2 Sheets--Sheet 1.

M. G. WILDER. W. H. McNEIL, S. H. WILDER, & H. C. TYLER.

Mortising-Machine.

No. 168,696. Patented Oct. 11, 1875.

Fig: 1.

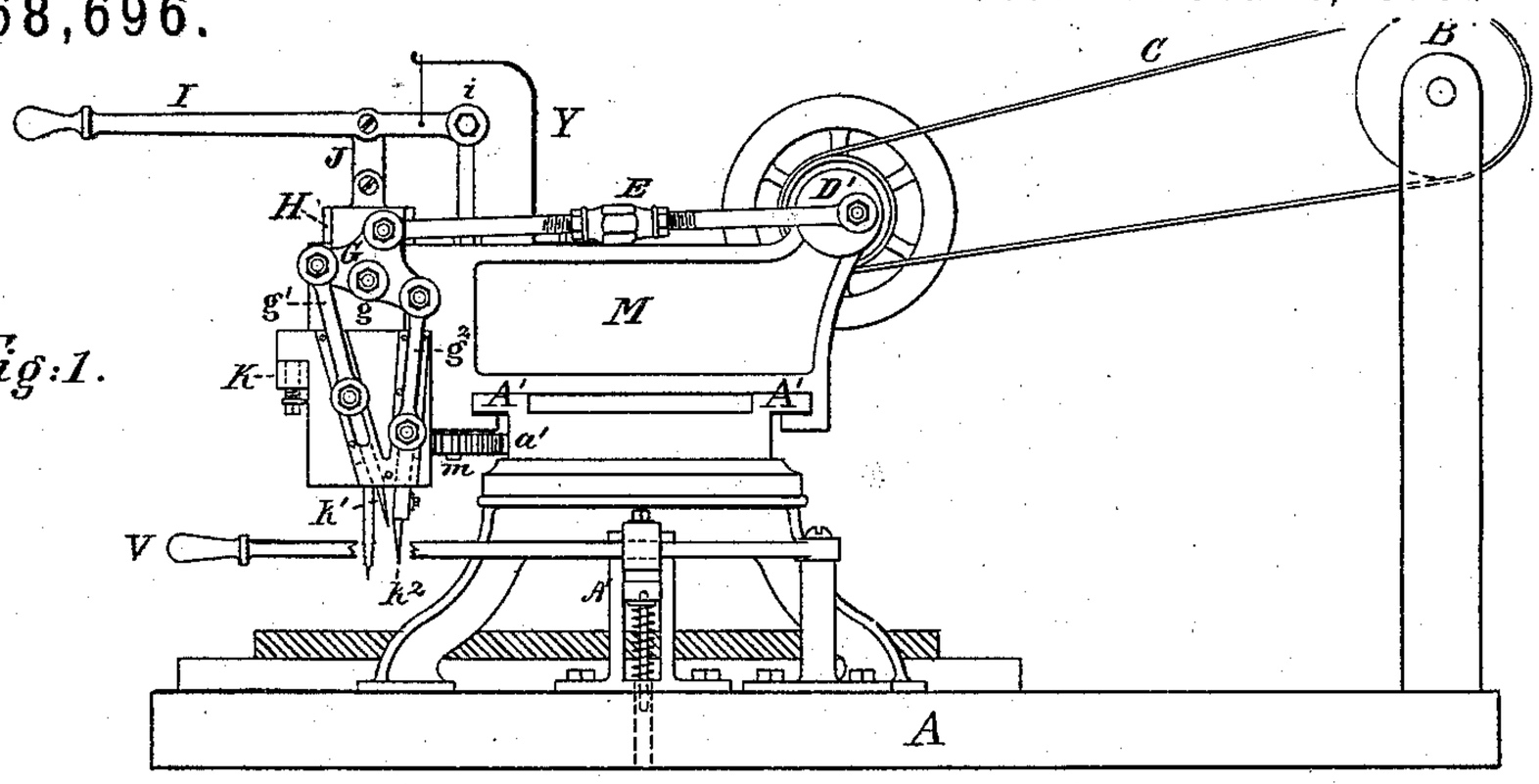
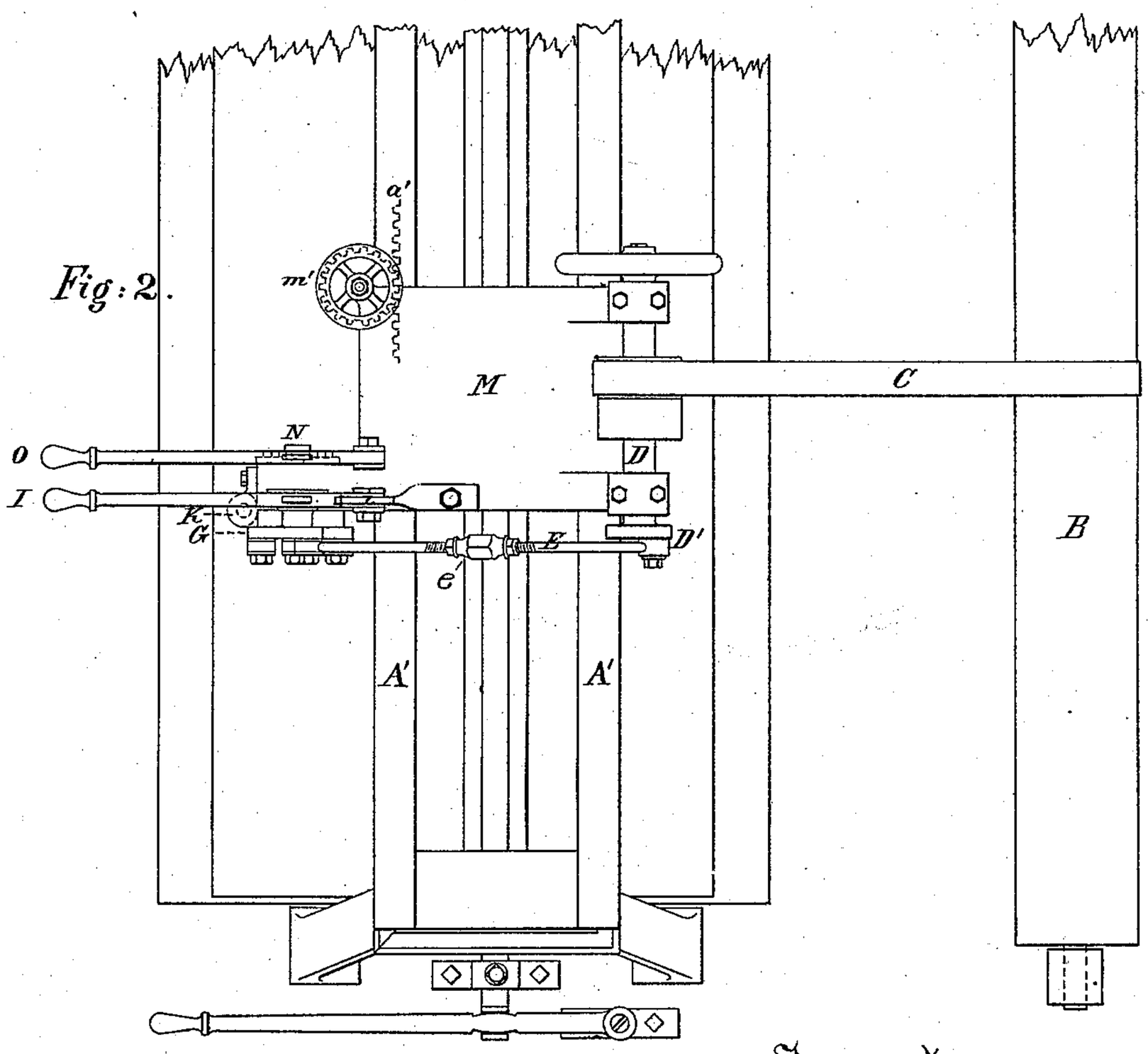


