F. LA CHAPELLE.

SEWING MACHINE.

APPLICATION FILED AUG. 8, 1907.

957,972.

Patented May 17, 1910.

2 SHEETS—SHEET 1.

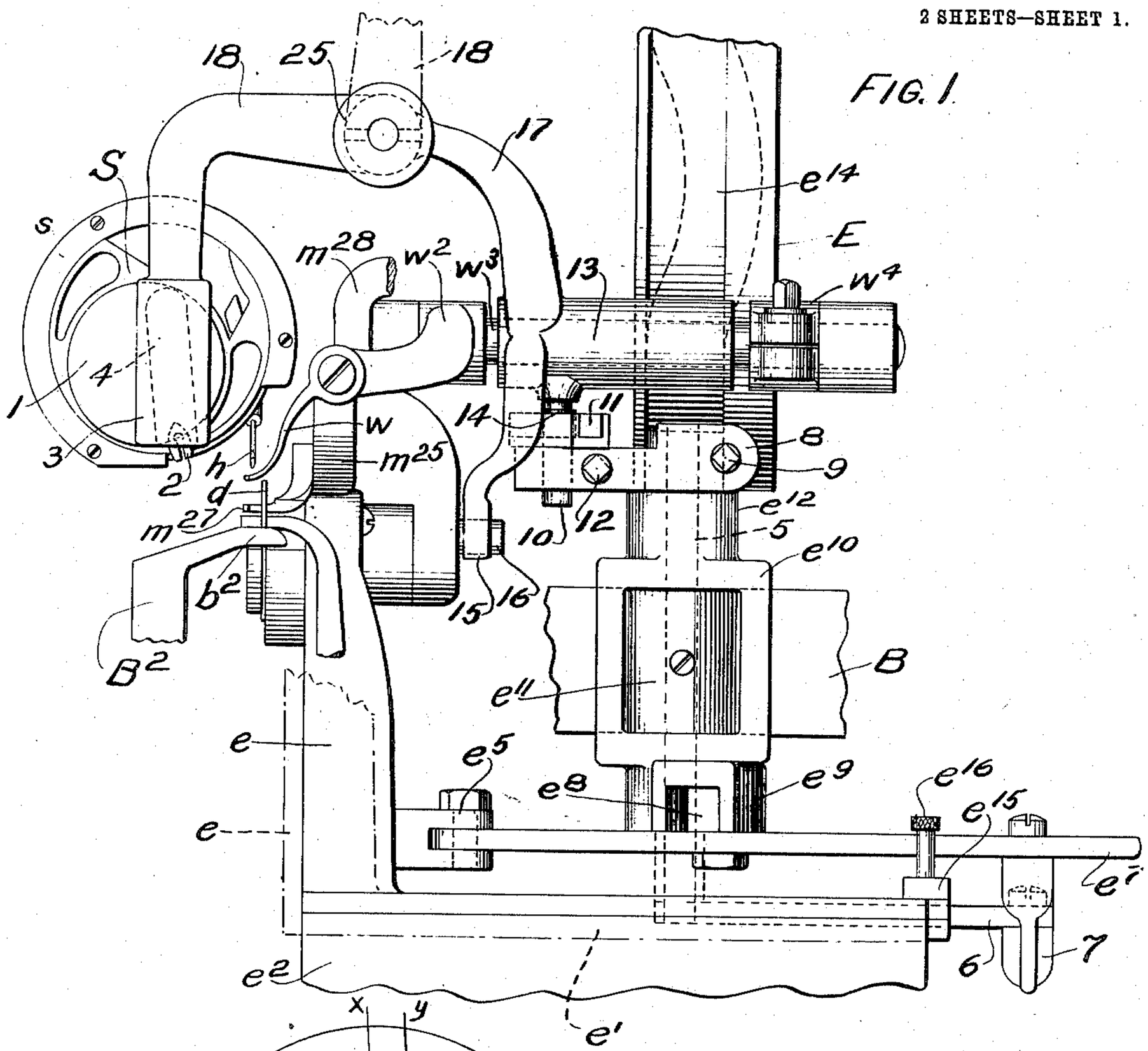

FIG. 1.

