

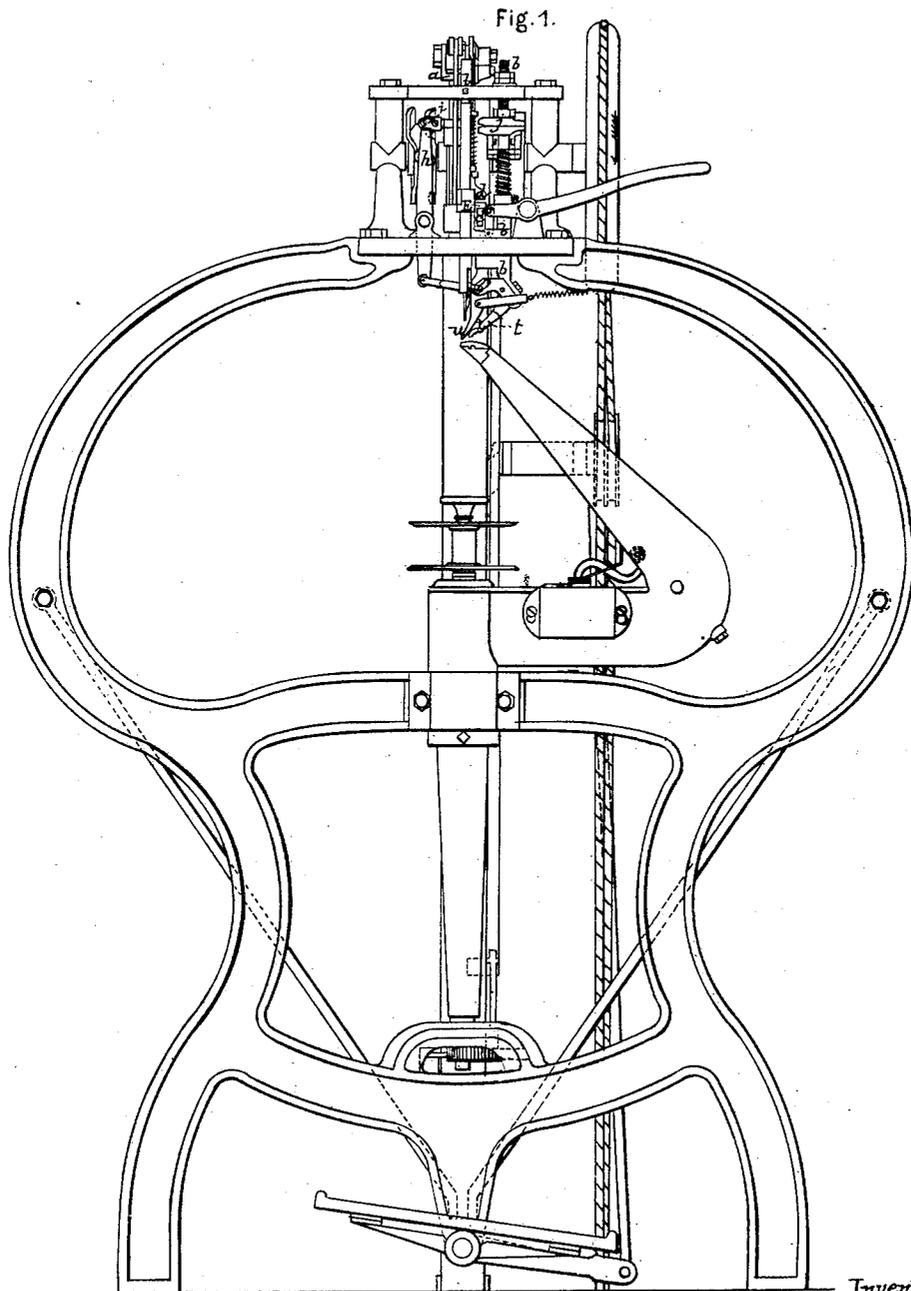
McKAY & BLAKE.

5 Sheets—Sheet 1.

Sewing Machine.

No. 45,422.

Patented Dec. 13, 1864.



Witnesses.  
F. Gould.  
J. B. Redden.