Fig: 2.



Witnesses:

Wm C Dey.

M. A. Van Tamee

Inventors

M. G. Wilder

W. H. McNeil

S. H. Wilder and H. C. Tyler,

by their attorney

V. D. Stetson

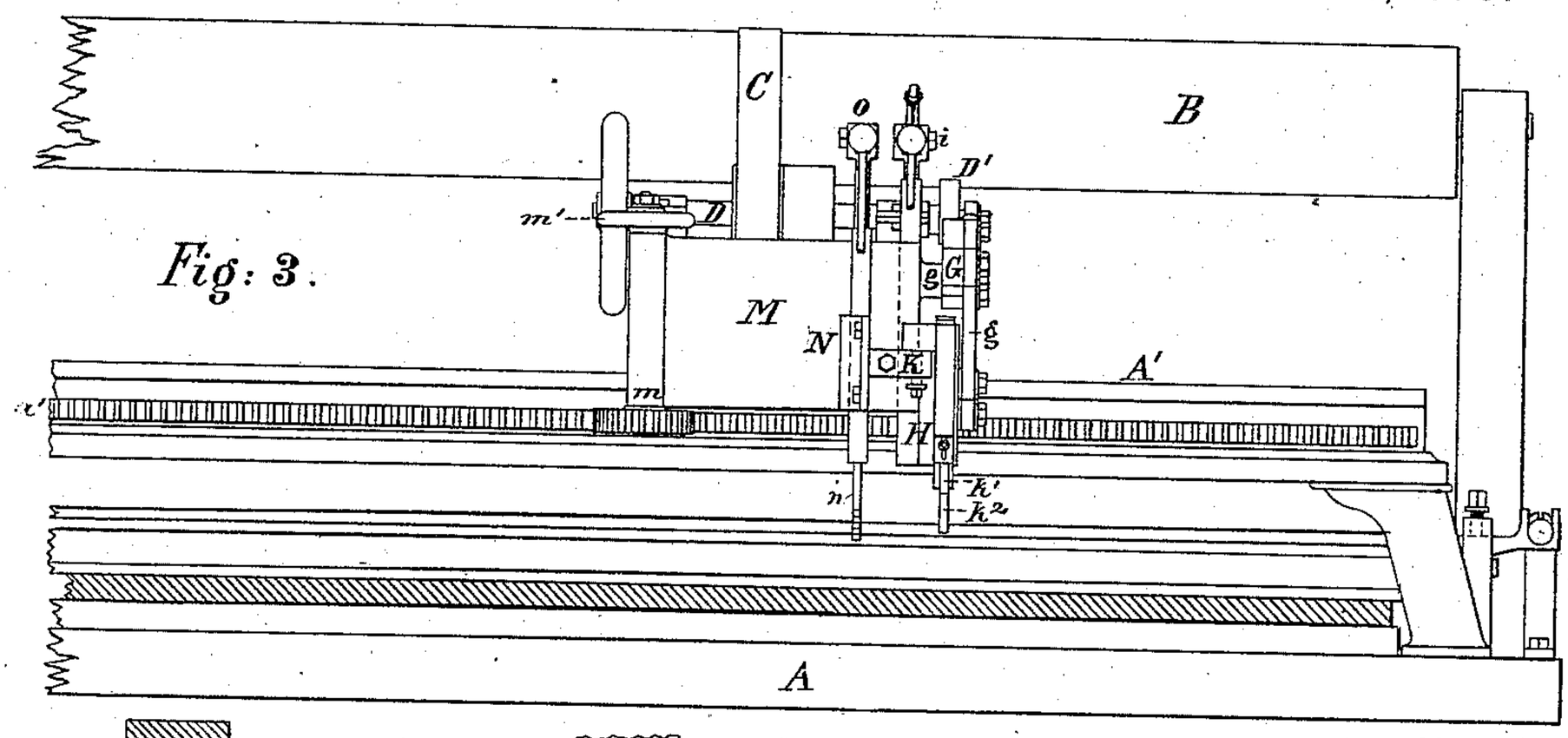
2 Sheets--Sheet 2.

M. G. WILDER. W. H. McNEIL, S. H. WILDER, & H. C. TYLER.

Mortising-Machine.

No. 168,696. Patented Oct. 11, 1875.

Fig: 3.



