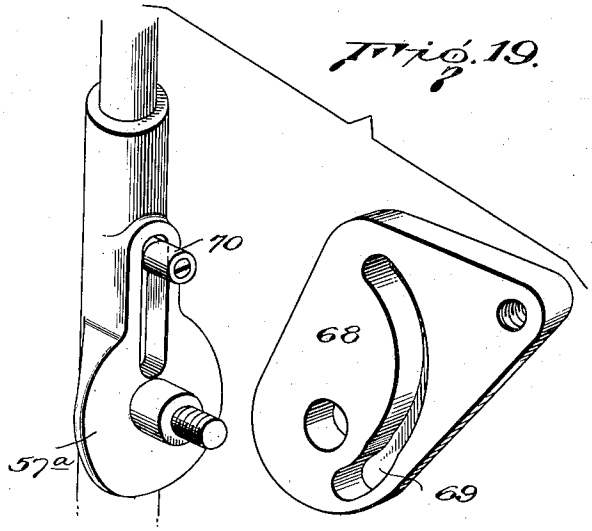
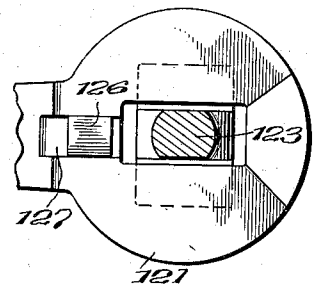


Fig. 20.



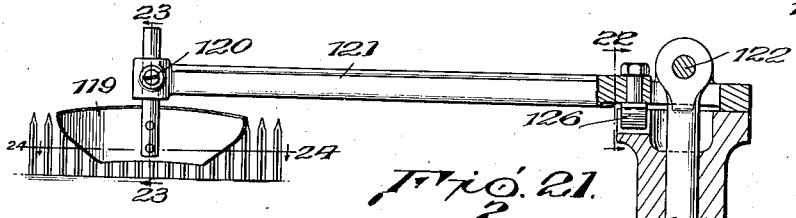


Fig. 21.

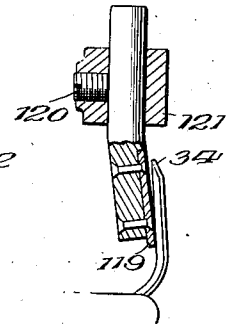


Fig. 23.

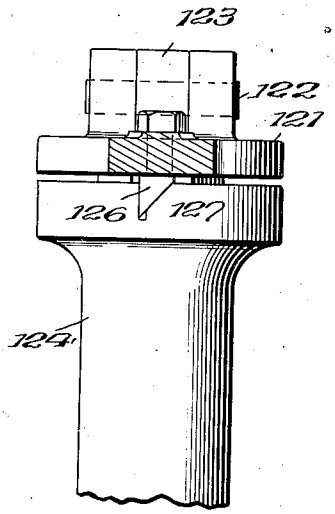
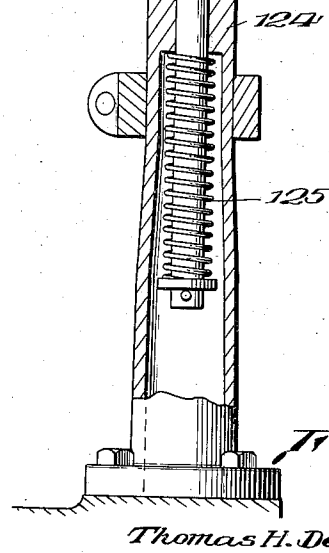


Fig. 22.



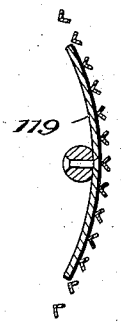


Fig. 24.

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UNITED STATES PATENT OFFICE

1,970,994

SEWING MACHINE

Thomas H. De Spain, Paducah, Ky., assignor to Southern Textile Machinery Company, Paducah, Ky., a corporation of Kentucky

Application December 23, 1931, Serial No. 582,857

16 Claims. (Cl. 112—25)

This invention relates to improvements in sewing machines.

Certain features are especially applicable to sewing machines of the looper type disclosed in the pending application of Robert N. Parkin, Serial No. 468,656, but are not limited to that particular type of machine.

