2 Sheets, Sheet 1.

T. J. Rockwood,

Milling Machine.

No. 95,729. Patented Oct. 12. 1869.

Fig. 1.

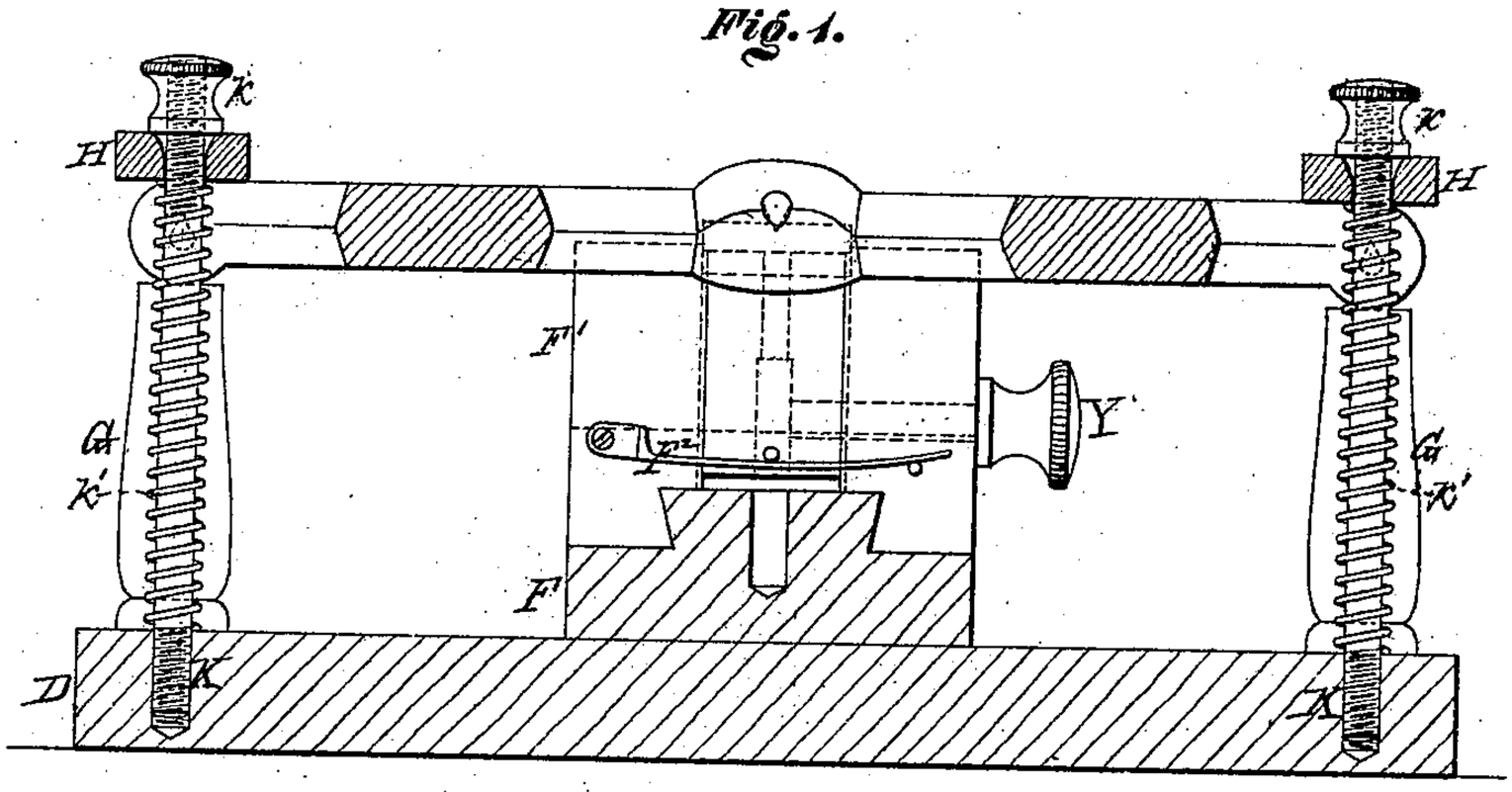
