M. H. PEARSON & A. E. JERRAM.

SEWING MACHINE.

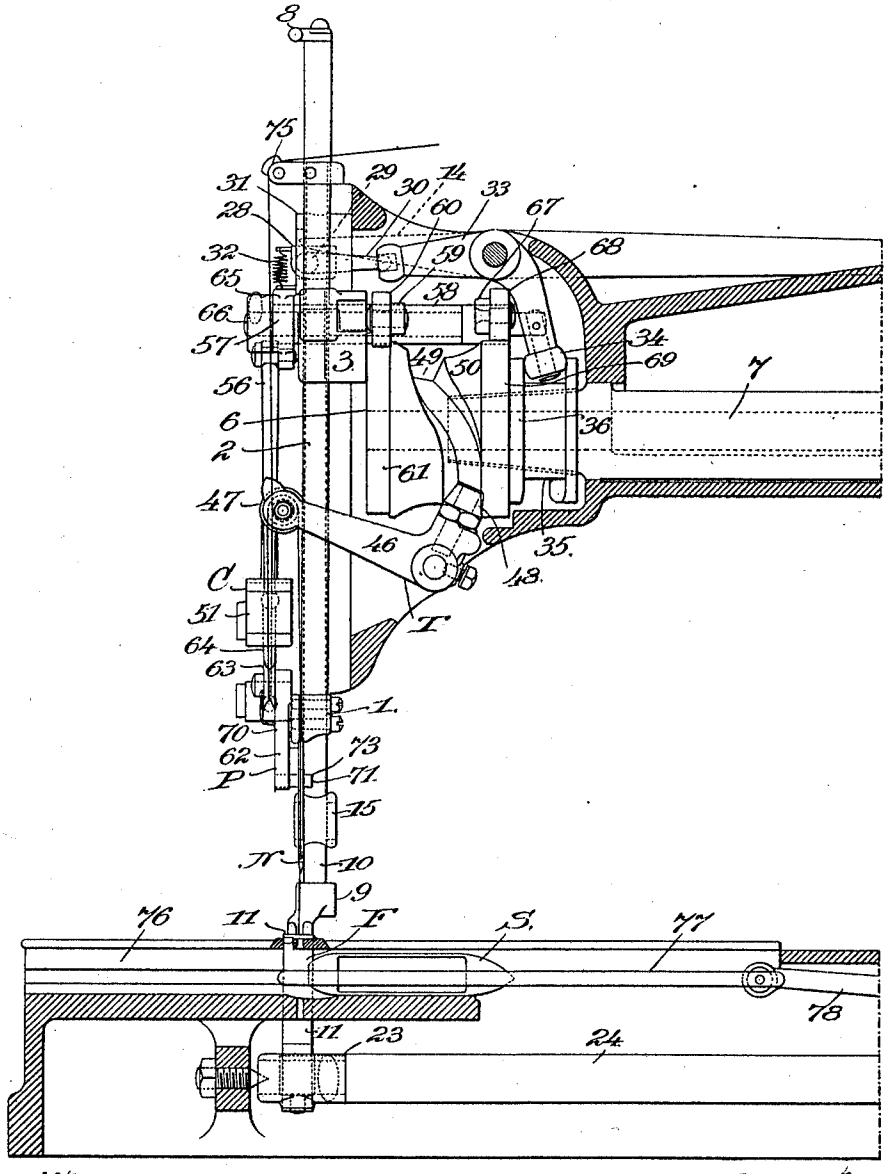
APPLICATION FILED MAY 29, 1902.

1,007,601.

Patented Oct. 31, 1911.