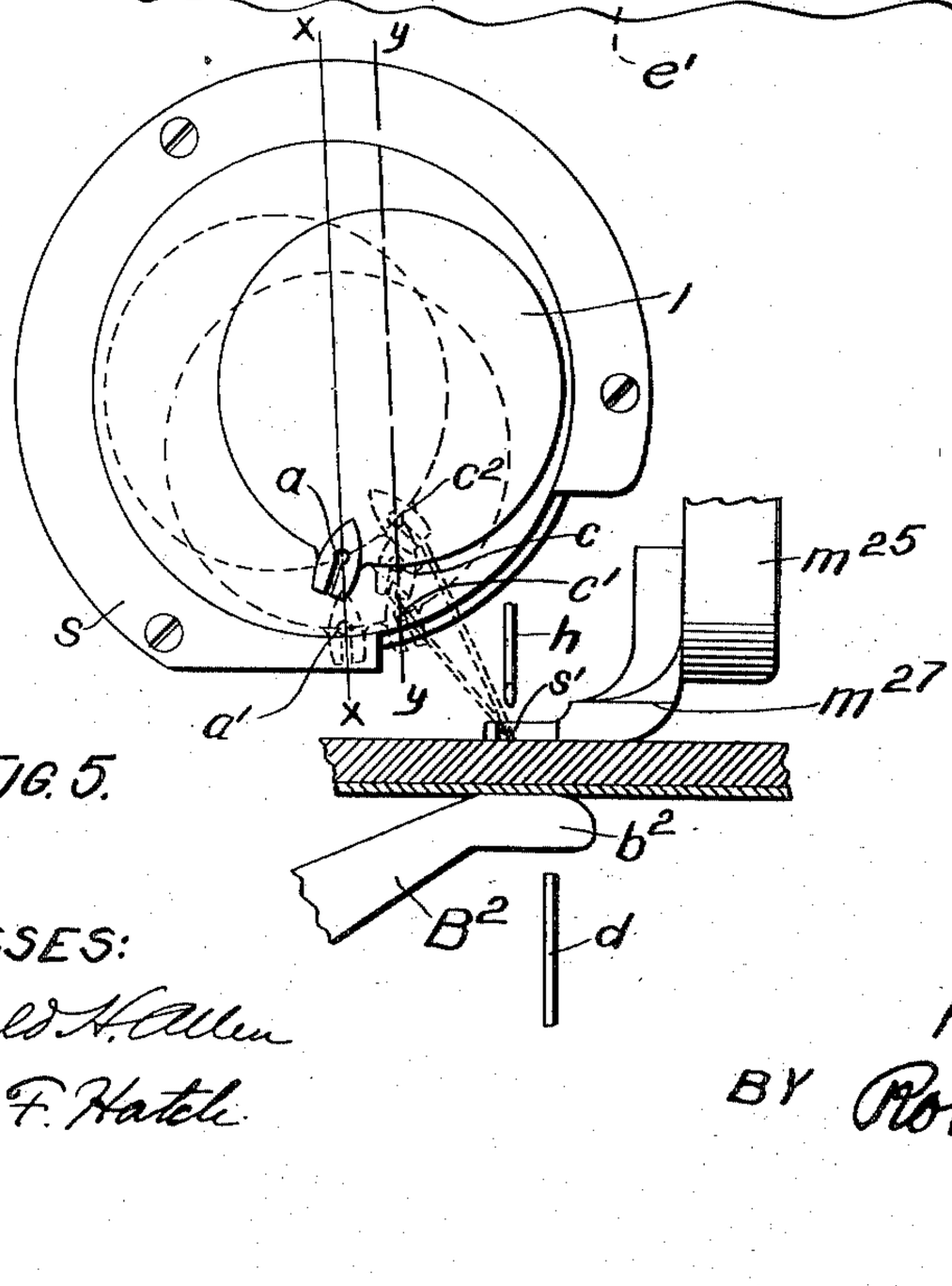

FIG. 5.