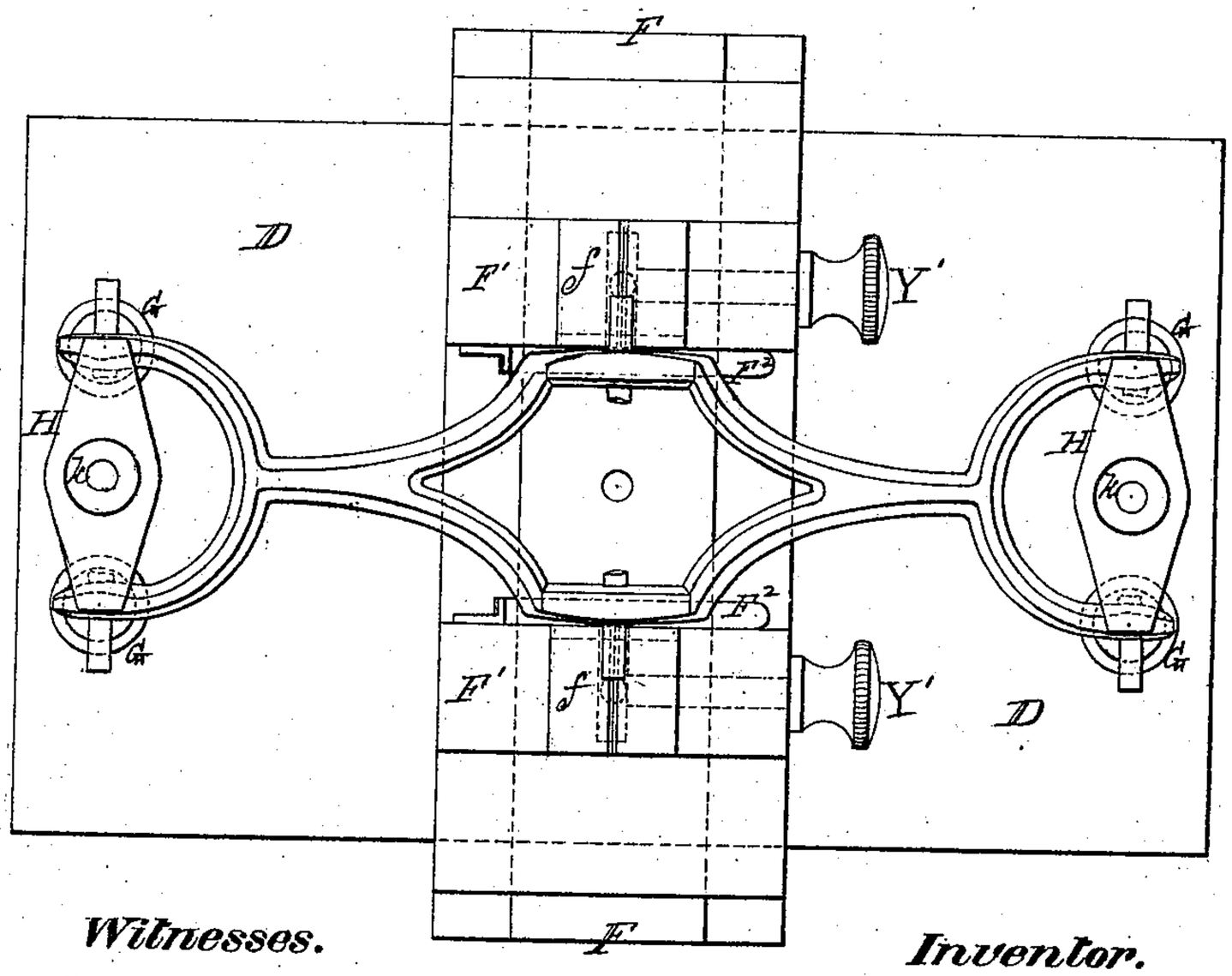


Fig. 2.



Witnesses.

Wm. B. Dey

C. C. Livings

Inventor.