4 SHEETS—SHEET 1.

Fig. 1a



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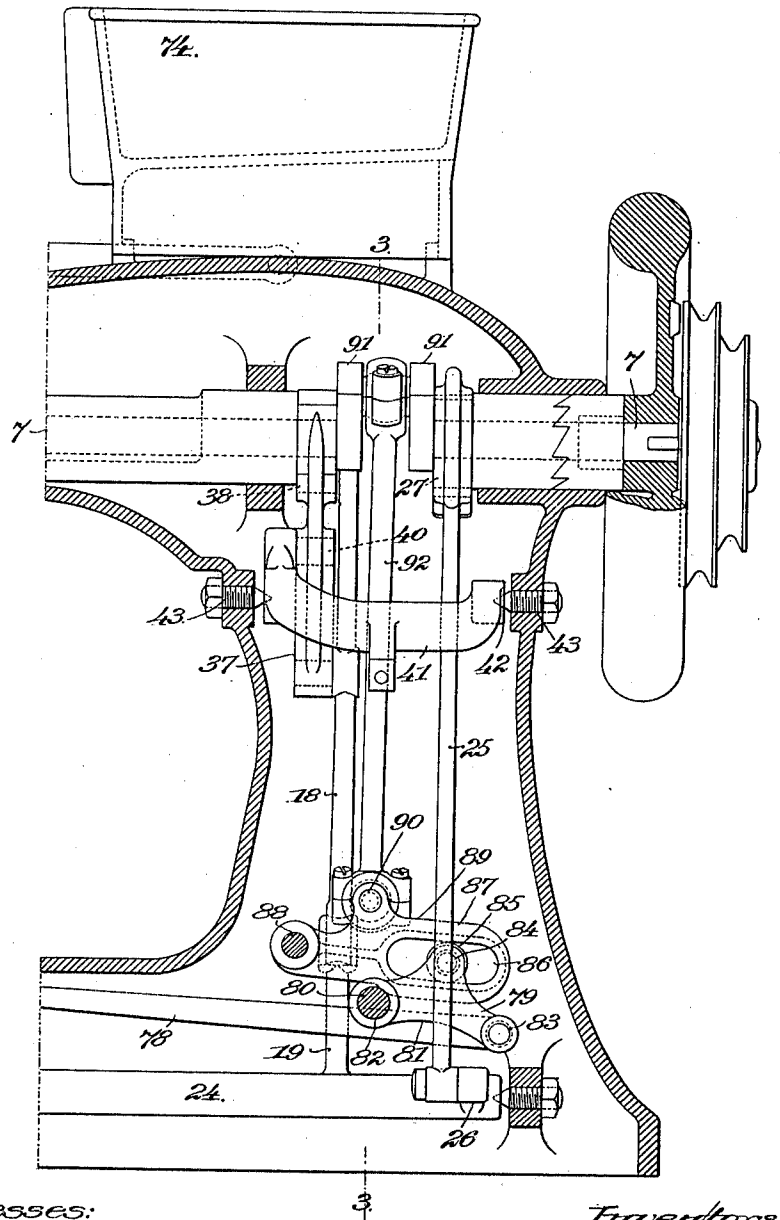
4 SHEETS—SHEET 2.

Fig. 7.



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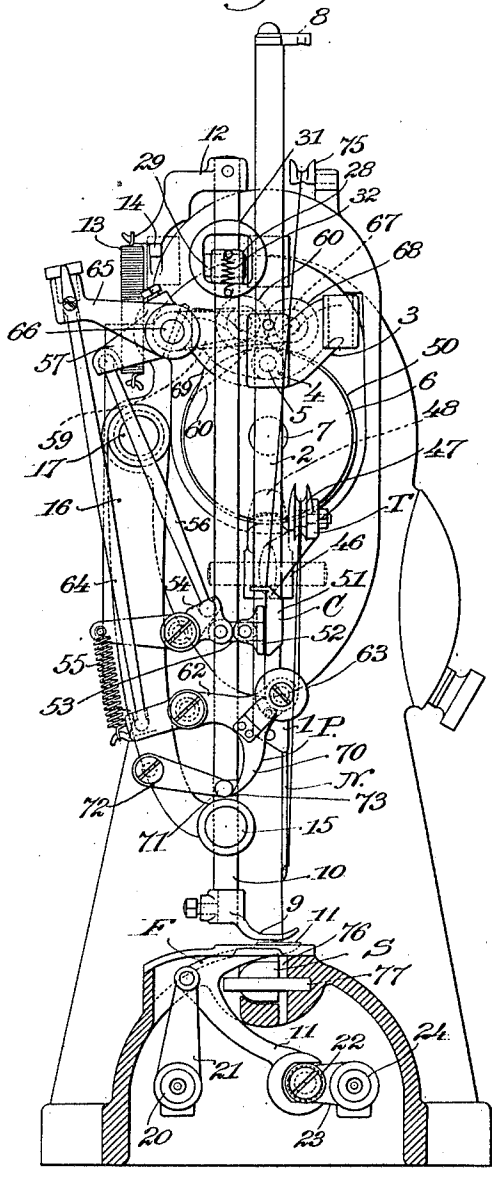
4 SHEETS—SHEET 3.

Fig: 2.