The machines disclosed in said pending application, and in the present application are adapted for use in uniting two tubular pieces of woven or knitted material and one object of the present invention is the provision of a timing mechanism whereby the ends of seams formed by the machine in uniting said materials will be overlapped, thereby producing a strong seam.

In machines for tubular work, the materials to be united are placed on rotatable work cylinders, said cylinders being provided with a circular series of impaling pins or points each adapted to receive two alined loops or stitches of the material to be united. These cylinder pins or points are formed with longitudinal grooves along which the sewing needles pass when projected through the loops or stitches of the work. It is, therefore, important that the pins or points be in registry or alinement with the sewing needles when the machine is placed in operation and a further object of the invention is the provision of means for insuring alinement of the points or pins with the needles when the machine is placed in operation. More specifically, this object contemplates a drive connection between the drive shaft and the rotatable cylinder embodying a worm, engaging driving teeth on the cylinder, the worm being movable into and out of engagement with the cylinder to allow of removal and substitution of work on the cylinders and capable of displacing a cylinder circumferentially when moved into engagement with the same so as to bring the first point engaged by the needles into registry with said needles.

The machine disclosed in the instant case is of the vertical type in that the work cylinder is vertically disposed in the machine and a further object is the provision of means for preventing the sewing needles accidentally displacing the loops or stitches of the woven materials from the work cylinder pins or points. As the work cylinders are used interchangeably in the machine, these hold down means preferably consist of a plate swingably mounted on the machine whereby said plate may easily be moved clear of the cylinder to permit removal of the latter.

The present machine, as well as the machine of the beforementioned pending application produces an interlocking stitch. In such a machine, two needles are alternately projected through loops or stitches of the work, and at least one needle is always in engagement with the work. It is, therefore, necessary to provide for removal of the work from the cylinder after the sewing operation is completed and another object of the invention is the provision of means for clearing the needles from the work at this time. More particularly, this feature comprises means for moving one of the needles out of the work by the same devices that are utilized for moving the driving worm out of engagement with the work cylinder. In the present machine, the timing arrangement may be so arranged that the lower needle will be out of the work at the time the driving shaft is rendered inoperative, or said shaft may be manually partially rotated to clear said needle and under such conditions it will be the upper needle that is cleared by the worm moving devices.

With these and other objects in view the invention consists in certain details of construction and combinations and arrangements of parts all as will hereinafter be more fully described and the novel features thereof particularly pointed out in the appended claims.

In the accompanying drawings, wherein one form of the present improvements are illustrated:

Figure 1 is a top plan view;

Fig. 2 is a side elevation;

Fig. 3 is a similar view, but on a larger scale illustrating a portion of the timer mechanism.

Fig. 4 is a section on the line 4—4 of Fig. 3;

Fig. 5 is a section on the line 5—5 of Fig. 3;

Fig. 6 is perspective view of the latch trip of the timer mechanism;

Fig. 7 is a similar view of the timer mechanism latch;

Fig. 8 is a section on the line 8—8 of Fig. 2;

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

Fig. 10 is a detail view illustrating the "off" and "on" positions of a portion of the timer mechanism;

Fig. 11 is an enlarged plan illustrating the work cylinder; its driving worm and the work actuating lever, the worm being in engagement with the cylinder;

Fig. 12 is a similar view but showing the worm disengaged;

Fig. 13 is a section on line 13—13 of Fig. 11;

Fig. 14 is a perspective view of the principal parts for moving the drive worm into and out of engagement with the work cylinder;

Fig. 15 is a sectional view on the line 15—15 of Fig. 12;

Fig. 16 is an elevation, illustrating the operating connections for the upper needle;

Fig. 17 is a section on line 17—17 of Fig. 16;

Fig. 18 is a section on line 18—18 of Fig. 16;

Fig. 19 is a perspective view of the adjustable connection between the upper needle arm and the lever for raising and lowering the needle;

Fig. 20 is a bottom plan view of one end of the stitch plate arm;

Fig. 21 is a vertical section of the stitch plate mounting;

Fig. 22 is a section on line 22—22 of Fig. 21;

Fig. 23 is a section on line 23—23 of Fig. 21;

Fig. 24 is a section on line 24—24 of Fig. 21;

Fig. 25 is a vertical section illustrating the mounting of a work cylinder.

