C. E. CASGRAIN.

BUTTONHOLE STITCHING MACHINE.

APPLICATION FILED MAR. 23, 1921.

1,411,953. **Patented Apr. 4, 1922.**

Fig. 1.

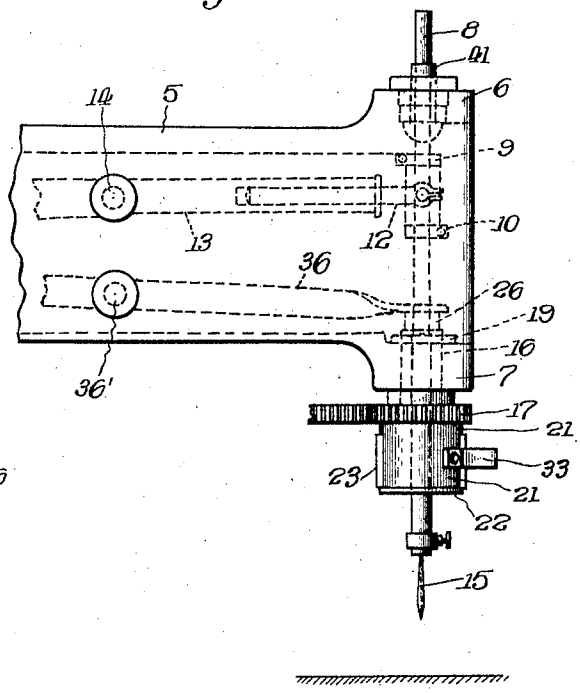


Fig. 2

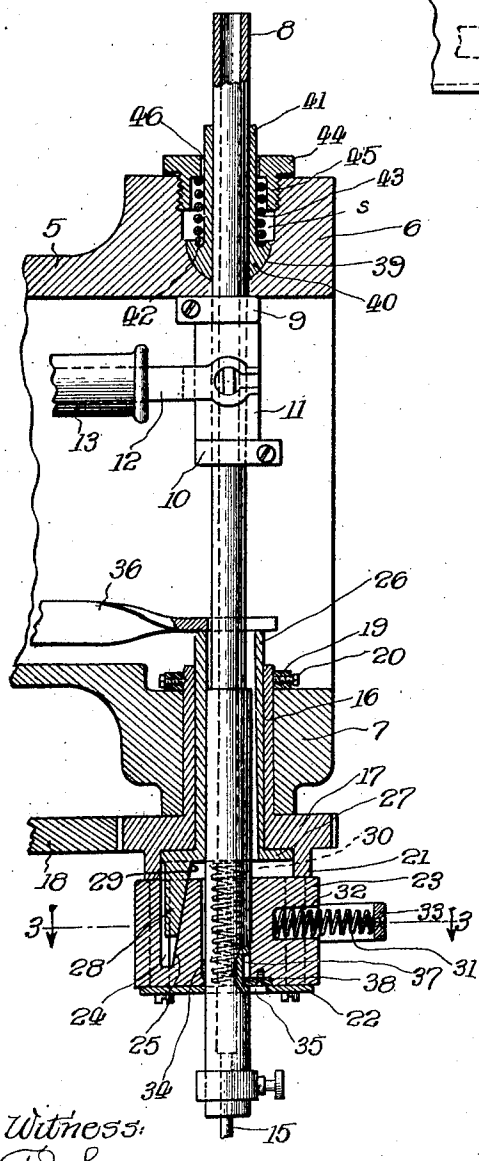
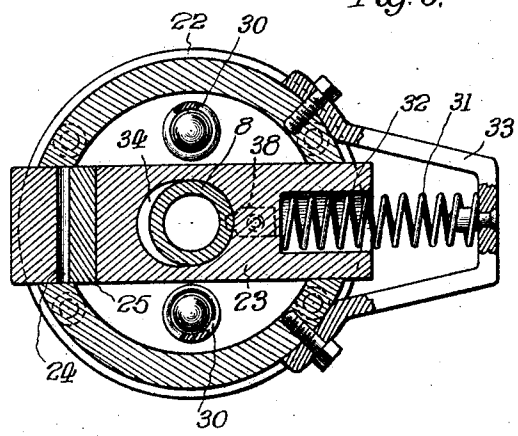


Fig. 3.