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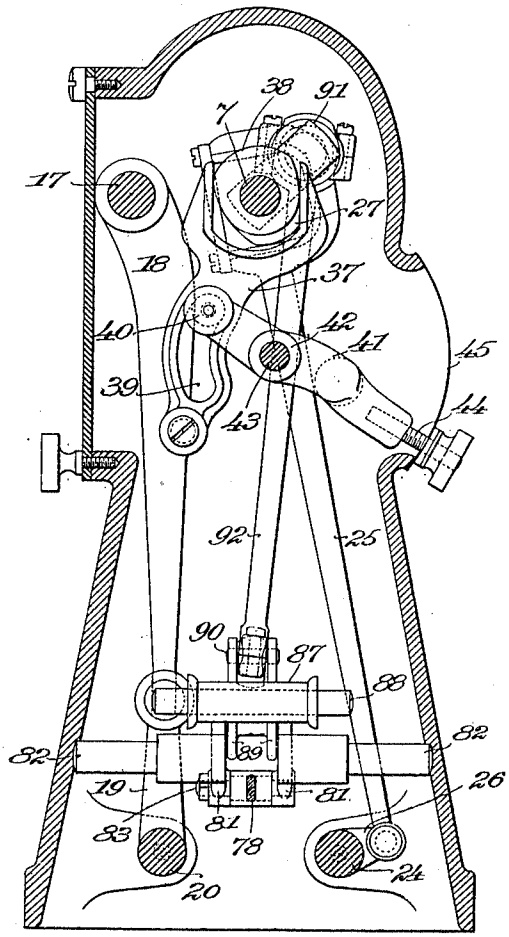
4 SHEETS—SHEET 4.

Fig: 3.



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UNITED STATES PATENT OFFICE.

MARSHALL HENRY PEARSON AND ARTHUR ERNEST JERRAM, OF LEICESTER, ENGLAND, ASSIGNORS TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SEWING-MACHINE.

1,007,601. Specification of Letters Patent. **Patented Oct. 31, 1911.**

Application filed May 29, 1902. Serial No. 109,491.

To all whom it may concern:

Be it known that we, MARSHALL HENRY PEARSON and ARTHUR ERNEST JERRAM, subjects of the King of the Kingdom of Great Britain and Ireland, residing at Leicester, in the county of Leicester, England, have invented certain new and useful Improvements in Sewing-Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to an improvement in sewing machines and more particularly to sewing machines of the straight-needle, lock-stitch, wax-thread type.

The object of our invention is to reorganize and improve sewing machines in order to increase their speed, render them more durable in operation and less liable to derangement in use.

To the above ends the present invention consists of the devices and combinations of devices hereinafter described and more particularly pointed out in the claims.

In the accompanying drawings illustrating the preferred form of our invention Figure 1^a and Fig. 1^b taken together illustrate a longitudinal sectional elevation of the machine, some parts being omitted to show the machine more clearly, Fig. 2 is a front elevation looking toward the left end of the machine as shown in Fig. 1^a, parts being omitted for the sake of clearness, and Fig. 3 is a vertical transverse section of our machine taken on the line 3—3 Fig. 1^b with parts omitted.

The stitch forming instrumentalities consist generally of the needle N, shuttle S, take-up T and thread measurer P, and the means for feeding the work indicated in a general way by the reference character F.

The needle N is mounted in the needle clamp 1 secured to the lower end of the needle bar 2 mounted in suitable bearings in the head coverplate (omitted for the sake of clearness) mounted in the usual manner at the front end of the over-hanging arm. The needle bar is actuated in the usual manner by the cam 3 secured to said bar and actuated by a cam roll 4 mounted upon a stud 5 projected forward from the disk 6, secured to the front end of the main shaft 7 of the machine. The needle bar 2 carries upon its upper end the usual thread controlling pin 8.

The feeding means are described as follows:—The presser foot 9 is secured to the lower end of the presser-bar 10 which is mounted in a bearing block 31 in the head coverplate above referred to and coöperates with the feed surface of the feed lever 11 to feed the work. The presser foot 9 and feed surface operate to clamp and hold the work between them during the formation of a stitch and then to move together rearwardly to feed the work the distance between the successive needle holes. Then the presser foot is raised and the feed surface is lowered, and they swing forward again into position for reëngagement with the work, the presser bar is permitted to drop upon the work and is held thereon by suitable means during the formation of the next stitch after which the feeding movement is repeated. The presser bar is provided with the rearwardly and downwardly extending arm 12 to which the spring 13 is attached, its other end being attached to a relatively stationary part of the machine and which normally acts to pull upon the presser bar in the direction to force the presser foot against the work. The presser foot lifting lever 14 is adapted to be engaged by the under-side of the arm 12 by means of which the presser bar may be raised. The lower end of the presser bar passes through a round block 15 which is carried by the lower end of an oscillating lever 16 secured to the rock shaft 17 mounted in suitable bearings in the over-hanging arm of the frame of the machine. This rock shaft 17 constitutes means for oscillating the presser bar 10 on the fulcrum formed by the block 31. On the rear end of the rock shaft 17 is mounted a downwardly extended arm 18 which is articulated at its lower end with an upwardly extended arm 19 secured to the rock shaft 20 mounted in suitable bearings in the lower part of the frame of the machine. The rock shaft 20 extends from end to end of the lower part of the frame of the machine and carries upon its front end an upwardly extended arm 21 to the upper end of which the feed lever 11 is pivotally attached. The feed lever 11 is bell crank