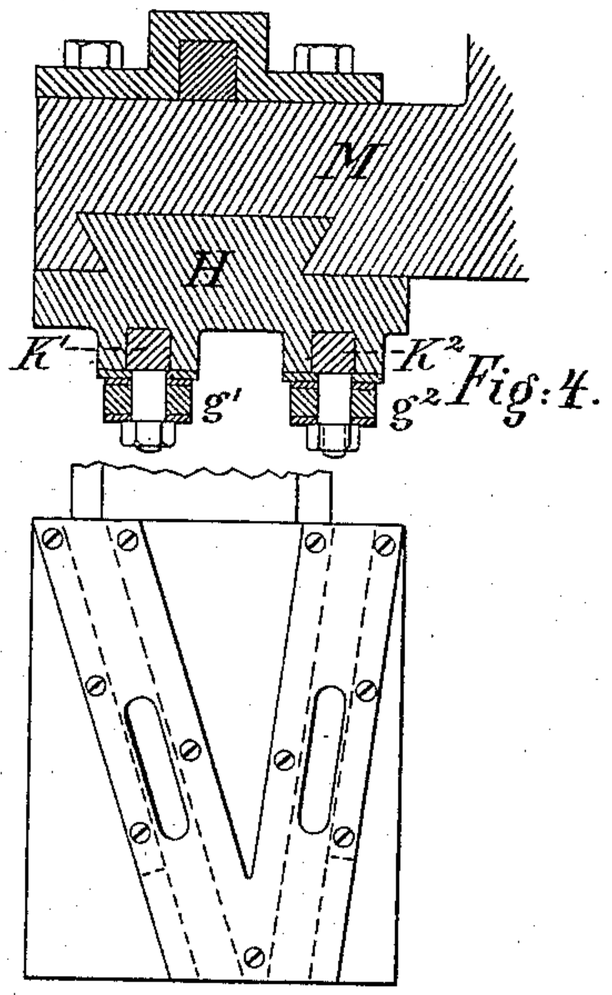
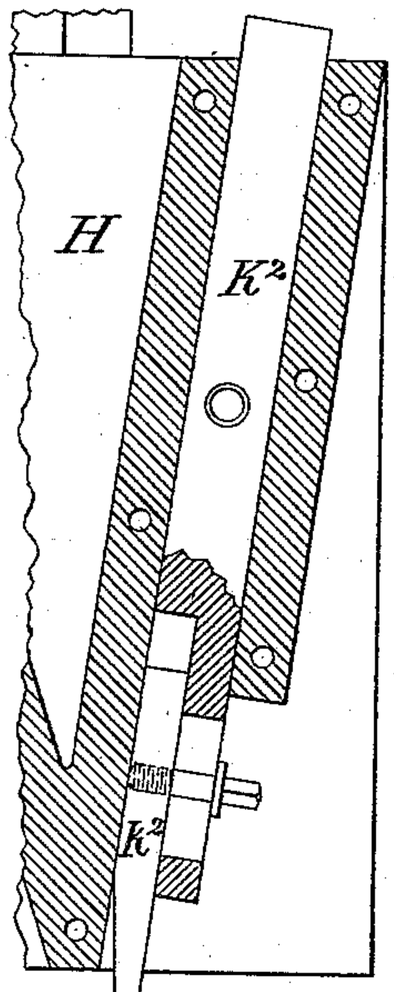


Fig: 4.