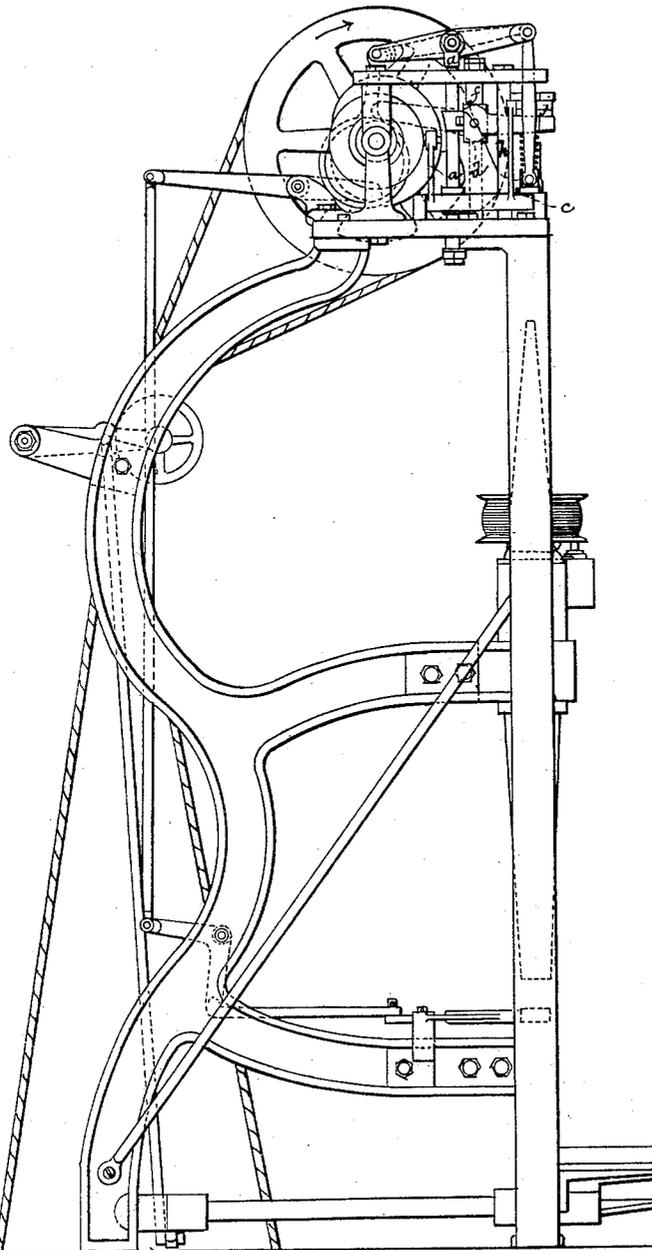
Inventors.  
Gordon McKay  
Lyman B. Blake  
By their atty  
W. B. Conroy

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Fig. 2.



Witnesses.  
F. Gould.  
L. B. Kidder.

Inventors.  
Gordon McKay  
Lyman R. Blake.  
By their Attys.  
H. B. Good.

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Fig. 3.

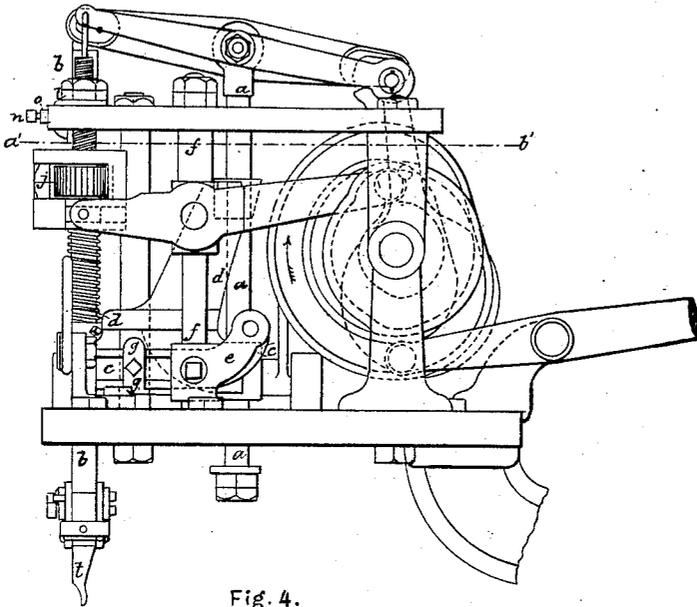
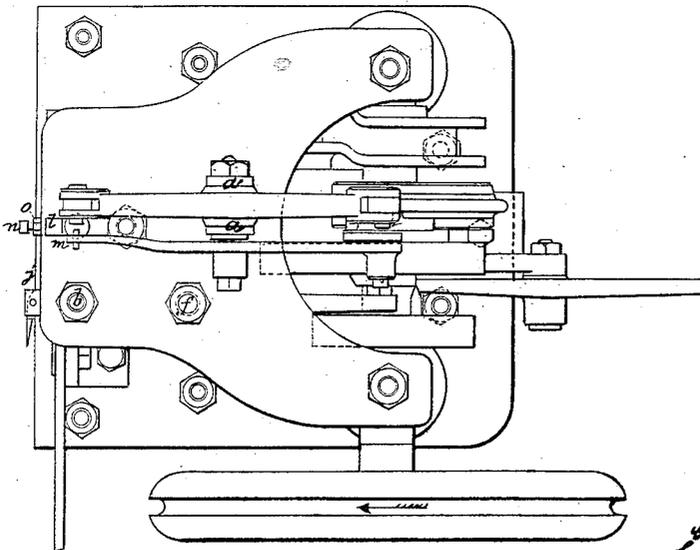