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by his attorney

S. L. Storrs

T. J. Rockwood,

2 Sheets Sheet 2.

Milling Machine.

No. 95,729. Patented Oct. 12. 1869.

Fig. 3.

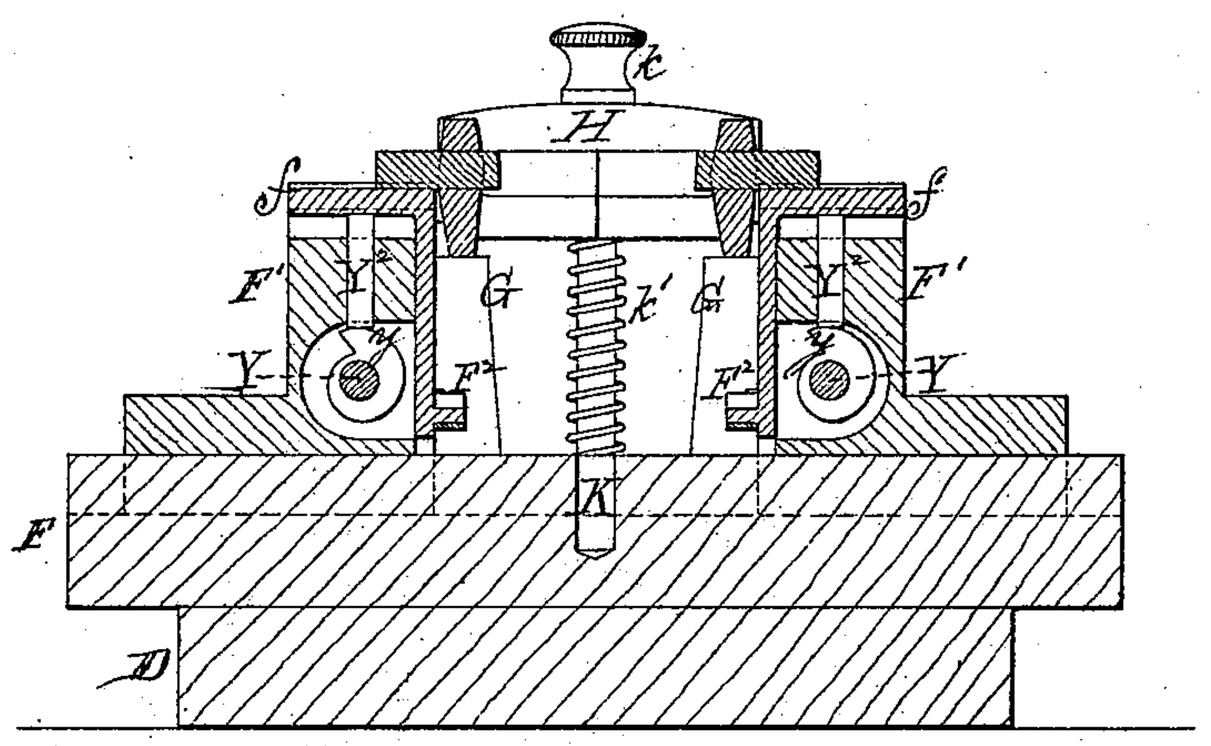


Fig. 4.