shaped, the angle of the crank being pivoted to the lever 21 and the upwardly extending arm being provided with a feed surface to coöperate with the presser foot to feed the work, the downwardly extended arm of the feed lever 11 is horizontally slotted at its lower end and receives within such slot a roll 22. It will be observed that oscillations which are imparted to the rock shaft 17 will impart corresponding oscillations to the presser bar 10 upon the upper side of the work and corresponding oscillations to the feed surface of the lever 11 on the lower side of the work, the roll 22 serving as a guide to control the vertical movements of the feed surface of the feed lever, the oscillations of the arm 21 imparting to the feed lever merely forward and back motions. It will be noted that the point of articulation of the connecting levers 18 and 19 between the rock shafts 17 and 20 lies in the plane of the surface of the work table so that the forward and back movements imparted to the presser foot and feed surface are exactly equal.

In sewing machines of this class it is preferable to have the feed surface which engages the work upon the lower side thereof rise to engage and clamp the work between itself and the presser foot, and at the same time to lift the work slightly from the feed table thereby diminishing the friction between the work and the feed table and conducing to accuracy of the length of the feed. To this end we have provided means for raising and lowering the guide roll 22 above referred to in timed relation to the oscillations of the feed lever and presser foot so that the feed lever will be raised when it is desired to engage and feed the materials and depressed during the return stroke thereof. To this end we have mounted the feed roller 22 upon the arm 23 secured to the rock shaft 24 mounted in bearings in the lower part of the frame of the machine parallel with the rock shaft 20 actuated by the pitman 25 pivotally attached to the arm 26 projected from the rear end of the rock shaft 24. The upper end of the pitman 25 embraces a cam 27 secured to the main shaft 7 of the machine. This arrangement is such that the feed surface of the feed lever 11 is pressed upward against the presser foot 9 by the means described when the feeding movement is to occur and depressed during the return movement thereof. As before stated it is necessary during the return movement that the presser foot be lifted from the work. To this end we have provided automatic means for lifting, releasing and holding depressed, the presser foot. These means consist of the spring 13 above described which normally acts to pull the presser foot down and a cam operated lever and suitable connecting devices for raising, releasing and holding down the presser bar which consist of the sleeve 28 slidingly mounted upon the presser bar 10 which receives a block 29 cut to embrace the presser bar 10 and provided with the rearwardly extended arm 30 by means of which it may be turned in the sleeve 28 to cramp it against the presser bar. A block 31 slidingly mounted on the presser bar and mounted in the head cover plate affords a bearing for said bar. Within an opening in this block 31 is located the said sleeve 28 which is normally held in the position shown in Fig. 2 by means of a spring 32 attached at its ends to pins in the sleeve 28 and block 31. A bell crank lever 33 receives at one end the rearwardly extended arm 30 of the block 29 and at its other end is provided with a cam roll 34 which is received in the cam groove 35 in the cam disk 36 mounted upon the main shaft 7 of the machine. The above described arrangement and the form of the cam groove 35 are such that the bell crank lever 33 acts to oscillate the block 29 and cramp it against the presser bar 10 whereupon the further upward movement of the lever 33 will raise the presser bar 10 against the action of the spring 13 and hold the same raised until the presser bar has been returned after the feed movement back to its original position when the cam groove 35 will again oscillate the lever 33 thereby, through the means described, releasing the presser bar 10 and permitting the same to drop under the influence of the spring 13 upon the work to hold the same during the formation of the next stitch, and during the next feeding movement. It will be noted that the first portion of the downward movement of the lever 33 acts to release the presser bar 10 which will then descend and that thereafter the further movement of the bell crank lever 33 in the same direction will depress the rearwardly extended arm 30 and cause the block 29 to again cramp and hold the presser bar thereby securely holding it in its lower position in engagement with the work during the time the stitch is being formed against the pull of the thread upon the work and during the feeding movement of the presser bar and feed lever to feed the work. The feed movements of the presser foot and feed lever are accomplished by suitable connections with the main shaft of the machine which conveniently consist of the lever 37 which is pivotally attached at its lower end to the arm 18 secured to the rock shaft 17 and the cam 38 mounted upon the main shaft 7 of the machine which is embraced by the opposite end of said lever. The lever 37 is slotted at 39 and receives in said slot a fulcrum stud 40 upon which the lever 37 oscillates. The stud 40 is capable of being adjusted in the slot 39 in order to