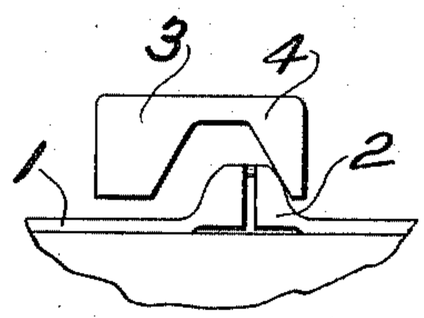

FIG. 4

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2 SHEETS—SHEET 2.

FIG. 2.

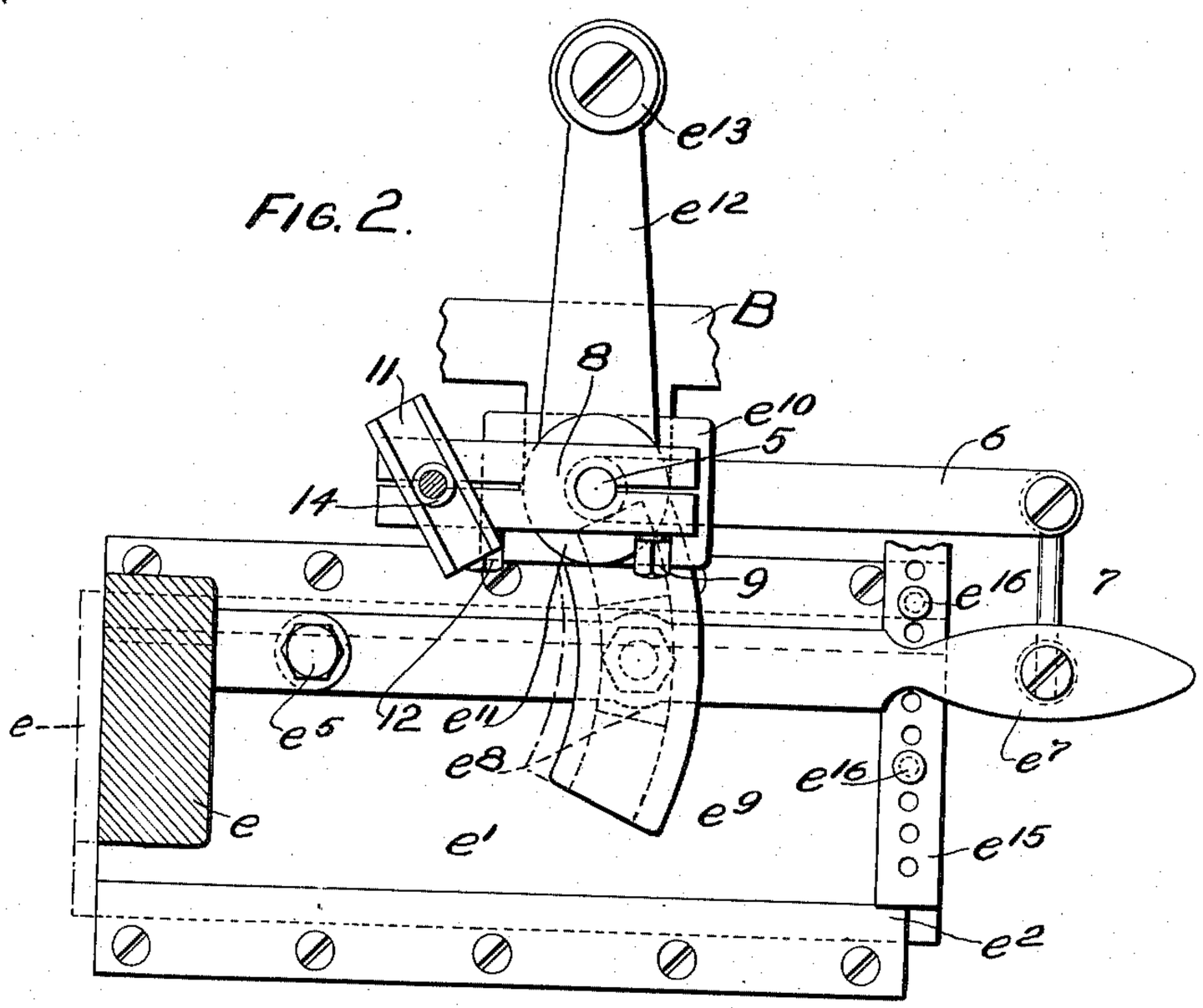
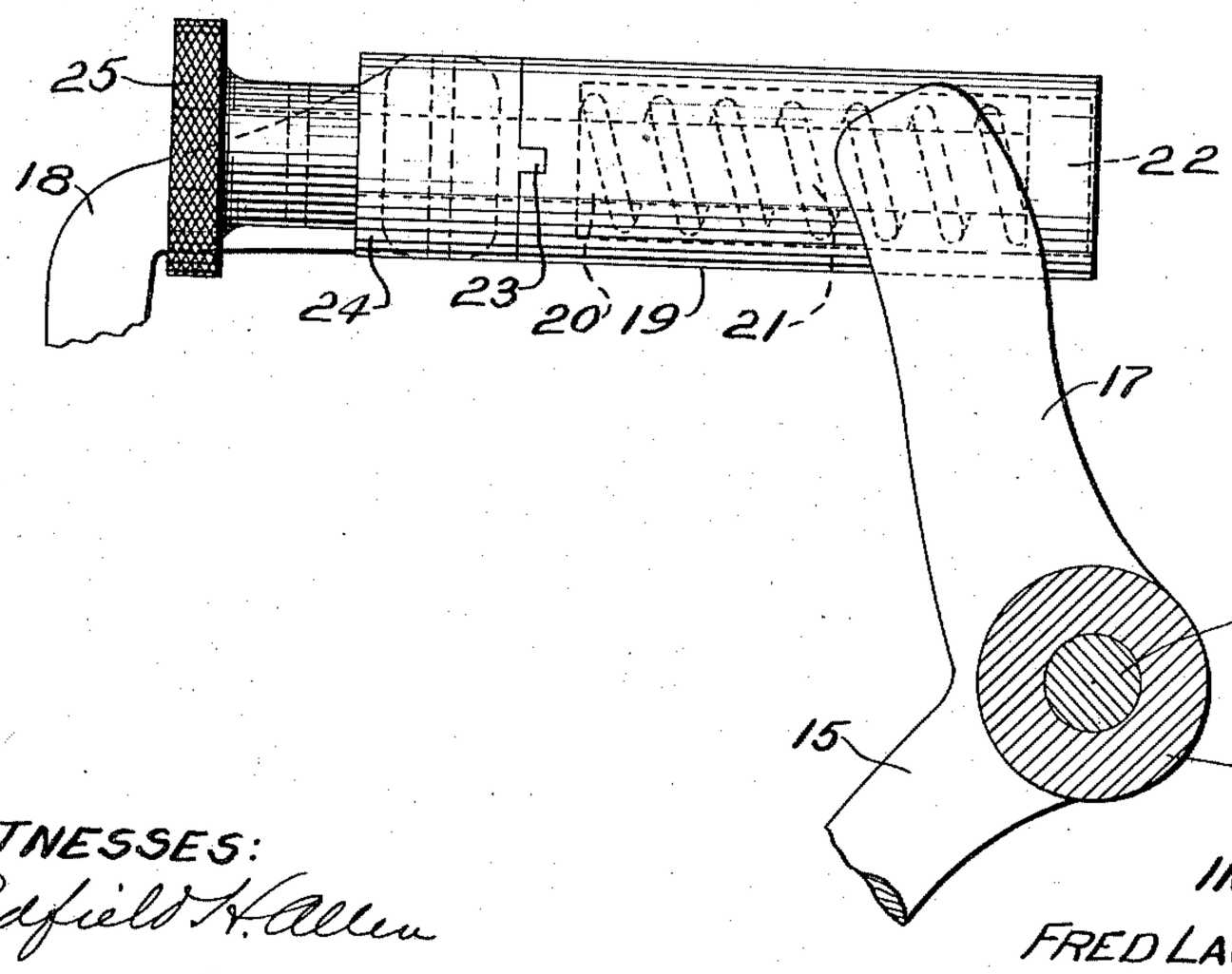


FIG. 3.