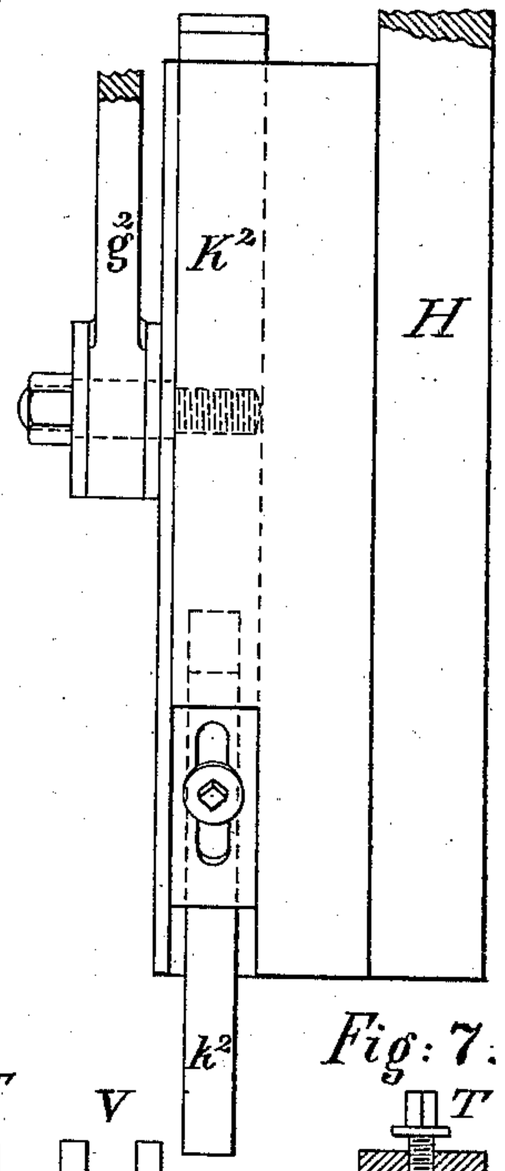
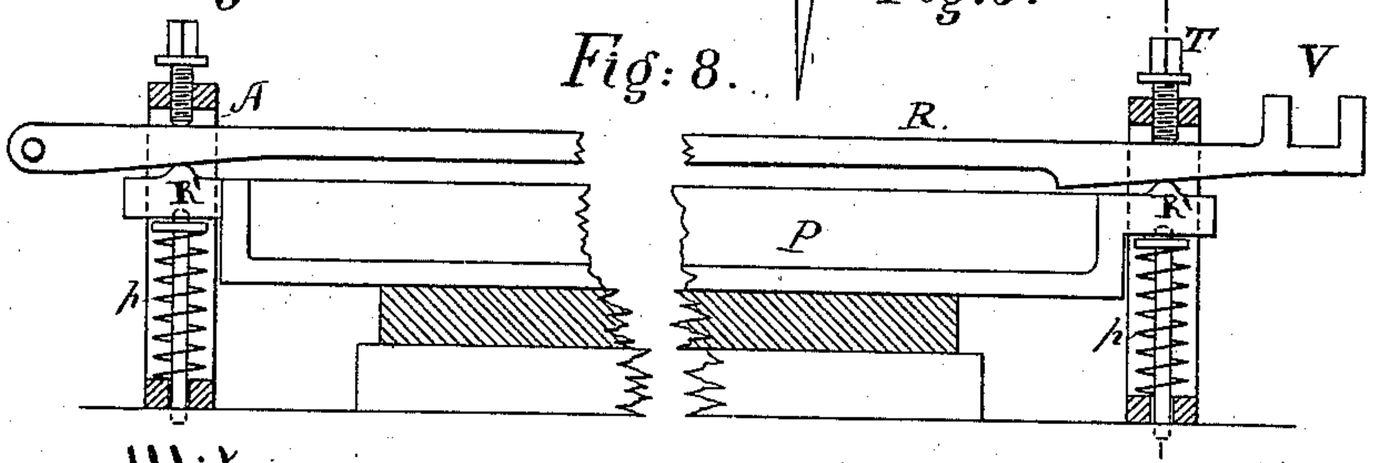


Fig: 5.

Fig: 6.

Fig: 7.

Fig: 8.



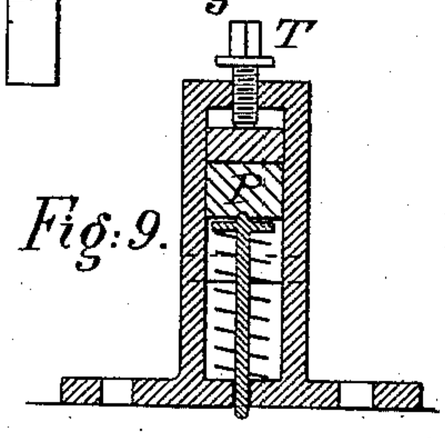


Fig: 9.

Witnesses:
Wm C Dey.
M. A Van Namee.

Inventors
M. G. Wilder.
W. H. McNeil, S. H. Wilder
and H. C. Tyler
by their attorney T. L. Stetson

UNITED STATES PATENT OFFICE.

MOSES G. WILDER, OF MERIDEN, CONNECTICUT, WILLIAM H. McNEIL, OF LANCASTER, MASSACHUSETTS, SALMON H. WILDER, OF MERIDEN, AND HENRY C. TYLER, OF DEEP RIVER, ASSIGNORS TO PRATT, READ & CO., OF DEEP RIVER, CONNECTICUT.

IMPROVEMENT IN MORTISING-MACHINES.