Fig. 4.



Witnesses  
*F. Gould.*  
*L. B. Hadden*

Inventors.  
*Samuel McKay*  
*Samuel R. Blake*  
 By their atty.  
*W. B. Crosby*

McKAY & BLAKE.  
Sewing Machine.

5 Sheets—Sheet 4.

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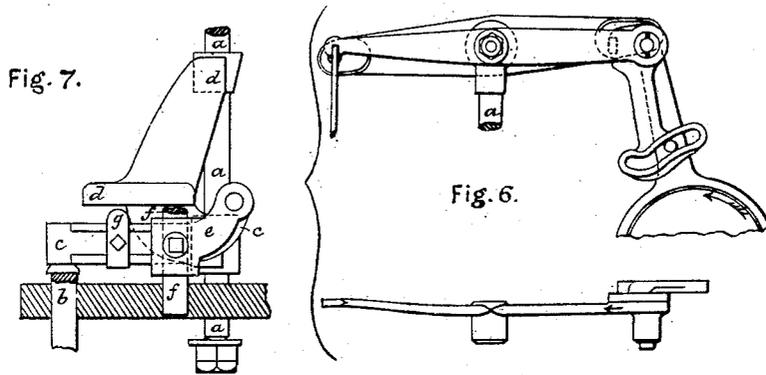
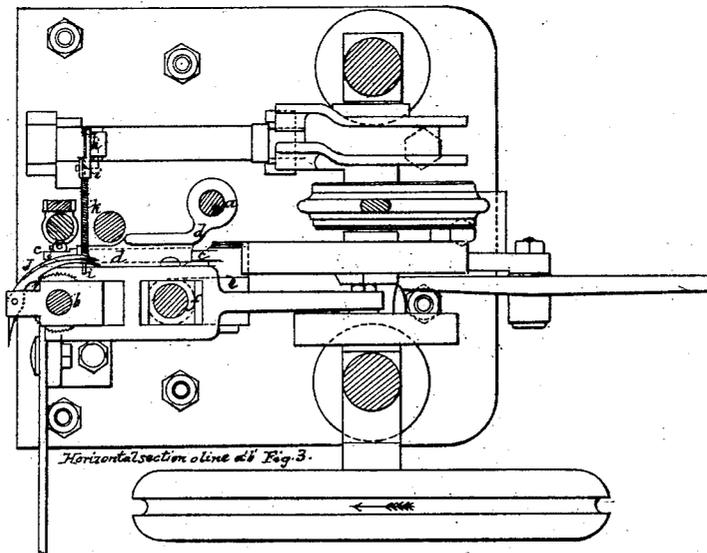


Fig. 5.



Witnesses.  
F. Gould  
I. B. Hilder

Inventors.  
Lyman R. Blake  
By their atty  
W. B. Swaby.