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UNITED STATES PATENT OFFICE.

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SEWING-MACHINE.

957,972. Specification of Letters Patent. Patented May 17, 1910.

Application filed August 8, 1907. Serial No. 387,623.

To all whom it may concern:

Be it known that I, FRED LA CHAPELLE, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented an Improvement in Sewing-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to improvements in sewing machines more particularly to lock-stitch sewing machines, and its object is to improve the operation of such machines and the quality of the work by the provision of devices for properly regulating the amount of thread provided for a stitch whereby the stitch is surely set within the materials, while at the same time the threads are drawn taut, whatever length the stitch may have.

One application of the invention is to machines for securing the outsoles of boots and shoes to the welt, such machines known as "outsole machines" or "rapid stitchers" and for the purpose of illustration the invention is herein described as applied to a machine of this class, for instance, the machine illustrated and described in application for United States patent Serial No. 266,244, filed June 21, 1905.

The various features of the invention will be best understood from a description of the embodiment of the invention selected for illustration, and what is new will be set forth in the claims at the end of the descriptive matter.

This illustration and description are intended for those skilled in the art, it being assumed that the general construction and operation of such machines are familiar to the reader.

In the drawings—Figure 1 shows in detail and in elevation a portion of the front of the machine of the application referred to, Fig. 2 is a plan, partly in section, of a portion of the devices shown in Fig. 1, Fig. 3 is an elevation, partly in section of a detail to be referred to, Fig. 4 is a detail underneath view of a portion of the bobbin case and the controlling door therefor, and Fig. 5 is a view showing diagrammatically the improved operation of the machine when fitted with the devices herein described.

In the particular embodiment of the invention selected for illustration herein and shown in the drawings, referring first to Figs. 1 and 2, b^2 is the work support of usual shape on the arm B^2 extending from the head casting B, and is slotted transversely for the passage therethrough of the curved awl d and needle h constructed and mounted in the usual manner. The awl is employed to feed the work and is mounted for lateral movement in the bracket e of the feed slide e' mounted for movement transversely of the machine in a slideway e^2 formed in the head casting or in a suitable part secured thereto. The slide e' is reciprocated by a feed lever e^7 suitably connected thereto as at e^5 and extending to the right. Upon its upper side the feed lever e^7 has pivoted a slide block e^8 adapted to slide in the arc-grooved actuator arm e^9 having a yoke-like hub e^{10} fulcrumed on a bearing e^{11} secured upon the head casting. The hub e^{10} is provided at its upper end with an arm e^{12} having a roller e^{13} adapted to travel in the cam path e^{14} of a cam disk E on the main shaft. Rotation of the cam E vibrates the arc-grooved arm e^9 which transmits its vibration through the inter-connecting devices to the awl d to effect a feed of the work. The extent of feed may be varied by swinging the actuating lever e^7 about its fulcrum e^5 to position the slide block e^8 farther from or nearer to the fulcrum of vibration of the cam actuated arm e^{12}. To this end the lever e^7 is arranged to travel over a bearing plate e^{15} provided with a closely arranged series of holes for the reception of stop pins e^{16} which may be adjusted to lock the lever in one position or limit its movement in one direction. The presser-foot is shown at m^{27} mounted upon its lever m^{25} and provided with its handle m^{28} (partly broken away) for throwing it toward or from the work. The usual loop spreader and lifter for spreading the needle loop for the passage of the shuttle therethrough is shown at w as supported upon the free end of a lifter lever w^2 fast upon a lifter shaft w^3 mounted in suitable fixed bearings in the machine, and provided with an arm w^4 extending to an operating cam (not shown). The shuttle, of usual type, is represented at S and is mounted to oscillate in a segmental case s by suitable actuating mechanism. The shuttle is cored out at its front side to receive the bobbin carrying the shuttle thread. The parts thus far described and their operation

may be, and preferably are, substantially the same as the similarly lettered parts of the United States application Serial No. 266,244 filed June 21, 1905 hereinbefore referred to.