Witness:
A. J. Sauser.

Inventor:
Charles E. Casgrain,
By Charles J. Schmidt.
Atty.

UNITED STATES PATENT OFFICE.

CHARLES E. CASGRAIN, OF CHICAGO, ILLINOIS.

BUTTONHOLE-STITCHING MACHINE.

1,411,953. Specification of Letters Patent. Patented Apr. 4, 1922.

Application filed March 23, 1921. Serial No. 454,938.

To all whom it may concern:

Be it known that I, CHARLES E. CASGRAIN, a citizen of the United States, and a resident of Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Buttonhole-Stitching Machines, of which the following is a specification.

My invention relates to buttonhole stitching machines and covers particularly improved needle bar bearing mechanism for assuring greater freedom and accuracy of operation of the needle bar and stitching mechanism cooperating therewith.

In buttonhole sewing machines in the class represented in Patent No. 544,827, August 20th, 1895, the needle bar has a number of movements. It reciprocates axially, rotates on its axis, and is given a vibratory or swinging movement. In the construction and arrangement heretofore used, the needle bar at its upper end passes through a spherical bearing member or ball through which it reciprocates, and this ball is held down in a spherical seat by means of a nut engaging against a semi-spherical bushing, the ball working in its bearing socket while the needle bar is vibrated or swung. With this construction and arrangement, pressure is directly communicated from the lock nut to the ball member of the bearing and unless the adjustment is at all times kept very accurate the operation will not be efficient. As the machine operates very rapidly and the needle bar reciprocates, rotates, and swings all at the same time, it must have freedom of movement without too much play. If in this prior construction too much pressure is applied on the ball member there will be too much friction and proper operation of the stitching mechanism will be interfered with. On the other hand, if the adjustment is too loose, the parts will rattle and will not accurately and efficiently operate. In other words, unless the adjustment is kept accurate at all times, accurate co-operation of the various parts is not assured and the needle will not travel accurately and the result has been breaking of the needle and disturbance or breaking of the looping members which co-operate with the needle to form the stitches.

The object of my invention is to provide improved bearing mechanism for the needle bar so that it will more or less automatically be kept in proper adjustment at all times. In accordance with my invention I interpose a spring to fit between an adjustable abutment and a bearing head which is semi-spherical, the interposition of the spring causing the bearing parts to be accurately held together at all times to prevent loose motion and rattling while at the same time the bearing engagement is sufficiently yielding to prevent interference with the smooth, ready and accurate operation of the needle bar.

On the accompanying drawings, I have shown my invention applied to a buttonhole sewing machine, only such parts of the machine itself being shown as will serve to illustrate the application of the invention. In the drawings

Fig. 1 is a side elevational view of the front end of a sewing machine head showing the needle bar arranged therein together with my improved bearing mechanism,

Fig. 2 is an enlarged vertical sectional view of the frame and needle bar mechanism, and

Fig. 3 is an enlarged sectional view on plane 3—3, Fig. 2.

On the drawings, 5 represents the hollow forwardly extending arm of the stitching frame which arm at its front end has the upper and lower enlargements 6 and 7 which are vertically alined and which accommodate the needle bar 8 and its supporting, guiding and operating mechanism. Between the enlargements the needle bar has secured thereto the upper and lower collars 9 and 10 between which is the hub 11 pivotally engaged by the fork arm 12 slidable in the front end of the lever 13 which is pivoted in the frame 5 at 14 and is connected at its inner end with suitable cam mechanism (not shown) but fully disclosed in Patent No. 544,827 dated August 20th, 1895. The lever 13 supports the needle bar and during rocking of the lever on its pivot the needle bar is vertically reciprocated to bring the needle 15 into co-operative association with the loopers and other stitching mechanism.