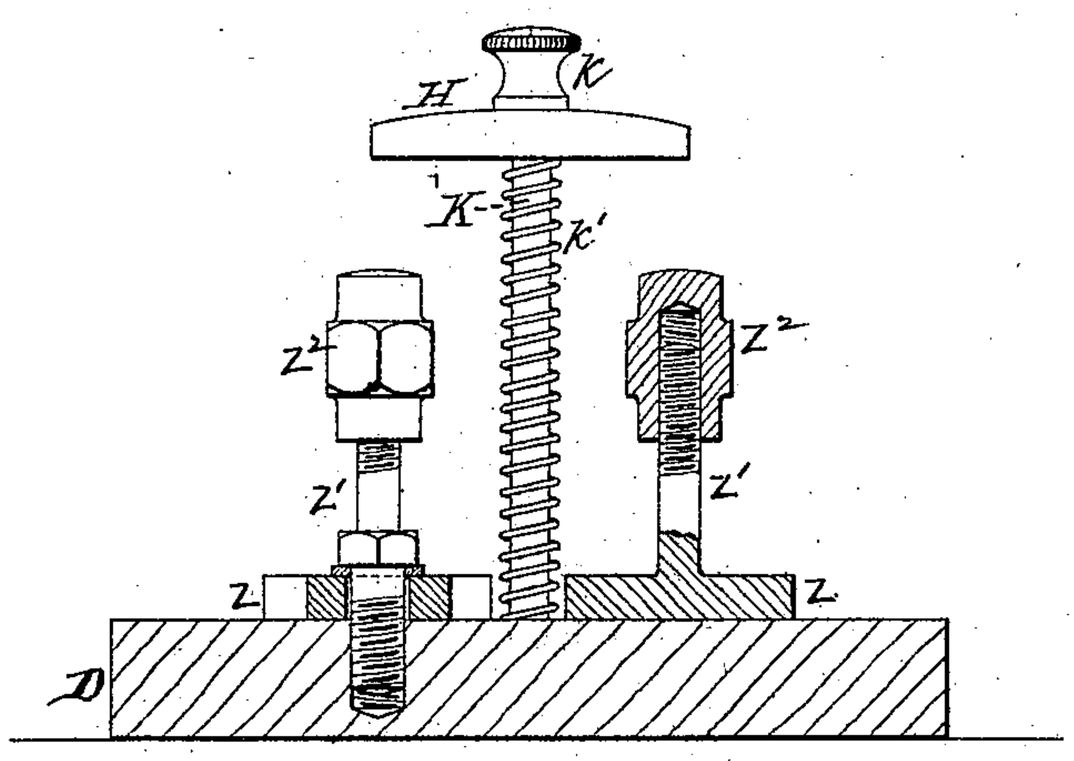
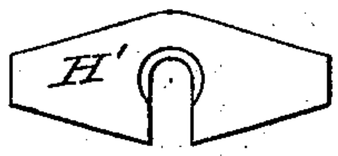


Fig. 5.



Witnesses.

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THOMAS J. ROCKWOOD, OF ST. JOHNSBURY, VERMONT.

Letters Patent No. 95,729, *dated October* 12, 1869.

IMPROVED MACHINE FOR MILLING THE KNIFE-EDGES OF SCALE-BEAMS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, THOMAS J. ROCKWOOD, of St. Johnsbury, in the county of Caledonia, and State of Vermont, have invented certain new and useful Improvements in Machines for Milling the Knife-Edges of Scales; and I do hereby declare that the following is a full and exact description thereof.

My invention is more especially intended to apply to the machines described in the patent issued to me, dated August 11, 1868, but may be used in connection with various modifications of mechanism for milling knife-edges, which are not described in said patent.

My invention facilitates the placing and properly holding of the levers.

It frequently happens, in spite of all the care taken in moulding, that levers are warped, bent, twisted, and variously contorted, to small extents, and although the milling-operation is adapted to remove enough of the material of the knife-edges, and the knife-edges are made sufficiently too large, in the first instance, to insure that the final result shall leave the finished knife-edges with their working angles in exactly the proper positions, the distortion of the general casting in which they are placed embarrasses the operation of properly mounting the lever in the machine.

In all this kind of work, we mount the lever twice. In the first instance, we adjust the position by means of the central knife-edges, resting them in notched bars. Having thus placed it, and taken a very firm hold of the ends of the lever, we proceed to mill the knife-edges at the ends, first treating those at one end, and then those at the other end of the lever. After having thus treated the ends of a lot of levers, we set them on another machine. In this second machine, we set the levers in position by the aid of the now finished knife-edges, and mill the central knife-edges. In order to leave no material to be milled in the central knife-edges, we place the rests in which they are mounted at first a little low. In other words, we finish the end knife-edges with the central knife-edges in a slightly false position, then afterward holding the beam exactly right, by the aid of the now nicely-finished end knife-edges, we again take a firm hold of the lever, and treat the central knife-edges, removing just enough to bring them into their exactly right position.