Referring now more particularly to Figs. 1 and 5, the bobbin chamber in the shuttle is made eccentric to the axis of oscillation of the shuttle, so that as the shuttle oscillates the bobbin is oscillated bodily across the shuttle, and with this construction means should be provided for preventing overthrow on the one hand and excessive tension on the other hand in order to obtain a proper stitch formation. This may be accomplished in a number of ways.

In the embodiment of the machine herein selected for illustration the bobbin is contained within a bobbin case 1, the shuttle thread passing through the case at a point on its periphery where there is preferably formed a projection or nose 2 constituting one form of thread delivery portion of the bobbin case. Over this nose 2 and against the face of the bobbin case is hung a door 3 provided with a vertically arranged groove 4 and suitably mounted to correctly maintain its position relative to the bobbin case as will be hereinafter described.

The groove 4 constitutes a guide for the nose or delivery portion of the bobbin case, and while a different character or form of guide other than the groove may suggest itself to those skilled in the art, such form of guide is found to be a good practical embodiment of this feature of the invention. With this construction it is obvious that as the bobbin oscillates through the arc of a circle within the shuttle, the nose 2 of the bobbin case 1 will be guided in a right line within the guide or groove 4 of the door 3 thus preventing overthrow at either end of the movement.

Referring now to Fig. 5, it will be clear to those skilled in the art, that if the door 3 be placed with its groove or guide extending along the line x—x (which generically represents a line bisecting the angle of oscillation of the center of the bobbin case, said line being herein shown as a vertical diameter of the shuttle), in the operation of the machine the nose 2 will start from the point a and move down to the point a', then back to the point a, the shuttle thread during the latter movement being drawn from the bobbin, then down to the point a' again while the looping operation is being performed and back to the starting point a at the time the needle thread is drawn through the work to set the stitch. It will be seen that as the nose 2, in drawing the thread, does not move upwardly beyond its starting and finishing position a, that at the time the stitch is set by drawing downwardly on the needle thread, no slack has been provided in the shuttle thread to enable it to be carried over from the last stitch and be properly drawn into the work. This may be remedied by placing the groove 4 of the door 3 along some line other than the line x—x. In the arrangement herein chosen for illustrative purposes, the shuttle is assumed so to oscillate that the center of the bobbin case 1 will move to points on opposite sides of and equidistant from a vertical diameter of the shuttle, said diameter in this arrangement being the line x—x. In the present arrangement the groove 4 is placed along a line y y to the right (viewing Fig. 1) of the vertical diameter of the shuttle. The nose 2 will then move during the formation of the stitch from a starting point c down to c', then up past c and to c^2 as the shuttle oscillates through a half cycle of its movements, thus drawing the thread from the bobbin. During the latter half cycle of shuttle movement, the nose moves down to c' once more and back to starting position at c at which time the stitch is set. An amount of slack is thus formed and is available, equal to the excess length of the line s'—c^2 over the line s'—c. The position of the line y—y, in order to produce the result above referred to, will depend upon the range of oscillation of the shuttle, and this line may be arranged at one side of and parallel to or at an angle to the line x—x. It will be seen however that with any arrangement of oscillating shuttle and bobbin case the groove 4 of the door 3 may readily be arranged with relation to the diameter of the shuttle so as to provide the proper amount of slack in the shuttle thread for any selected length of stitch the parts being also positioned so that the slack will provide for setting the stitch at a proper distance below the surface of the stock being operated upon. If now with the door 3 in the position y—y the feed of the awl be lengthened by proper movement of the feed slide lever e^7 it is obvious that as the slack in the shuttle thread remains the same some of it will be used in carrying the thread over the extra length between the stitches and therefore the stitch will be set nearer to the surface of the stock than before. On the other hand if the feed of the awl be shortened, after carrying the shuttle thread over to the next stitch there will be an excess of slack to be taken care of and the stitch will therefore be set farther in from the surface of the stock than before. This would generally be immaterial and a single position of the door 3 could be used were it not for the fact that the stitch is usually shortened when sewing through thinner stock. This being the case it frequently happens that if the door 3 has been set to give sufficient slack to properly set a long stitch when the stitch is shortened for sewing thin stock the shuttle thread is