Specification forming part of Letters Patent No. **168,696**, dated October 11, 1875; application filed April 5, 1875.

To all whom it may concern:

Be it known that we, MOSES G. WILDER, of Meriden, New Haven county, Connecticut, WILLIAM H. MCNEIL, of Lancaster, Worcester county, Massachusetts, SALMON H. WILDER, of Meriden aforesaid, and HENRY C. TYLER, of Deep River, Middlesex county, Connecticut, have invented certain Improvements in Mortising-Machines, of which the following is a specification:

The improved machine is designed for making the peculiar cuts which are required in key-boards, for the production of keys for pianos and analogous instruments.

Convenience of manufacture and perfection of result require that keys shall be made from material which is first produced in the form of a broad continuous board. When such board, of even-grained and well-seasoned material, is marked off, the principal portion of the dividing may be done by a fine saw; but the cross-cuts at the end of the short levers or "sharps" require a different mode of separation. The wood should be previously divided along these short lines by a mortise of a V-shaped section, as is well known. The material should be barely divided on one face, which is the upper face of the keys when completed, while the opening should grow wider below, like an inverted V. Such has long been the practice, the mortises being produced by hand.

Our machine produces them by treating the key-board in an inverted position with chisels reciprocated rapidly in oblique guides, so as to give the proper inclined motion to each. The width of each chisel employed is just that of the mortise required. The chisels, with the frame which guides them, and a portion of the mechanism which drives them, are in a single vertically-traversing carriage. While in the highest position the cutters reciprocate rapidly without touching the material. A simple movement of the attendant then gradually depresses the carriage, and the chisels remove the material in the desired V-shaped form. On being depressed so far as to exactly divide the material an adjustable stop arrests the farther descent, and, on being liberated by the hand, it is instantly elevated by a quick-acting spring, and the whole may then be moved along to the place for the next mortise, when the operation is repeated.

The chisels and connected vibrating parts are made as light as is practicable, and the stationary parts immediately adjoining are made peculiarly massive. By giving a very great weight to the fixed parts immediately adjacent to the reciprocating parts we avoid all troublesome vibration or tremor.

We traverse the mortising mechanism along the work while the work is held fixed instead of, as usual, traversing the work in the machine. We have provided also, in combination with these parts, means for conveniently and firmly clamping the key-board along the whole length, and means for drifting the mortise in the head of each long key.

The following is a description of what we consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is an end elevation. Fig. 2 is a plan view; and Fig. 3 is a front view, showing all the principal parts. The remaining figures represent certain portions on a larger scale. Fig. 4 is a horizontal section through a portion. Fig. 5 is a face view corresponding thereto. Fig. 6 is a vertical section, and Fig. 7 is a front view corresponding thereto. Fig. 8 represents the clamping means in front elevation, with central portions broken away; and Fig. 9 is a vertical section on the line *s s* in Fig. 8.

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

A is a stationary framing. B is a long drum driven by a steam-engine or other suitable power (not represented.) This long drum B allows a belt, C, to be traversed from one end to the other thereon, according as the carriage, with the mortising mechanism thereon, is traversed. M is a peculiarly heavy carriage, which may be traversed from end to end of the machine on smoothly-finished ways A′ A′, according as it is actuated by the gear-wheel *m*, which engages in the rack *a′*. The carriage M performs not only the function of supporting the working parts in suitable bearings, but also of effectually defeating, by its