vary the position of the fulcrum for the lever 37 so as to vary the length of the feed, it being obvious that as the stud 40 occupies lower positions in the slot 39 the amplitude of oscillation imparted to the lever 18 by said lever 37 will decrease. This is accomplished by mounting the stud 40 upon one end of the lever 41 pivoted at 42 upon the stationary part of the machine, as upon the pivot 43. The lever 41 is yoke shaped in order to afford a space within the yoke for other operating parts of the machine and the rear end of the yoke is provided with a stud 44 which projects outward through a slot 45 in the front part of the frame of the machine, said stud 44 being screw threaded and provided with a thumb nut 45 by means of which the lever 41 may be fixed in any desired position.

The take-up T consists of a bell crank lever 46 pivotally mounted in bearings in the over-hanging arm, provided upon its front end with a thread truck 47 and upon its rear end with a cam roll 48 which engages a cam groove 49 in the cam disk 50 mounted upon the front end of the main shaft of the machine. The cam groove 49 imparts suitable vertical oscillations to the take-up thereby causing the said lever to take-up the thread at the proper time during the formation of each stitch as will be hereinafter more particularly set forth in connection with the description of its coöperative relation with the other stitch forming instrumentalities.

The thread clamp C consists of a relatively stationary clamping member 51 mounted upon the oscillating frame of the machine which coöperates with the movable clamping member 52, which is pivotally attached to the connecting link 53, said link being in turn pivotally attached to the lever 54 which is pivotally mounted upon the oscillating frame. A spring 55 is attached to the rearwardly extended arm of the lever 54 and acts in a direction thereon to withdraw the clamping member 52 from engagement with the member 51. The strut 56 engages one arm of the lever 54, being received in a socket in said arm, and extends upwardly and is received in a socket in the arm 57 which is secured to a sleeve 58 mounted in a stationary bearing in the over-hanging arm extending rearwardly therein, and being provided with the lever 59 carrying upon its end a cam roll 60 which engages a cam 61 on the cam disk 6 upon the front end of the main shaft 7. This arrangement is such that periodically during the formation of each stitch the arm 57 is depressed thereby depressing the strut 56 and causing it to depress the lever 54 which in turn clamps the clamping member 52 against member 51 to clamp and hold the thread which passes between such members. The timed relation of the clamping of the thread by this thread clamp to the operations of the other stitch forming instrumentalities will be more fully described hereinafter in connection with the description of the operation of the stitch forming instrumentalities and particularly in connection with the description of the operation of the take-up.

The thread measurer P consists of a lever 62 pivotally mounted upon the oscillating frame and provided at one end with a thread truck 63 and at the other end with a rearwardly projecting arm which is engaged by the opposite end of the spring 55 above referred to. The rearwardly extended arm of the lever 62 is provided with a socket which receives a strut 64 which extends upwardly and is received within a socket in the arm 65 which is secured to the rock shaft 66 which, for convenience, is extended through the sleeve 58 being supported thereby and carrying upon its rear end the lever 67 carrying a cam roll 68 which rests upon the cam surface 69 of the cam disk 50. By these means the thread truck of the thread measurer P is periodically depressed by its spring to pull off thread from the supply and periodically raised against the action of its spring in order to cause the same to positively give up thread to the stitch forming instrumentalities in the manner hereinafter described. The thread measurer is provided with a connection or connections with the presser bar so that its pull off movement shall be proportional to the thickness of the stock upon which the presser foot rests. These means in the illustrated embodiment of our invention are arranged as follows:—The lever 62 is provided with a downwardly projected horn 70 which is adapted to engage a pull-off stop or pin 71 mounted upon the end of the lever 72 pivotally attached at some convenient point upon the head cover plate. One end of the pin 71 is received within a transverse groove 73 in the presser bar. As the presser bar rises and falls it carries with it the pin 71 which therefore moves transversely in the groove 73 assuming different positions therein depending upon the vertical position of the presser bar. The downwardly projected horn 70 is provided with a surface of such a shape that the downward movement of the lever 62 is made to vary in extent with the thickness in the stock so that when the thread measurer descends it will descend a variable amount depending on the position of the presser foot and pull off an amount of thread proportional to the thickness of the stock.