pulled completely through the stock by the pulling force applied to the needle thread. The device of this invention is designed to cure this very considerable defect in the use of a stationarily supported door for governing the line of movement of the bobbin case nose. To this end the door has been made adjustable transversely of the shuttle so that when the stitch is lengthened or shortened the door, and with it the bobbin case nose, is moved away from or toward, respectively the vertical diameter through the shuttle. Preferably this movement of the door is controlled by the movement of the feed slide, and there will now be described one embodiment of the invention wherein this controlled movement is provided.

Referring more particularly to Fig. 1, the stud 5 of the bearing e^{11} is extended at its lower end and has secured thereto one end of a lever arm 6 the outer end of which is connected to the feed slide lever e^{7} by a short link 7. The upper end of the stud 5 is also extended beyond the bearing e^{11} and has secured thereto a lever arm 8 (see Fig. 2) by means of a split end and set screw 9. This form of connection allows the arm 8 to be angularly adjusted about the stud 5. The free end of the arm 8 is also split and carries a pin 10 supporting a guideway 11 angularly adjustable with relation to the arm 8 by loosening a set screw 12. Above the lever arm 8 and most conveniently on the lifter lever shaft w^{3}, is a slidable sleeve 13 from which depends a pin provided with a roller 14 adapted to rest in the guideway 11. The sleeve 13 is held against rotation by a fork ended guide arm 15 extending therefrom and embracing a pin 16 on a stationary part of the head casting B. The sleeve 13 is also provided with an upwardly extending arm 17 connected (as hereinafter described) to the supporting arm 18 of the door 3. Thus any transverse movement imparted to the sleeve 13 will impart a similar and equal movement to the door 3, which movement of the door may be regulated to give any desired amount of slack in the shuttle thread for a given length of stitch by proper adjustment of the angularity of the lever arm 8 or of the guideway 11 with relation to the sleeve 13. A movement of the lever arm 8 about the stud 5 will give a coarse adjustment while a fine adjustment is obtained by a movement of the guideway 11 about its supporting pin 10 as is readily seen.

With the connections as described it is clear that a movement of the feed slide lever e^{7}, to lengthen or shorten the feed of the awl, will simultaneously rock the stud 5 and thereby slide the sleeve 13 along the shaft w^{3}, and, the connections having been previously properly adjusted, this movement of the sleeve 13 will place the door 3 in proper relation to the vertical diameter of the shuttle to give to the shuttle thread the amount of slack required. Obviously the parts can be so proportioned that any given movement of the feed slide lever will secure the required amount of slack for the length of stitch resulting from such movement.

In order to secure access to the bobbin the door 3 should be mounted for removal from its position shown in Fig. 1. Referring more particularly to Fig. 3, to accomplish this end the supporting arm 17 is preferably provided with a casing 19 open at the rear and entered through the wall at the forward end by a pin 20 surrounded by a coiled spring 21 bearing against the forward wall of the casing and a head 22 on the pin. The spring 21 normally maintains a tongue 23, on a boss 24 of the arm 18, in a groove formed in the outer face of the forward wall of the casing forming a mortise and tenon joint. The arm 18, directly supporting the door 3, is thus carried by the rotatable pin 20 and by seizing the milled head 25 of the pin and pulling the tongue 23 out of its groove the door may be turned up and out of the way of the bobbin and shuttle without disturbing any of the adjustments.