Fig. 26 is a detail sectional view of the driving teeth on the work cylinder and the driving worm.

In the present machine the entire mechanism is carried on a base plate 30 mounted on a pedestal, an upper portion of the latter being shown at 31. An electric motor for operating the mechanism is indicated at 32. The work cylinder 33, provided with the usual points or impaling pins 34 is mounted on a turret 35 loosely journaled in a bearing plate 36 on a base 30. (See Fig. 25.) As is understood in the art, registered or alined loops or stitches of the two pieces of material to be united are placed on the pins or points of the work cylinder and secured together by the sewing mechanism. For an interlocking stitch, the sewing mechanism comprises two needles 37, 38 which function both as needles and loopers all as fully described in the pending application before mentioned.

In the present machine these needles are actuated from a main drive shaft 39 having a worm wheel 40 mounted thereon and engaging with a worm 41 on the motor shaft 42. The connections between the drive shaft 39 and said needles preferably consist of the following instrumentalities. The lower needle 37 is mounted in a needle arm 43 capable of rocking and sliding on a stub shaft 44 mounted in a bracket 45 on the base. Attached to said needle arm 43 is a rod 46 connected to one arm of a bell crank lever 47 pivoted on the covering 48 for worm wheel 40. The other arm of said bell crank lever carries a cam roller positioned in a cam-way in a cam 49 mounted on drive shaft 39. These connections effect an up and down movement of needle 37 to move it back and forth through the loops on the work cylinder points. The bearing portion 43^a of needle arm 43 is positioned between the arms of a yoke member 50 also slidable on stub shaft 44. A rock lever 51 pivoted intermediate its ends has its upper end attached to said yoke and its lower end carries a cam roller 51^a engaging in a cam-way 52 of another cam 53 on the drive shaft. These connections will effect a lateral movement of needle 37.

The upper needle 38 is mounted in a needle arm 54 on a stub shaft 55 in a bracket 56 and is rocked by a rod 57 connected to one arm of a bell crank lever 58 whose other arm carries a cam roller 59 positioned in a cam-way 60 of a cam 61 on the main drive shaft. (See Fig. 16.) These connections move needle 38 up and down. The needle arm is positioned on stub shaft 55 between the arms of a yoke 62 slidable on said shaft by a rocker arm 63 which carries a cam 64 working in cam-way 65 in a cam 66 on the main drive shaft. These connections impart a lateral movement to the upper needle at the proper time.

In order to permit the upper needle to be raised independently of its connections to the main drive shaft, the rod 57 is made sectional, one section 57 telescoping in the section 57^a. A spring 67 is preferably placed in the bore of section 57^a. Pivoted on section 57^a is a plate 68 formed with an eccentric groove 69 in which engages a pin 70 carried by section 57 and projecting through a slot in section 57^a. This connects the two sections together to transmit motion from the drive shaft to the needle arm but by rocking plate 68 the section 57 may be moved independently of section 57^a. This is preferably accomplished by a rod 81 connected at one end to plate 68 and its other end to a bracket 71 on a block 72 journaled in the base 30. The connection between said rod 81 and bracket 71 is adjustable to vary the throw imparted to plate 68. Block 72 is provided with a handle 73. By turning block 72, from the position shown in Fig. 11 to that shown in Fig. 12, plate 68 and needle arm 54 and upper needle 38 will be moved from the positions shown in dotted lines in Fig. 16 to the positions shown in full lines.