The lead of the needle thread is from the wax pot 74 over the thread guide 75 down between the members of the thread clamp C around the thread truck 63 of the thread

measurer P upwardly over the thread truck 47 of the take-up T and then down through the eye of the needle to the work. It will be noted that the thread clamp, thread measurer, and take-up are all located in close proximity to the work. This feature is of considerable importance as during the action of the take-up to pull the thread into the materials the amount of thread extending from the thread clamp around the thread measurer and take-up to the work and which is thereby subjected to the strain exerted by the take-up thereon is comparatively small and the elongation of such thread is comparatively slight. Owing to such slight variations in the elasticity of the thread as is unavoidable in practice it is desirable to reduce to a minimum the amount of thread placed under the full stitch setting strain in order that such strain may be made as uniform as possible for all the stitches being made at any given time.

The shuttle S is arranged to reciprocate within a race extended at right angles to the direction of the feed, and longitudinally of the base of the frame of the machine. By arranging the shuttle race in this way we are enabled to provide a very simple and efficient means for actuating the shuttle and to avoid the disadvantageous leverage incident to the arrangement of the shuttle race parallel to the direction of the feed. Other advantages incident to this arrangement will be apparent to those skilled in the art. The shuttle as before stated is received within the shuttle race 76 and a shuttle moving member or picker 77 provided with the usual opening therein embraces the shuttle and is received in guide ways within the frame of the machine (see Fig. 2). The opening in the picker is made somewhat longer than the shuttle for a purpose which will be hereinafter pointed out. The shuttle pitman 78 articulated to the rear end of the picker 77 extends rearwardly to and is articulated with the shuttle actuating lever 79, pivoted at 80 on a stationary part of the frame of the machine. The shuttle actuating lever 79 consists of two similar parts or arms 81 secured respectively upon the co-axial short shafts 82 mounted in suitable bearings in the frame of the machine, said arms 81 carrying at their outer ends a pin 83 which passes through a correspondingly shaped hole in the end of the pitman 78. The arms 81 are also provided with the pin 84 which carries a roll 85 between the two arms 81. This roll is received in the slot 86 of an intermediate lever 87 pivoted at 88 in suitable bearings on the frame of the machine. The intermediate lever 87 is adapted to swing between the two arms 81 of the lever 79 and as it swings it causes the lever 79 to swing; a movement of the lever 87 through an arc of about 90° will impart a movement to the lever 79 through an arc somewhat greater than 180°. The lever 87 is webbed at 89 upon opposite sides so that the pitman 78 may enter the space between such webs when the lever 79 is raised to its highest position. The intermediate lever 87 is provided with a spherically surfaced crank pin 90 mounted between the webs 89 and upon the upper side of the lever 87. This crank pin is connected with a similar crank pin, mounted between the two cranks 91 of the main shaft 7, by means of a pitman 92. By this means, motion is imparted to the intermediate lever 87 and through it to the shuttle actuating lever 79 which in turn transmits motion through the pitman 78 to the shuttle picker 77. The plane of motion of the intermediate lever 87 being at right angles to the plane of motion of the crank pin connecting the cranks 91 on the main shaft necessitates the use of the universal joint at the ends of the pitman 92 and this arrangement conduces to simplicity of construction and lightness of parts for securing the considerable throw necessary for a shuttle of the size used in this machine.

It is to be noted that the center of the joint of the pitman 78 and picker 77, and the centers of the pivots 80 and pin 83 all lie in the same straight line when the picker 77 is at the limit of its forward stroke and that the construction and arrangement of the shuttle actuating lever 79 and the intermediate lever 87 are such that the pin 83 passes upward beyond this line and therefore moves the picker back a short distance from the heel of the shuttle after the shuttle has reached the limit of its forward motion and come to rest thereby leaving an open space owing to the making of this space larger than the shuttle as before noted, through which the loop of needle thread may be drawn upward without disadvantageous resistance being offered thereto and with the attendant advantages apparent to those skilled in the art. It will also be observed that the arrangement of the shuttle pitman 78, shuttle actuating lever 79, the intermediate lever 87, the pitman 92 and the cranks 91 are such that as the vertical component of the speed of the crank pin connecting the cranks 91 increases the angular speed of the intermediate lever 87 increases and at the same time the roll 85 moves outward in the slot 86 to a portion of the slot which moves at a greater lineal speed so that, as a consequence, the angular speed of the shuttle actuating lever 79 is increased for both reasons and furthermore that the angular speed of the shuttle actuating lever 79 is greatest when the radius connecting the pin 83 with its center of motion is substantially at right angles to the direction of motion of the shuttle so that the resulting