Extending upwardly through the bearing enlargement 7 is the cylindrical hollow hub 16 which at its lower end carries the horizontal gear 17 which is engaged by the segmental gear 18 operated by suitable cam mechanism (not shown) to rock at certain times and to certain degrees to impart movement to the gear 17. The hub and gear are

rotatably held in place by the collar 19 secured to the sleeve by set screws 20 and resting on top of the enlargement 7. Extending downwardly from the gear 17 and concentric therewith is the cylindrical shell 21 closed at its lower end by the detachable plate 22. Reciprocable transversely through the shell is the block 23 which has the notch 24 providing the wedging or cam surface 25. Within the hub 16 is the sleeve 26 which at its lower end has the flange 27 bearing against the lower face of the gear 17 and from this flange extends the cam tongue 28 which engages in the groove 24 and has the wedging or cam surface 29 for co-operating with the cam surface 25 of the block 23. Compression springs 30 seating on the plate 22 engage against the flange 27 and tend to hold the tongue 28 in its upper position. When the sleeve 26 is shifted downwardly the wedging or cam surfaces 25 and 29 co-operate to shift the block 23 outwardly, the spring 31 resisting such movement of the block and serving to restore it when the sleeve 26 is raised to withdraw the cam tongue 28. The spring 31 seats in the pocket 32 formed in the block and abuts at its outer end against the yoke frame or brace 33 secured to the frame 21.

The needle bar 8 extends downwardly through the sleeve 26 and through the hole 34 provided in the block 23, and the hole 35 provided in the plate 22. When the block 23 is shifted the needle bar will be swung and to avoid binding sufficient clearance is provided for the hole 34. As is well understood, such swing of the needle bar is necessary to form the buttonhole stitches. The rock lever 36 extending through the frame 5 and pivoted at 36′ straddles the needle bar at its front end and engages with the top of the sleeve 26. By suitable cam mechanism (not shown) the lever is rocked and forces the sleeve 26 downwardly against the force of the spring 30, the spring returning the sleeve to its upper position.

While the needle bar is reciprocated vertically and swung laterally, it is also rotated on its axis as the stitches are kept at right angles with the edges or line of the buttonhole to be stitched. As shown, the needle bar near its lower end has the keyway 37 into which projects the key 38 detachably secured to the block 23. The block 23 being seated in the frame 21 and this frame being connected with the gear 17, the needle bar is rotated when the gear 17 is turned. The degree and time of turning of the gear 17 is controlled by cam mechanism (not shown) which operates the segmental gear 18 which has already been referred to. To permit lateral swing of the needle bar, sufficient clearance is provided in the sleeve 26 through which the bar extends, this being plainly shown in Fig. 2.

During operation of the buttonhole sewing machine the needle bar is rapidly reciprocated vertically, swung laterally and rotated on its axis and the parts shown for accomplishing these movements are disclosed in earlier patents and form no part of my invention. However, to permit such complex and numerous movements of the needle bar and to permit the needle to co-operate accurately with the work and with the loopers and other delicate stitch forming devices, great care must be taken to provide suitable bearing for the needle bar so that the bar will be free to operate smoothly and accurately at all times and also be prevented from having too much freedom which would cause rattling and uncertain work. My invention, therefore, resides particularly in the bearing mechanism provided in the upper enlargement 6 through which the needle bar extends. In the enlargement I provide a semi-spherical bearing pocket 39 for receiving the semi-spherical bearing head 40 at the lower end of the bearing sleeve 41 which receives the needle bar and in which it may freely turn and reciprocate. In the top of the bearing head 40 is the annular groove 42 for seating the lower end of the compression spring 43. At its upper end the spring abuts against the cap 44 which by its flange 45 has threaded engagement in the head 6, the cap being thus adjustable to vary the pressure of the spring against the bearing head 40. The sleeve 41 extends upwardly through the opening 46 in the cap 44, sufficient clearance space being provided to permit movement of the sleeve as it swings with the needle bar.