Obviously, this invention is not limited to the particular embodiment thereof herein shown and described for purposes of illustration, but said invention may be varied without departing from its scope and spirit as gathered from the present disclosure.

What is claimed, is:—

1. In a machine of the class described, the combination of a shuttle having an eccentrically mounted bobbin case provided with a thread delivery portion, a guide to restrain oscillatory movement of the bobbin case in response to shuttle movement, a needle, work feeding means, means to vary the movement of the feeding means to vary the length of stitch, and connections between said last named means and said guide to change the path of movement of the thread delivery portion of the bobbin case in accordance with the variation of stitch length.

2. In a lock stitch sewing machine, the combination of a shuttle having an eccentrically mounted bobbin case, a door having a guide to determine the movement of the bobbin case, awl feeding means, and means to simultaneously vary the feeding movement of the awl and the position of said door and its guide.

3. In a machine of the character described, the combination of a shuttle having an eccentrically mounted bobbin case provided with a thread delivery portion, a guide for determining the path of movement of the bobbin case as the shuttle is oscillated, work feeding means, a lever e^{7} for varying the movement of the work feeding means, and a lever 6 movable with the lever e^{7} and connected to said guide to vary the path of

movement of the thread delivery portion of the bobbin case as the feed movement of the feeding means is varied.

4. In a sewing machine of the class described, the combination of a shuttle and needle for forming a stitch, a bobbin case having a thread delivery portion and mounted eccentrically in the shuttle, means for holding the bobbin case from oscillatory movement with the shuttle, means for varying the stitch length, and devices connected to said last named means for adjusting the bobbin case holding devices to change the path of movement of the thread delivery portion of the bobbin due to oscillation of the shuttle as the length of the stitch is changed.

5. In a machine of the class described, the combination of a shuttle having an eccentrically mounted bobbin case and a needle for forming a stitch, means for varying the length of stitch, and means connected to the bobbin case for controlling the slack in the shuttle thread due to the eccentricity of the bobbin case and shuttle and in conformity with the variation in length of stitch.

6. In a machine of the class described, the combination of a shuttle having an eccentrically mounted bobbin case provided with a thread delivery portion and a needle for forming a stitch, an awl for feeding the work, means for varying the awl movement to change the length of stitch, and devices connected to the last named means for controlling the path of movement of the thread delivery portion of the bobbin case.

7. In a machine of the character described, the combination of a shuttle having an eccentrically mounted bobbin case, a door having a guide to determine the movement of the bobbin case, an arm carrying said door, locking means for normally holding the door in operative position, a spring permitting movement of the arm to disengage the lock and the door from engagement with the bobbin case, and means permitting the door to then be moved upward in a substantially vertical plane from in front of the shuttle.

8. In a machine of the class described, the combination with a shuttle and a needle for forming a stitch, of an awl arranged to feed the work, means for altering the feed travel of the awl to vary the length of stitch, and means controlled through the first named means for varying the amount of slack in the shuttle thread in proportion to the variation in stitch length.

9. In a machine of the class described, a shuttle and a bobbin case eccentrically mounted therein, a feed slide, means for moving said slide to alter the length of stitch and operable connections between said moving means and bobbin case to alter the position of the bobbin case in the shuttle as the feed slide is moved to vary the length of stitch.

10. In a sewing machine, the combination, with stitch forming means including a shuttle and thread supplying means eccentrically carried and actuated by said shuttle, of awl feeding stitch lengthening and shortening means, and means for varying the slack in the thread from said supplying means in response to changes in the length of stitch.

11. In a sewing machine, the combination, with a bobbin case having a thread opening and a shuttle in which said case is eccentrically mounted, of means to actuate said bobbin case, controlling means to control the movement of said thread opening, awl feeding stitch lengthening and shortening means, and means governed by said last named means for varying the operation of said controlling means.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

FRED LA CHAPELLE.

Witnesses:
ROSWELL F. HATCH,
REDFIELD H. ALLEN.