As heretofore mentioned, means are provided for centering the pins or points of the work cylinder with respect to the path of the sewing needles. This is preferably accomplished by means of the worm utilized for rotating the work cylinder. Referring to Figs. 1, 11 and 12, a worm gear 74 on the main drive shaft engages with a worm gear 75 on a shaft formed of a section 76 journaled in a housing 77 and connected by a universal joint 78 to a second shaft 76^a journaled in a bracket 79. This latter shaft section 76^a carries a worm 80 adapted to cooperate with teeth 82 formed circumferentially of the work cylinder turret whereby rotary motion will be imparted to the cylinder. The universal joint 78 permits shaft section 76^a to be moved laterally to disengage the worm 80 from the turret teeth and in order that the pins on the work cylinder will register with the sewing needles, the teeth of said worm function more or less like wedges when entering between the teeth on the work cylinder turret. In Fig. 26, it will be seen that the crowns of all of said teeth are beveled so that as the teeth of the worm come into engagement with the teeth on the turret, a slight rotary movement will be imparted to the turret cylinder and by properly arranging the turret teeth with respect to the cylinder points, this partial rotary movement will insure an alinement of said points with the sewing needles. Various means may be utilized for shifting worm 80 into and out of engagement with the turret teeth but it is preferred that this movement be effected by the same instrumentalities that raise and lower the upper needle 38. For instance, bracket 79 in which shaft section 76^a is journaled, may be formed integrally with a plate 83 slidable on an extension 88 of the turret plate 36 and said plate 83 has an opening 84 therein through which projects the shank 85 of block 72. Shank 85 is threaded into a bushing 86 and the latter is retained in a slot 87 in an extension 88 by a nut 89 threaded on the bushing. Bushing 86 is free to turn in slot 87 and said slot is arranged tangentially of the work cylinder turret whereby turrets of different diameters may be interchangeably used in the machine.

Formed in block 72 is a slot 90 in which engages a pin 91 on plate 83. The major portion of slot 90 is concentric with respect to the shank 85 or axis on which block 72 turns, but one end of said slot extends radially inward with respect to said major portion. A washer 92 is preferably interposed between block 72 and plate 83. Another washer 93 may also be used between extension 88 and nut 89 on bushing 86.

With this arrangement, the manipulation of handle 73 will effect a raising of upper needle 38 and disengage worm 80 from turret teeth 82. That is, by moving handle 73 from position shown in Fig. 11 to that shown in Fig. 12, block 72 will

be turned and rod 81 moved from its position shown in dotted lines in Fig. 16 to the position shown in full lines. This will elevate the needle 38. During the initial turning of block 72, worm 80 will not be affected due to the concentricity of the major portion of slot 90 but when the walls of the offset portion of said slot engage pin 91 on plate 83, said plate will be shifted laterally, thereby disengaging the worm 80. These elements are thus disengaged after the timing mechanism later described has rendered the main drive inoperative upon completion of a sewing operation. After the finished work has been removed and a new work placed on the cylinder, lever 73 is moved in the reverse direction whereupon, the worm 80 is reengaged with teeth 82 and needle 38 moved into sewing position. As before pointed out, if turret 35 has accidentally moved during the change of work on the cylinder, the worm 80, in conjunction with teeth 82, will restore it to a position where the cylinder points will register with the needles.

The timing mechanism heretofore referred to automatically renders the sewing mechanism inoperative upon completion of a predetermined number of stitches equal to the number of points on the work cylinder and five or six additional stitches whereby the ends of the seam produced in uniting two pieces of material will be overlapped. This mechanism acts in conjunction with the main control bar 94 for the motor switch. Bar 94 is attached to one arm of a bell crank lever 95 pivoted on an extension 96 of the switch housing 97. The other arm of lever 95 has attached thereto a link 98 which in turn is connected to a bar 99 projecting into a housing 97. Within the housing said bar is formed with a bail like portion 100 pivoted on a rod 101. Said bail 100 carries movable contact members 102 adapted to close the motor circuit through the spaced fixed contacts 103, 104. When handle or bar 94 is pushed in, bell crank lever 95 raises bar 99 and bail 100 compressing spring 108, and closing the motor circuit contacts.

Formed on extension 96, is a catch 105 and pivoted on bar 99 is a latch 106. Attached to said latch is a trip member 107. A spring attached to the base and said trip urges the latch toward said catch and when the bar is elevated to close the motor circuit said latch engages over the catch and retains the switch closed.