When the machine is in operation the needle bar is rapidly reciprocated in the sleeve 41 and at the same time it is rapidly vibrated, and during such vibration which changes its direction as the needle bar is turned to keep the stitches at right angles with the buttonhole edge, the bearing head 40 rapidly vibrates in the pocket 39. The cap 44 is adjusted to cause the spring 43 to hold the head 40 in bearing engagement with the bearing pocket at all times and to prevent the bearing head from jumping off its seat during rapid vibration of the needle bar. However, the adjustment of the spring is not too tight so that unnecessary friction would be produced. By means of the spring interposed between the adjusting cap and the bearing head, adjustment can be made which will cause the needle bar to function freely and accurately and noiselessly. In prior construction where an adjusting cap or bushing engages directly with a spherical ball bearing member, such accurate, efficient and noiseless operation is not possible for if the adjusting bushing is turned the least bit too far in one direction it will clamp the ball too tight and cause unnecessary friction and

if turned too far in the other direction, it will permit rattling, either condition resulting in inaccurate and uncertain work. However, by interposing the spring, a little overturning in one direction or the other would not matter as the spring would function to keep the bearing surfaces together with the proper pressure. The space S surrounding the sleeve 41 in the enlargement 6 will serve as an oil reservoir so that the bearing surface between the bearing head and pocket will at all times be well lubricated.

I thus produce a very simple but highly efficient bearing for the needle bar structure in a buttonhole sewing machine. I do not desire to be limited to the exact construction and arrangement shown and described as modifications can no doubt be made which would still come within the scope of the invention.

I claim as follows:

1. In a buttonhole sewing machine, the combination of a frame, a needle bar, means for longitudinally reciprocating said needle bar, means for laterally vibrating said needle bar, a bearing sleeve receiving the upper end of said needle bar through which it reciprocates, said frame having a semi-spherical bearing pocket surrounding said needle bar, a semi-spherical bearing head on the lower end of said sleeve having bearing engagement in said bearing pocket, an adjustable abutment on said frame, and a spring interposed between said abutment and said bearing head for holding said head in bearing engagement in said bearing pocket.

2. In a buttonhole sewing machine, the combination of a frame, a needle bar, means for longitudinally reciprocating said needle bar, means for laterally vibrating said needle bar, said frame providing a bearing pocket around said needle bar near the upper end thereof, a bearing member having a bearing surface for engaging in said bearing pocket, an adjustable abutment on said frame, and a spring interposed between said abutment and said bearing member for holding it in bearing engagement in said pocket.

3. In a buttonhole sewing machine, the combination of a frame, a needle bar, means for longitudinally reciprocating said needle bar, means for laterally vibrating said needle bar, a bearing sleeve receiving the upper end of said needle bar, a bearing enlargement on said sleeve presenting a bearing surface, said frame having a bearing pocket for receiving said bearing enlargement, an adjustable abutment on said frame, and a spring interposed between said abutment and enlargement for holding it in bearing engagement in said pocket.

4. In a buttonhole sewing machine, the combination of a frame, a needle bar, means for longitudinally reciprocating said needle bar, means for vibrating said needle bar, a bearing sleeve receiving the upper end of said needle bar through which said bar reciprocates, a bearing enlargement on said sleeve presenting a bearing surface, said frame providing a bearing pocket for receiving said bearing enlargement, an adjustable abutment on said frame, and a spring surrounding said sleeve between said abutment and enlargement for holding said bearing surface in bearing engagement in said pocket during reciprocation and vibration of the needle bar.

5. In a buttonhole sewing machine, the combination of a frame, a needle bar disposed vertically in said frame, means for longitudinally reciprocating said needle bar, means for laterally vibrating said needle bar, means for axially rotating said needle bar, a sleeve receiving the upper end of said needle bar, a semi-spherical enlargement at the lower end of said sleeve forming a bearing head, said frame providing a semi-spherical bearing pocket for said head, an adjustable abutment member on said frame, and a spring surrounding said sleeve between said abutment member and bearing head for holding said bearing head in bearing relation in said bearing pocket.

6. In a buttonhole sewing machine, the combination of a frame, a needle bar vertically disposed in said frame, means for longitudinally reciprocating said needle bar, means for laterally vibrating said needle bar, means for rotating said needle bar, a bearing sleeve receiving the upper end of said needle bar in which it may reciprocate and rotate, a semi-spherical bearing head at the lower end of said sleeve, said frame providing a semi-spherical bearing pocket for said head, an adjustable abutment on said frame through which said sleeve extends, and a spring surrounding said sleeve between said abutment and bearing head for holding said bearing head in bearing relation with said bearing pocket.

In witness whereof, I hereunto subscribe my name this 1st day of March A. D., 1921.

CHARLES E. CASGRAIN.