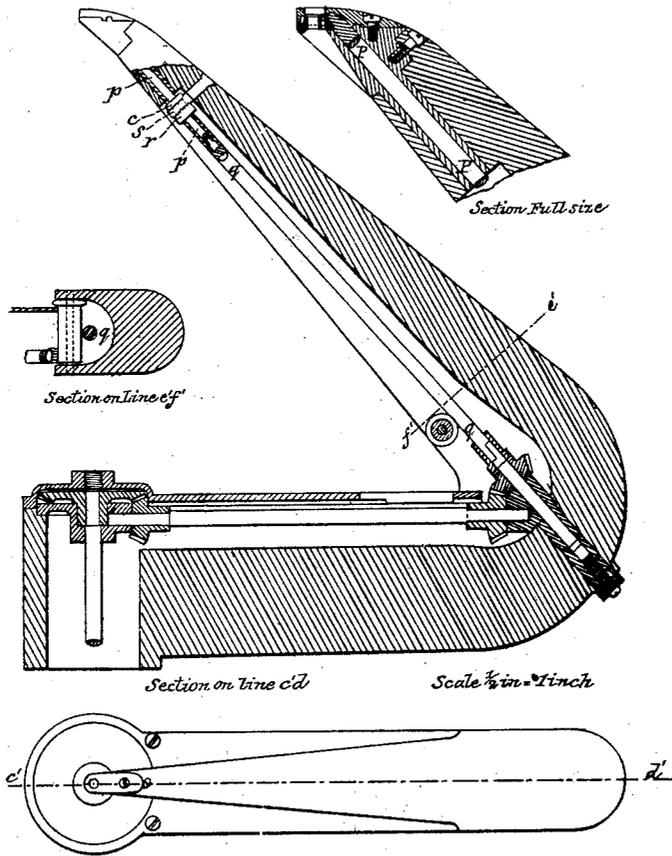
McKAY & BLAKE,  
Sewing Machine.

5 Sheets—Sheet 5.

No. 45,422.

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Fig. 8.



Witnesses.  
T. Gould.  
S. B. Kidder.

Inventors.  
Gordon McKay,  
Layman R. Blake  
By their Atty  
W. B. Crosby.

# UNITED STATES PATENT OFFICE.

RECEIVED

GORDON MCKAY, OF BOSTON, AND LYMAN R. BLAKE, OF QUINCY, MASS.

## IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 45,422, dated December 13, 1864.

*To all whom it may concern:*

Be it known that we, GORDON MCKAY, of Boston, Suffolk county, and LYMAN R. BLAKE, of Quincy, Norfolk county, both in the State of Massachusetts, have invented jointly certain Improvements in Sewing-Machines; and we do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of our invention sufficient to enable those skilled in the art to practice it.

This invention relates to improvements on the sewing mechanism patented on the 12th day of August, 1862, to Gordon McKay and Robert H. Mathies, which patent is numbered 36,163. As the general construction and operation of the said mechanism is fully shown and described in the aforesaid patent, these will not be set forth in this specification, except, perhaps, partially and incidentally, to elucidate the novelties therewith connected, especially as the old construction shown in the aforesaid patent, where it is not changed by the invention herein set forth, is clearly shown in the drawings herewith accompanying, of which—

Figure 1 is a front elevation of a sewing-machine embodying this invention. Fig. 2 is a side elevation of the same. Fig. 3 is a side elevation of the upper works of the said machine, taken upon the side opposite to that shown in Fig. 2. Fig. 4 is a plan of said upper works. Fig. 5 is a sectional plan of the same, the section being taken beneath the top plate of the upper works and in the plane of the line *a' b'*. Fig. 6 shows in detail the mechanism which operates the slide which covers at times the hook of the needle. Fig. 7 shows in side elevation the means which, in connection with a mechanism for reciprocating the needle and a rest upon or connected with the presser-foot, provides for adjusting the ratio of the needle-stroke with reference to the vertical changes of the position of the presser-foot obtained by resting upon the stock. Fig. 8 comprises all the drawings seen on the sheet marked with that figure, the same being illustrations of the horn or work-bed of the machine in plan and in section.