Loose on drive shaft 39 is a toothed disk 110 on which there is a pin 109 adapted to engage trip 107, when the circuit is closed, and disengage latch 106 whereupon the switch will be opened by the action of spring 108. This release or disengagement of latch 106 is timed with relation to the formation of the seam in the work whereby the overlap of the seam ends is secured. That is, assuming an overlap of six stitches is desired the number of teeth on disk 110 will exceed the number of points on the work cylinder by six. The drive shaft makes one revolution for each stitch formed and disk 110 is advanced one step or tooth each revolution of the shaft. Therefore, while the disk is making a complete revolution, at which time trip 107 will be actuated by pin 109 to disengage latch 106, the working cylinder would have moved six points or stitches in excess of a complete revolution of the work cylinder and an overlap of six stitches made in the seam. This step by step movement of disk 110 is preferably obtained by a lever 111 pivoted on base 30 with one end engaging a cam 112 on shaft 39. Attached to the other end of said lever 111 is a link 113 which in turn is attached to a lever 114 pivoted on the base 30. Pivoted on lever 114 is a pawl 115 yieldingly held in engagement with the disk teeth by a spring 116. A spring 117 yieldingly urges the lever 111 into contact with cam 112. Pawl 115 is preferably adjustably secured in a slot 118 in lever 114. In order that the control switch may be opened manually by the operator, the operating rod 94 is connected to trip 107 by a link 130.

While the points 34 on the work cylinder 33 are grooved to facilitate movement of the needles through loops of material on the points and while the points are accurately centered with respect to the paths of movements of said needles, nevertheless, the needles sometimes tend to raise the loops on the points or totally displace them. The present machine is, therefore, provided with a stitch hold-down plate or what for convenience will be termed a "stitch plate". Said plate, indicated at 119, Figs. 1 and 20 to 24, is adjustably secured by a screw 120 in an arm 121 which, in turn, is secured by a pivot pin 122 to a rod 123 swiveled in a tubular post 124 on base 30. A spring 125, around rod 123 tends to hold said rod and the switch plate arm down and the plate is held in stitch engaging position, within the circularly arranged cylinder points, by a lug 126 engaging in a depression 127 in the top face of post 124. When work is to be removed from or placed on the work cylinder, the stitch plate and arm can be readily swung to one side by raising the arm against the tension of spring 125 until lug 126 is clear of depression 127. A rest 128 for the operator's arm may be swiveled on post 124. A hand wheel 129 is also provided on the drive shaft 39.

What I claim is:

1. In a sewing machine, a pair of pivoted sewing needles, a work cylinder, a plurality of pins on said cylinder on which work is supported, means for alining said cylinder points with said needles, and means for manually moving one of said needles on its pivotal center and out of work engaging position.

2. In a sewing machine, a pair of pivoted sewing needles, a work cylinder, a drive shaft, operating connections between said shaft and needles and said shaft and cylinder, and means for moving one of said needles on its pivotal center away from said cylinder and rendering the operating connections for said cylinder inoperative.

3. In a sewing machine, a sewing mechanism comprising a needle arm, a rotatable work cylinder, a plurality of teeth on said cylinder, a worm, a motor for rotating said worm, a lever, means operable by said lever for moving said worm into and out of engagement with the cylinder teeth, and means operable by said lever for moving said needle arm relatively to said cylinder.

4. In a sewing machine, a sewing mechanism, a drive shaft, operating connections between said shaft and mechanism, a work support comprising a plurality of work impaling points, means operated by said shaft for moving said points relative to the sewing mechanism, a motor connected to said shaft, manually operable means for closing the motor circuit, and means operable by said drive shaft independently of said work support for opening the motor circuit.

5. In a sewing machine, a sewing mechanism, a drive shaft, operating connections between said shaft and mechanism, a work support compris-

ing a plurality of work impaling points, means operable by said shaft for moving said points relatively to the sewing mechanism, a motor connected to said shaft, manually operable means for closing the motor circuit, a trip member for opening said motor circuit, and means operable by said drive shaft independently of the work support for actuating said trip.

6. In a sewing machine, a sewing mechanism, a drive shaft, operating connections between said shaft and mechanism, a work support comprising a plurality of work impaling points, means operable by said shaft for moving said points relatively to the sewing mechanism, a motor connected to said shaft, manually operable means for closing the motor circuit, a latch yieldingly maintaining said circuit closed, a trip member engageable with said latch to release the same and thereby open said circuit, and means operable by said drive shaft independently of the work support for actuating said trip member.