This, which I have now described, is the part of the old process to which my present invention relates. In the old practice, the entire lever was finished in the plane in which the central knife-edges happened to stand; that is to say, the central knife-edges were assumed, at first, to be right, or, rather, to be to an equal extent below the proper position, and the entire lever was necessarily finished in that plane.

Now the central knife-edges are as liable as either of the others to be slightly misplaced, and the general plane of the entire lever should evidently be the influential plane. In other words, in case the lever is twisted, or otherwise distorted, we should strike an average position with the knife-edges, and finish them all thereby, instead of by the central knife-edges.

It frequently happens, that the four knife-edges at the end are all pretty much in the same plane, but the central knife-edges are distorted or twisted relatively thereto; that is to say, one of the knife-edges is in its true position, and the other is considerably below.

Now, while the old plan would twist the whole lever to correspond with this distorted position of the central knife-edges, my present invention holds the lever in the position to which the end levers are already nearly adapted, and removes the material mainly from the central knife-edge, which is too much depressed.

I accomplish this by providing yielding supports, in which the central knife-edges are rested for the first operation.

The supports are very firmly guided, so that they can only move vertically; but they may sink to any required degree, one below the other, and both may go below or remain above their old position, as required by the twisting or other distortion of the lever.

I have provided, also, several other modifications in the mechanism, which render the holding and milling of the parts more mathematically exact, or more easy of accomplishment.

I will now proceed to describe what I consider the best means of carrying out my invention, and will afterward designate the points which I believe to be new.

The accompanying drawings form a part of this specification.

Figure 1 is a central longitudinal section, through a scale-lever, while mounted on the means for holding it. It gives an inside view of one of the supports which hold up the central pivots, and shows, in dotted lines, the cam, by turning which such support is made firm.

Figure 2 is a plan view of the same parts. The two cams are here represented in dotted lines, one on each side.

Figure 3 is a cross-section through the centre of the same parts. In this view the cams appear in strong lines.

Figure 4 is a cross-section, showing a modification of the construction of the firm supports at the ends. They are adjustable in their height.

Figure 5 is a plan view of a modification of the cross-pieces or clamps, which hold down the lever, in which are the knife-edges to be milled.

Similar letters of reference indicate corresponding parts in all the figures.

The drawings represent the novel parts, with only so much of the ordinary parts as is necessary to indicate their relation thereto.

The parts not represented may be as described in my patent of 1868, above referred to.

There is a fixed frame-work of the machine, made, by preference, of cast-iron. This supports a carriage, with a table, &c., as described in my previous patent, above referred to.

D is a table, capable of traversing, longitudinally, in the vertically-moving carriage, exactly as described in my previous patent.

These, and all other parts of the machine, whether represented or not, will be understood as being made sufficiently heavy to avoid any appreciable springing.

G G G G are stout blocks or firm supports, on which rest the ends of the levers, while the end knife-edges are being milled.

These blocks may be adjustable, outward and inward, to adapt the machine to treat levers of different sizes, or the blocks may be changed for each size or style of beam; but those adjustments or changes will be readily understood without prolonged description.

I will describe them as fixed, which in fact they may be, during the treatment of a hundred or any other number of levers which are of uniform size and style.

I have devised a construction by which the upper surfaces of these blocks may be very conveniently adjusted, vertically, within wide limits, when required; but this will be explained further on.

H H are clamps, which are pressed down on the ends of the levers, by means of nuts *k*, which traverse on screw-threads on the upper end of the fixed rods K.

A coiled spring, *k'*, surrounds each of these rods K, and exerts a constant lifting-force on the clamp or cross-piece H.

The knife-edge is easily liberated by slackening the nut *k*, and turning the cross-piece H.

In such position, it allows the lever to be readily lifted off, and the cross-piece H, being supported by the spring *k'*, does not fall down, but remains up in position, ready to be immediately turned back into its transverse position, and again screwed down, when a new lever is introduced.

In case the fork at the end of the lever is not sufficiently deep to allow the lever to be lifted vertically, when the cross-piece H is turned properly, it can sometimes be liberated by being moved a little endwise, first one way and then the other, to pass the cross-pieces in succession.