speed of motion imparted to the shuttle at this time is still further increased as a result of this arrangement. In other words, the connections between the shuttle and the main shaft of the machine are such that at each stroke of the shuttle a plurality of devices cumulatively accelerate the speed of the shuttle and then cumulatively retard its speed. This feature we regard as of importance in the production of a high speed sewing machine and as one the use of which is not limited to wax-thread machines but is capable of advantageous use in dry thread sewing machines.

The operation of the machine of the drawings and particularly the operation of the stitch forming instrumentalities thereof and their coöperative relation with each other are as follows:—Starting with the needle in its highest position, the shuttle being in the act of returning to its position at the left hand end of the shuttle race as viewed in Fig. 1ª, the thread clamp being unlocked, the take-up at the limit of its upward stroke, the thread measurer being at the top of its stroke, the feeding of the material begins and is carried out in the manner hereinbefore described in connection with the description of the feeding devices. The thread measurer begins to descend to pull off thread from the supply to provide thread for the formation of the next stitch. By the time the thread measurer has finished its downward stroke the feeding of the material will be completed and the presser foot will have been returned to its initial position and dropped upon the work so that the thickness of the work at the point where the next stitch is to be made will determine the height of the presser bar and adjust the pull off stop 71 to the proper position for engagement with the horn 70 of the thread measurer so that the thread measurer will have pulled off exactly the correct amount of thread for the formation of the next stitch. By this time the needle will have descended to a position with its point about level with the upper surface of the work. The thread clamp remains unlocked and the needle continues its descent until its eye arrives at a position about level with the top of the work whereupon the thread clamp is locked and the thread measurer is lifted to pay off the thread, which it had previously pulled off from the supply, to the needle during the time the eye of the needle is passing through the materials at which time the pay-off movement of the thread measurer will be completed. During the further downward movement of the needle the take-up pays off thread thereto. At the completion of the downward stroke of the needle the shuttle, having previously completed its return movement, begins to move forward (to the right as viewed in Fig. 1ª) and the needle rises slightly to form a loop in the needle thread to receive the point of the shuttle, the take-up rising with the needle a very short distance to prevent any slack thread from occurring between the needle eye and the take-up but the movement of the take-up is such as not to pull any thread through the eye of the needle from the loop formed by the rising of the needle. The needle now stands fast while the shuttle passes through the loop, the take-up paying off thread as required to the loop through which the shuttle passes. The needle now rises to its full height and the take-up rises pulling upon the loop of needle thread drawn out by the shuttle and the shuttle picker is pushed slightly back from the heel of the shuttle leaving a space through which the needle thread may rise. By the time the needle has risen to its full height the shuttle will again be engaged by the picker and its return movement will be begun. By this time also the take-up will have risen to its full height and will have pulled upon the needle thread to draw a bight of the shuttle thread up into the materials, the presser foot during all this time having remained down and locked in position holding the work against the strain exerted thereon by the pull of the needle thread exerted by the take-up. As soon as the setting of the stitch is completed the thread clamp is released and the cycle of operations above described is repeated.

We have not deemed it necessary to illustrate and describe in detail the form of the several cams employed in the machine of the drawings as they can readily be developed by any person skilled in the art by the exercise of mechanical skill from the foregoing description of the construction, organization and mode of operation of the machine and its parts taken in connection with the accompanying drawings.

While the machine illustrated in the accompanying drawings and described in this specification is particularly designed and intended for use for wax thread sewing some features thereof, as is apparent to those skilled in the art, are useful and efficient in dry thread sewing, and it is not intended that claims for such features are to be limited to wax thread sewing machines. It is also to be understood that the claims hereof, except where specifically limited by their terms, are not to be limited to the illustrated embodiment of the combinations defined thereby but are intended to cover other equivalent forms of mechanism.

Having thus described our invention we claim as new and desire to secure by Letters Patent:

1. A lock stitch sewing machine having, in combination, a needle, a movable shuttle, a shuttle-moving member, a take-up, a driv-

ing member, connections between the driving member and the needle and take-up, connections between the driving member and the shuttle-moving member including a lever and a pitman pivotally connected, and means for oscillating the lever through an arc of more than 180°, the lever and pitman being arranged to pass dead center after advancing the shuttle through the needle thread so as to move the shuttle-moving member rearwardly to withdraw it from contact with the shuttle after the shuttle has passed through the loop, substantially as described.