great inertia, the tendency of the high velocities to impart a tremulous motion to the entire machine. Its weight is sufficient to maintain a perfect steadiness, notwithstanding the tendency to tremor induced by the violent reciprocations of the light attached machinery. D is a rapidly revolving shaft, mounted in bearings on the carriage M. It receives motion through the belt C on a pulley, as represented, and communicates a rapid reciprocating motion from a crank, D′, through a peculiar connecting-rod, E, to a triangular lever, G. This lever is mounted on a pivot, *g*, in a vertically-moving slide, H, which is guided in ways in the carriage M, and is governed by a hand-lever, I, which turns on a pivot, *i*, and is connected to H by a link, J. K is a screw, tapped through a lug on the heavy carriage M. It may be adjusted up and down, and forms a stop for the descent of the carriage H and its attached machinery. The lower pins in the triangular lever G are connected by links to slides K^1 K^2, which are mounted in inclined ways on the carriage H. The links are marked, respectively, g^1 g^2, and, like the lever G, slides K^1 K^2, and chisels k^1 k^2, fixed in the latter, should be as light as is practicable. The chisels k^1 k^2, moving in inclined paths, alternate with each other, and both terminate their downward motion at the same line, which line may be raised and lowered by changing the position of the lever I, and consequently the elevation of the slide H and the entire connected machinery. N is a slide, traversing vertically in a suitable guideway, in the carriage M. It carries a drift-tool, *n*, at its lower end, and is connected by links from its upper end to a hand-lever, O, hinged to a post on the carriage M. This drift-tool is carried just the proper distance in front of the chisels k^1 k^2 to drift the holes in the long keys which receive the front pins. An active spring, fixed on the carriage M, is connected by a link to the lever I, and holds the carriage H and its connections up. There may be also a weight, as represented, to contribute to this end, but I prefer, in most cases, to dispense with the weight and depend upon the spring alone, as it can be made to work more rapidly than gravity. The chisels k^1 k^2 are set adjustably in slides K^1 K^2, which traverse in the inclined grooves represented. In setting the chisels in their slides, care should be taken to so adjust them that they will descend to as nearly as may be the same line, one as the other. It will usually, however, be found in practice that a further adjustment is necessary. This is attained by turning the right-and-left nut *e*, which connects the two independent parts of the connecting-rod E. By thus slightly increasing or diminishing the length of the connecting-rod, the descent of the cutters k^1 k^2, relatively to each other, is adjusted with delicacy. Jam-nuts should be used, in connection with the right-and-left nut *e*, to hold the length very firmly after it is adjusted. The carriage M is of an approximately cubical form, and made of a shell of cast-iron filled with lead. This mode of construction, by giving a nearly uniform thickness to the casting at all points, tends to avoid strains due to irregularity in the shrinkage. It is not essential that the thickness of the casting be uniform, or that the filling material be lead, so long as the result is obtained of giving a very great weight and corresponding great inertia to the mass. We find that by this means we can avoid the tendency to vibration and tremor, which is otherwise serious, in consequence of the very rapid vibration of the reciprocating parts.

The key-board, having been inverted and properly marked for the division into separate parts or keys, is held on the framing A, being firmly confined by a clamp, to be described below. The drum B being set in motion, the chisels or cutters k^1 k^2 reciprocate rapidly, but at an elevation too high to be effective, the carriage H being held up by the lever I. The attendant seizes the lever I with the right hand, and the wheel *m′* with the left, and, turning the wheel *m′*, moves the carriage M to one side or the other until the chisels k^1 k^2 are brought over the right position for cutting a mortise, when the lever I is forcibly depressed, and the chisels excavate a V-shaped mortise. The lever I is then automatically raised, and the hand-wheel *m′* is again turned to move the carriage M and its connections into a new position, where the lever I is again depressed to produce a second mortise. The belt C traverses along on the drum B, to allow for these changes of position from one end of the series of mortises to the other. It is thus traversed from mortise to mortise the whole length of the key-board, cutting exactly through the board at each point required. As the descent of the lever I is arrested by the stop the hand of the attendant liberates it, and it instantly returns by the action of the spring Y. The hand-wheel *m′* is turned one way or the other to bring the drift into position, if it is not already so, and the attendant seizes and depresses the lever O, and on again elevating the latter, the hand-wheel *m′* is again turned to move the heavy carriage M and its attached mechanism into the position required to allow the next depression of the lever I.

We have provided means for exerting a clamping-pressure continuously along the whole length of the key-board, near the line of the mortising. This is attained by a clamping-bar, P, which is made with considerable depth along the middle of its length, to give it stiffness in the vertical direction, and, preferably, with its under face slightly rounded down in the center. In practice, we effect this by planing it straight, and then lightly planing the under surface to give it a slight swell. Bearings are provided at each end of the bar P to receive the wedge-like action of two inclined faces formed on a long bar, R, which lies over said bar P, and extends through housings A′, which also serve to

guide the ends of said bar P. Springs *p*, in each of the housings, press up under each end of the bar P, and screws T, tapped through the housings, press either directly or through the intervention of suitable shoes (not represented) upon the upper face of the sliding bar P. A hand-lever, V, pivoted on a post of the framing, furnishes a means for moving the bar R longitudinally, by acting between two pins set in the upper face thereof, near the end.