In treating any pattern of lever, which does not allow of being readily introduced and removed in this way, I employ cross-pieces H', which are slotted, as indicated in fig. 5, to allow the clamp H to be removed altogether at one end, or both ends, and again replaced with facility.

In treating a lot of levers, we first take the wind out of them by filing, so as to make four surfaces at the ends, which are in the same plane.

This operation can be effected by milling, if preferred, but it is usually done with great facility by hand.

We lay each lever on a plain surface, and if it does not rest fair on the four corners, we file one or another lightly until it does.

Having treated them all in this manner, we are ready to place them, in succession, in the machine, and the four surfaces thus prepared will evidently rest fairly on the four blocks G. This insures the right position of the lever, in one respect.

This part of the work is performed the same as has been practised with my formerly-patented machine.

Now, to get the lever in the right position laterally, it is necessary to rest the central knife-edges in notches, in two central rests *f f*, as has been before explained. And instead of having these blocks *f f* absolutely fixed, I make them capable of yielding downward, to any required extent.

This is effected by mounting them in vertical guides in the stout blocks F^1, and resting them upon springs F^2.

The entire blocks F^1, with their attachments, may be adjusted to or from each other on the stout transverse way F, and may be held firmly in any position by means of screw-keys, or the like, not represented.

Now, when a lever is placed in position, so that its surfaces at the ends rest on the four stout posts or blocks G, the fingers of the operator are applied on the central knife-edges, and the entire lever is moved and turned a little in one direction and the other, until both the central knife-edges rest in the notches represented in the spring-blocks *f*.

These blocks, by reason of their being mounted on springs, may sink to any required extent, either equally or unequally, so as to adapt themselves to any false position of the central knife-edges in the vertical direction, and consequently the entire lever, when gauged by the central knife-edges, resting in the notches in these spring-blocks *f*, and resting at the ends on the four solid blocks G, is with positive certainty in the correct position.

Now, after screwing down the nuts *k*, and thus depressing the clamping-pieces H very firmly at each end, I desire to insure a still more firm holding of the entire lever, to avoid any trembling, or any motion of any part while the knife-edges at the ends are being milled. Were the central blocks *f f* firm, I could hold the centre of the lever very strongly, by simply introducing at these points such a bolt, K, nut *k*, cross-piece or clamp H, and spring *k'*. I do employ such parts at the centre, which are not represented, as it may tend to confuse the drawing.

The means for clamping from above in this manner will involve no difficulty to any good mechanic, but I employ peculiar means, by which I transform the yielding supports *f f* instantaneously into solid and very substantial supports to aid in holding the lever very firmly.

This is effected by means of cams *y*, in the interior of the blocks F^1, which are mounted on the shaft Y, and turned by the mill-wheel Y^1. There are two of these cams, one for each of the blocks F^1, and they are readily turned by the thumb-wheel Y^1, so as to liberate the slide *f*, by turning it in one direction, and support it by turning it in the other direction. The cam may act directly against the end-surface of the yielding support *f*, or it may act thereon through an intermediate pin or block, Y^2, as represented.

The operation of this portion of my invention will now be very readily understood.

The knife-edges at each end of the lever are treated by the milling-tools in the manner described in my patent of August 11, 1868, above referred to. So soon as each is milled, I liberate the lever, by lifting the cross-pieces H H at each end, and also the corresponding cross-piece at the centre, not represented, remove the lever, and giving a half turn, or thereabout, to each of the thumb-wheels Y^1, and consequently to the cams *y*, I set the adjustable supports *f f* at liberty to move up and down again under the influence of the springs F^2 and of the friction, whatever it may be, to which they are subject. The force of the springs F^2 should be sufficient to overcome the friction, and to immediately raise the adjustable supports into a position above that which they will assume when a lever is placed in the machine.