In the aforesaid patent it is described how the stroke of the needle is automatically increased and diminished double the amount that the thickness of the stock operated upon

increases or diminishes; but the construction of the parts is such that said ratio of this increase or diminution of the stroke of the needle to the increase or diminution of the thickness of the stock cannot be changed; and while it is true that this ratio is theoretically the correct one, it is also true that, on account of the bending of the stock between the points of operation thereupon of the thread and the presser-foot, and also on account of the various degrees of compressibility of the stock, it is desirable to be able to change this ratio, and experience proves that generally the lessening of said ratio of the stroke improves the sewing done by the machine. One part, then, of this invention consists in so adapting the mechanism that the proportion of the ratio between the stroke of the needle and the thickness of the stock can be changed or adjusted by the operator, while at the same time the automatic variations of the stroke to conform to the varying thickness of the stock are maintained. As explained in the aforesaid patent, the proportions of the parts and the arrangement of the leverage are such that if the fulcrum-bar *a* of the needle-lever rested on the presser-bar *b* the change in the needle-stroke would be twice that in the thickness of the stock. To make provision for change of this ratio, the lever or bar *c* is interposed between the projection *d* from the fulcrum-bar *a* and the presser-bar *b* in such a manner that while the part of *c* which rests upon *b* has a movement identical therewith, one end of the bar *c* shall have very little or no movement. As when this invention was made several machines existed to which it was desirable to apply it, one end of *c*, which it was desired to keep still, or nearly so, was pivoted for convenience to a piece, *e*, which was easily made and secured to the presser-lever fulcrum-bar *f*, and thus in the construction shown in the drawings the pivoted end of *c* has accidentally the slight movement which the fulcrum-bar *f* may have. A slide-piece, *g*, is so made that it may be moved and fixed in position anywhere on bar *c*, and on this adjustable fulcrum *g* the arm or projection *d* rests at the proper times, it being so shaped as to come over *g* in any position in which it may be set.

It will be obvious that the ratio of the change of the needle-stroke caused by change in thickness of the stock will be lessened as the ful-

crum *g* is moved to the still or pivoted end of *c*; also, that the theoretical ratio stated in the aforesaid patent might be increased by letting *c* project and overhang beyond the presser-bar *b*, and by making *d* so as to come above *g*, if fixed on such overhanging end of *c*; but as the ratio obtained by the construction shown in the aforesaid patent requires in practice no other change than diminution, the construction herein shown in Fig. 7, and also in Figs. 1, 2, 3, and 5, is sufficient for the demands of practical use.

In the aforesaid patent it was shown and described in two ways how the presser-foot was freed from such control as prevented its descent. The first way was to liberate the presser-foot at its greatest elevation, and the second was to liberate it at the lowest point to which the action of its cam brought it.

The last way of working the presser-foot has been found best in practice, and one part of this invention relates to the means by which the presser-foot is freed from control when brought to the lowest point of throw given by its cam.

From the rocker-shaft which works the feeder an arm, *h*, extends upward and gives motion to a link, *i*, to pull the pawls *j* out of gear with the ratchet-teeth on the presser-bar nut, the motion given by the feed-cam being such as to operate at the right time by detaching the pawls from the nut to free the presser-bar from control at the time when it is most depressed by the presser-cam. Small spiral springs *k* are coiled, one around each arm of the link, and serve to keep the pawls in gear with the ratchet-teeth when not pulled out of gear by the means described. This part of the mechanism is best seen in Fig. 5, and parts thereof are also shown in Figs. 1, 2, and 3.

The needle is driven by the positive throw of an eccentric, but has a rest from movement both at its highest and lowest point of movement. To render it certain that the needle shall rest at these points, as is needed for the perfect operation of the machine, it is necessary to make the needle-bar move with more difficulty than does the needle-lever fulcrum-bar, so that when the needle-bar and its lever-fulcrum bar are both free to move it will be certain that the latter will move by reason of its moving upon less expenditure of force, thereby giving times of rest to the needle at the extremes of its stroke. This object was partially accomplished in the aforesaid patent—that is to say, the rest of the needle was obtained at the top of the stroke by the use of a counterbalancing-spring, and at the bottom of the stroke by the friction of the needle in the stock and the resistance offered by the loop of thread when entered into the hook of the needle, and this partially but not certainly answered the purpose. One part of this invention consists in the application of an adjustable yielding pressure to the needle-bar,

which secures the needed times of rest from motion to the needle, it being capable of adjustment to all the varying conditions of the machine.

In one of the plates of the upper works, preferably the top one, is fitted the gib *l*, faced with a leather, *m*, so as to work smoothly with the needle-bar, and back of the gib, concealed in the plate, is a spring, against which the set-screw *n* acts to force the leather-face of the gib into contact with the needle-bar, and so produce that amount of friction needed under any circumstances of practical usage to hold the needle at rest at the top and bottom of its stroke. The check-nut *o* serves to prevent derangement of adjustment of the friction. In this connection reference may be had to Figs. 3 and 4, also to Fig. 1.