Moving the hand-lever T to the right depresses the bar P, and moving it to the left again relaxes the pressure of the inclined faces R′ R′ upon the bar P, and allows the latter to be elevated by the force of the springs *p*, and thus to release the key-board.

The level face or table of the framing A, which receives and directly supports the key-board, should be faced with wood. The chisels k^1 k^2, at their lowest descent, terminate their motion exactly in or a very little below the lower face of the key-board. It may be practicable, with extraordinary care, to work the chisels under these conditions, striking against or close down to a metal face, particularly if the face be soft metal; but we esteem it preferable to employ wood as the supporting-surface, and as the wood along the line where the chisels strike becomes removed in consequence of occasional or constant too great descent of the chisels, we insert an easily-exchangeable strip of fine-grain wood along that line.

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

First, by reason of the chisels k^1 k^2, reciprocated in inclined paths, and terminating their motion at a common line, we are able to remove the material smoothly by successive thin shavings, and to make a smooth and perfect V-shaped mortise.

Second, by reason of the adjustable stop K we are able to arrest the sinking of the V-shaped mortise at the point where the wood is completely divided.

Third, by reason of the great weight and inertia of our carriage M filled with lead or other dense material, so as to give a great mass relatively to the mass of the rapidly-reciprocating parts mounted thereon, it is enabled to perform the functions not only of bearings for the mechanism, but also of effectually resisting all tendency to injurious vibration or tremor.

Fourth, by reason of the adjusting-nut *e* on the connecting-rod E we are able to equalize the descent of the chisels k^1 k^2 with great delicacy.

Fifth, by reason of the fact that the cutters k^1 k^2 and their supporting-carriage M are traversed along the ways A′ over the fixed key-board, we are able to act on any desired part of the length of a key-board with a machine which is only of a little greater length. An arrangement in which the key-board (similarly clamped) should be traversed past the cutters would require a length of machine nearly twice as great.

Sixth, by reason of the double wedge-bar R R^1 R^2, springs *p*, adjusting-screws T, and operating lever V, we are able to operate the long bearing or clamping bar P to the required extent with firmness and facility.

Seventh, by reason of the drifting-slide N and its operating means O, carried on the same carriage M, we are able to drift the holes in the key-board in a manner practically simultaneous with the production of the V-shaped mortises, and at one clamping of the key-board.

We claim as our invention—

1. The chisels k^1 k^2, reciprocated in inclined paths, in combination with a supporting-table for holding the work, sliding frame H, and lever I, for bringing the chisels gradually into action to sink a V-shaped mortise, as and for the purposes specified.

2. The adjustable stop K, in combination with the reciprocating cutters k^1 k^2, and frame H and lever I for bringing the same gradually into action, as herein specified.

3. The adjusting-nut *e* in the connecting-rod E, in combination with the crank D′, and the lever G, adapted to allow the equalization of the descent of the obliquely-traversing cutters k^1 k^2, as herein specified.

4. The traversing-carriage M, and the cutters k^1 k^2, and other mechanism mounted thereon, in combination with means B C for communicating power thereto in every position, adapted to traverse along a fixed key-board, and to mortise at any desired point in its length, as herein specified.

5. The clamping-bar P, housings or guides A^2, wedge-bar R R^1 R^2, springs *p*, and adjusting-means T, arranged to serve, relatively to the key-board, as and for the purposes herein specified.

6. The drift-slide N and its operating lever O, in combination with the chisels k^1 k^2 and their operating means, as and for the purposes herein specified.

In testimony whereof we have hereunto set our hands this 10th day of January, 1875, in the presence of two subscribing witnesses.

MOSES G. WILDER.
WM. H. McNEIL.
SALMON H. WILDER.
HENRY C. TYLER.

Witnesses to signature of M. G. WILDER:
GEO. W. CHUTE, Jr.,
CLARENCE J. BROWN.
Witnesses to signature of W. H. McNEIL:
S. R. MERRICK,
A. P. MARVIN.
Witnesses to signature of S. H. WILDER:
JAMES P. PLATT,
ORVILLE H. PLATT.
Witnesses to signature of H. C. TYLER:
GIDEON PARKER,
W. J. DIXON.