Now a new lever is introduced, and again shaken, or turned slightly in one direction or the other, and pressed down upon the yielding supports *f f* until both the central knife-edges are received and retained in the notches therein. This movement is effected almost instantaneously, and immediately thereon the end-clamps or cross-pieces H may be set down in place, the cams *y* turned up until the central blocks *f f* are firmly supported, then the centre clamp, not repre-

sented, is applied, and the lever is ready to have its ends milled and in its turn to be removed.

There now remains to be described a modification which I have invented in the posts G. I can make one alone, or all four of these posts in this manner, so that their height shall be adjustable. Fig. 4 represents this construction.

Z is a strong and broad support, fastened down adjustably upon a table, D, by means of a bolt standing in a slot, as represented.

Z^1 is a stout screw, rising from near the centre of the support Z, and threaded for a part or the whole of its height, as represented.

Z^2 is a cap-nut, or adjustable block, adapted, on its under side, to fit upon the screw-post Z^1.

Now, by turning the block Z^2 in one direction or the other, I raise or lower its upper surface, and graduate its elevation to any extent desired, while the parts may be of such stiffness and strength as to support the lever the same as a single solid block.

I call the threaded screw Z^1, and its support, my adjustable block. One will be of some service in connection with three of the fixed blocks G. I prefer, however, to use two; in other words, to replace both of the blocks G at one end by these adjustable blocks. I can employ them at both ends, if necessary, but do not deem it generally expedient. I can employ them with particularly good effect to support the centre of the milling-machine on which I mill the central knife-edges, after the end knife-edges have been finished.

A very marked advantage comes from the fact that the block Z^2 fits over and screws down upon the screw Z^1, as represented. This arrangement insures that all chips and dirt fall clear, and cannot lodge upon or in the screw.

My block works freely under all conditions, while, if the parts were the other side up, like the common jack-screw employed in lifting weights, it would be liable to be clogged, cut, or abraded with filings and dirt.

Some of the advantages due to certain features of my invention may be separately enumerated, as follows:

First, by reason of the fact that the supports are not permanently fixed, but adjust themselves vertically, as represented, I cause them to perform the function of determining the correct lateral position of the lever, and of placing it with mathematical accuracy on the end supports G G G G, while at the same time they allow for a very considerable misplacement of the yet unfinished central knife-edges.

Second, by reason of the fact that my cams *y* press up under the blocks *f*, after the placing of the lever is completed, I am able to make the latter serve, in connection with suitable clamps or cross-pieces at that point, to aid in holding the lever very firmly, and to effect this by very simple and rapid movements, and with little labor or complication, and without interfering with the yielding character of the supports when the lever is being located.

Third, by reason of the fact that my clamps or cross-pieces H are held up by coiled springs K^2, as represented, I am able to support the cross-pieces in a position to facilitate the introduction of the next lever, without interfering with the freedom of its movements, or adding any complicated parts, or subtracting in any degree from the useful qualities of the machine.

Fourth, by reason of the peculiar construction of my blocks Z^2, I am able to obtain a very delicate adjustment vertically, being at the same time sufficiently strong to avoid springing or vibration, and offering, by their construction, no possibilities for an accumulation of cuttings or chips to interfere with the working.

I claim—

1. The notched supports *f f*, mounted in vertical guides in the blocks F^1, so that they may yield vertically downward to any required extent, being pressed upward by the action of the springs F^2, or their equivalents, the several parts being adapted to serve, relatively to each other and to the cutting-mechanism of a milling-machine, substantially in the manner and for the purposes set forth.

2. The cams *y*, and their operating-means, in combination with the yielding supports *f f*, all adapted to serve, in relation to each other and to the clamping and cutting-mechanism in a knife-edge milling-machine, substantially as and for the purposes herein set forth.

3. The springs K^1, arranged, relatively to the clamps or cross-pieces H and to the supports G of a milling-machine, substantially as herein described

4. The blocks Z^2, mounted, as represented, on the screws Z^1, and adapted to serve as represented, relatively to each other and to the cutting-mechanism of a milling-machine, for the purposes herein set forth.

In testimony whereof, I have hereunto set my name, in presence of two subscribing witnesses.

THOS. J. ROCKWOOD.

Witnesses:

W. C. DEY,

C. C. LIVINGS.