In the use of the aforesaid patented machine heat is always applied to the horn to keep the wax on the thread in a soft and plastic condition; but heat so applied expanded the small inclined shaft in the horn more than it expanded the horn, and damage resulted from such expansion to the shaft, the whirl, and the tip of the horn.

One part of this invention consists in introducing into the inclined shaft an expansion-joint, so that the increase of length in the shaft shall not crowd the teeth of the whirl and of the pinion which drives it too closely together or otherwise injure the parts located in or at the end of the horn, which, from the necessities of the case, have to be made small as possible. Reference may here be had to Fig. 8, where it will be seen that the inclined shaft is made up of two pieces, *p* and *q*.

On one end of *p* the pinion is formed which meshes into and drives the whirl, while the other end is simply slotted. On *p* a grooved collar, *r*, is placed, and made capable of adjustment thereupon by a set-screw. The forked piece *s* fits the groove around the collar, and is secured to the horn, and it will be obvious that the teeth of the pinion can be nicely adjusted with relation to the teeth of the whirl by means of the collar and set-screw. The upper end of *q* is bored to admit the slotted end of *p*, and a pin in *q*, entering the slot in *p*, makes the two parts of the inclined shaft to move in unison when the part *q* is rotated, while it is obvious that expansion of *q* will produce no other effect than to slide its pin in the slot in *p*. The part *p* is less exposed to heat than is the part *q*, and is besides so short from its fixed point—the collar *s*—that its expansion is not noticeable in practice.

In connection with the horn, it may be observed that it has been found best to change the small grooved guide-wheel, over which the thread passed from the spool on its passage to the whirl, into a roll, one end of which, being heated by the same means employed to heat the horn, keeps the other end, over which the thread passes, warm enough to prevent wax from sticking thereto, which, with the grooved

guide-wheel just mentioned, caused irregularities in the sewing. This is illustrated in the cross-section embodied in Fig. 8.

In the aforesaid patent it is described how the length of the stitches is changed; also how and why the stroke of the needle should be changed when the length of the stitches is altered.

Inspection of Fig. 1 will show some modifications connected with the presser, by which, when its position is changed to alter the length of the stitch, the proper length of the needle-stroke is secured by the same adjustment and without care or thought on the part of the operator. On reference to said figure it will appear that the presser *t* is secured to the presser-bar by a joint, which is made substantially on the angle shown, the effect of which is as follows: When the stitch is shortened by moving the presser-foot *t* toward the needle that part of the presser-bar which supports the needle-lever fulcrum-bar is lowered, which allows more lost motion to the needle-lever fulcrum, and consequently shortens the needle-stroke. When the stitch is lengthened by moving the presser-foot from the needle, this raises the presser-bar and lessens the lost motion of the needle-lever fulcrum, consequently increasing the length of needle-stroke. The inclined or cam slots, which modify the movement of the feeder *u*, it will be seen on inspection of Fig. 1, have been changed in detail of construction, they being no longer formed on and in part as portions of the presser-bar, but are now made as separate pieces, capable of easy change if worn or injured, and are secured to the presser-foot, so as always to move with it.

The detail by which the needle-slide is operated is also changed in some respects from that contained in the aforesaid patent, as will be seen on inspection of Fig. 6, where the improved connections between the cast-off or slide-lever and the pin in the arm of the eccentric strap are plainly shown.

By this improved connection the formerly-used spring-notched catch is dispensed with, and the difficulties occasioned by its breakage and occasional failure to act are avoided, and the movements of the slide remain precisely as described in the aforesaid patent.

We claim—

1. In combination with a mechanism for reciprocating the needle, and with the presser-foot, means for altering the ratio of the needle-stroke to those variations in the position of the presser-foot which are caused by changes in the thickness of the stock.
2. The means described for leaving the presser free to move downward from the lowest positions in which it is left by positive movement of its actuating mechanism.
3. In connection with a mechanism for reciprocating the needle, an adjustable device for producing any desired degree of retardation, substantially for the purpose described.
4. The construction of the shaft, driving the whirl within the horn, with an expansion-joint, for the purpose specified.

GORDON McKAY.  
LYMAN R. BLAKE.

Witnesses:

J. B. CROSBY,  
ALBERT F. HALL.