2. A lock stitch sewing machine, having, in combination, a needle, a take-up, a longitudinally reciprocating shuttle, a driving member, connections between the driving member and needle and take-up, connections between the driving member and shuttle including an intermediate lever provided with a slot, said lever being adapted to swing through an arc of approximately 90° and a shuttle actuating lever provided with a portion adapted to engage said slot in the intermediate lever, and to be actuated thereby to swing through an arc of a circle somewhat exceding 180°, substantially as described.

3. A lock stitch sewing machine, having, in combination, a needle, a shuttle, a thread clamp for the needle thread located at the front of the machine and in close proximity to the work, a thread measurer located in position to engage the thread after it has passed through the thread clamp, a take-up located above the thread measurer or pull-off over which the thread from the thread measurer passes before it passes to the work, positive means for actuating the take-up in both directions, positive means for actuating the thread clamp to clamp the thread, positive means for actuating the thread measurer to give up thread, and yielding means for actuating the thread clamp to release the same and for actuating the thread measurer to pull off thread from the supply, substantially as described.

4. A sewing machine, having, in combination, a needle, a shuttle, a driving member, connections between the driving member and the needle and shuttle, a thread clamp located in the front of the machine and in proximity to the work, means connecting the thread clamp with the driving member to positively clamp and hold the thread, a thread measurer, means connecting said thread measurer with the driving member acting positively to cause the thread measurer to give up thread, yielding means for actuating the thread clamp to release the same and the thread measurer to cause the same to pull off thread from the supply through the released clamp, a take-up arranged above the thread measurer over which the thread passes from the thread measurer on its way to the work, and connections between the take-up and driving member for positively controlling its movements in both directions, means for feeding the work comprising a presser foot and a feed surface, and means connecting such parts with the driving member to actuate them, substantially as described.

5. A sewing machine, having, in combination, stitch forming mechanism including a needle, a driving member provided with a cam, a feed device for clamping and feeding the work, and connections between the feeding device and the driving member consisting of a lever pivoted to the feeding devices provided with a slot adapted to receive an adjustable fulcrum and having at its end a portion adapted to receive said cam, said needle and feed devices operating in timed relation to each other to cause the needle to stand stationary in the materials during the back-feed of the feed device, substantially as described.

6. A lock stitch sewing machine, having, in combination, a needle, a shuttle, a take-up, a presser foot, a thread clamp, a thread measurer and a pull-off stop connected with the presser foot and thread measurer, and operating mechanism for the several parts acting to cause the thread measurer to exert its thread-pulling or measuring movement after the thread clamp is released and to an extent determined by the position of the pull-off stop, substantially as described.

7. A lock stitch sewing machine, having, in combination, an eye-pointed needle, a shuttle, a thread clamp, thread measurer, feeding devices including a presser foot, a pull-off stop connected with the presser foot, said thread measurer having a horn adapted to engage said pull-off stop thereby to limit its pull-off movement, said pull-off stop being controlled, and its position determined, by the position of the presser foot, substantially as described.

8. A sewing machine, having, in combination, stitch forming mechanism, a presser bar, a rock shaft, a lever connecting the rock shaft with the presser bar, a bell-crank shaped feed lever provided upon the end of one of its arms with a feed surface adapted to coöperate with the presser foot to form a feed clamp, and at the end of the other of its arms with a slot, a second rock shaft provided with an arm articulated with the angle of the feed lever, said rock shaft being operatively connected with the first-named rock shaft, means for raising and lowering the presser foot, means for swinging the feed lever consisting of a device for engaging the slot in the slotted end of the feed lever to raise and lower the feed surface in timed relation to the feed movements of the presser foot and feed surface, substantially as described.

9. A lock stitch sewing machine, having, in combination, an eye-pointed needle, a shuttle, a thread clamp, a take-up and thread measurer, the take-up and thread measurer being located between the thread clamp and the needle, substantially as described.

10. A sewing machine having, in combination, a needle, a take-up, a thread measurer, and a thread clamp, the take-up, thread measurer and thread clamp being located close to the needle and the parts being arranged in such relative positions that the thread leads directly between them without guides, substantially as described.

In testimony whereof we affix our signatures, in presence of two witnesses.

MARSHALL HENRY PEARSON.
ARTHUR ERNEST JERRAM.

Witnesses:
T. S. KNOWLES,
WALTER W. BALL.