7. In a sewing machine, a work cylinder having a circularly arranged series of impaling points on which loops of fabric to be united are placed, a sewing needle engageable with loops of fabric on successive points, a motor for revolving said cylinder and actuating said needle, means for manually closing the motor circuit, and means operable independently of the work cylinder for automatically opening said circuit when a predetermined number of said loops have been engaged by said needle a second time.

8. In a sewing machine, a drive shaft, a work cylinder having a circularly arranged series of impaling points on which loops of fabric to be united are placed, means operable by said shaft for revolving said cylinder, a sewing needle, means operable by said shaft for actuating said needle whereby it will engage loops of fabric on sucessive impaling points, a motor connected to said shaft, means for manually rendering said motor operative, and means operable by said shaft independently of the work cylinder for rendering said motor inoperative when said needle has engaged a predetermined number of loops on said points.

9. In a sewing machine, the combination of a drive shaft, a motor connected to said shaft, a work support, a sewing mechanism, connections between said shaft and support for moving the latter relatively to the sewing mechanism, operating connections between said shaft and sewing mechanism, manually operated means for closing the motor circuit, a latch yieldingly maintaining said circuit closed, and means operable by said shaft independently of the work support for opening said circuit, said means comprising a rotatable disk movable step by step each revolution of said shaft, and a trip movable by said disk to release said latch.

10. In a sewing machine, the combination of a sewing mechanism comprising a pivoted sewing needle, operating connections for oscillating said needle on its pivotal center through a normal sewing stroke, and supplemental means for imparting an abnormal movement to said needle for completely removing said needle from sewing association with the work.

11. In a sewing machine, the combination of a drive shaft, a work cylinder, operating connections between said shaft and cylinder for revolving the latter, a pivoted sewing needle, means operably associated with said shaft for moving said needle on its pivotal center into and out of engagement with work on said cylinder, said movement of the needle constituting a normal stroke and manually operable means for moving said needle on its center through an abnormal stroke to completely move the needle out of operative association with said work and for rendering the connections between said shaft and cylinder inoperable.

12. In a sewing machine, a needle, a work cylinder, a rocker arm for said needle, motor driven means for revolving the cylinder, and motor driven means for actuating said rocker arm and needle, said last mentioned motor driven means comprising a rod connected to said rocker arm for imparting a normal working stroke to the needle when in sewing association with work on said cylinder, said rod being formed of yieldingly connected sections capable of imparting an abnormal movement to said rocker arm to move said needle completely out of sewing association with work on said work cylinder.

13. In a sewing machine, a needle, a work cylinder, a rocker arm for said needle, motor driven means for revolving the cylinder, and motor driven means for actuating said rocker arm and needle, said last mentioned motor driven means comprising a rod connected to said rocker arm for imparting a normal working stroke to the needle when in sewing association with work on said cylinder, said rod being formed of yieldingly connected sections capable of imparting an abnormal movement to said rocker arm to move said needle completely out of sewing association with work on said work cylinder, and manually operable means for rendering the cylinder revolving means inoperative.

14. In a sewing machine, a needle, a work cylinder, a rocker arm for said needle, motor driven means for revolving the cylinder, and motor driven means for actuating said rocker arm and needle, said last mentioned motor driven means comprising a rod connected to said rocker arm for imparting a normal working stroke to the needle when in sewing association with work on said cylinder, said rod being formed of yieldingly connected sections capable of imparting an abnormal movement to said rocker arm to move said needle completely out of sewing association with work on said work cylinder, and manually operable means for disconnecting the motor driven means for revolving the cylinder from said cylinder.

15. In a sewing machine, a needle, a work cylinder, a rocker arm for said needle, a motor driven means for revolving the cylinder, and motor driven means comprising a connecting rod for actuating said rocker arm and needle to move said needle through a normal sewing stroke when the needle is in sewing association with the work, said connecting rod being formed of yieldingly connected sections, and means for rendering said cylinder revolving means inoperative, said means also being capable of moving the connecting rod sections relative to one another to impart an abnormal movement to the rocker arm and needle to completely move the needle out of sewing association with work on said cylinder.

16. In a sewing machine, the combination of a work support, a pair of pivoted sewing needles, operating connections for moving said needles on their pivotal center into and out of engagement with work on said support, and supplemental means for moving one of said needles on its pivotal center out of its normal range of movement to disengage it from the work.

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