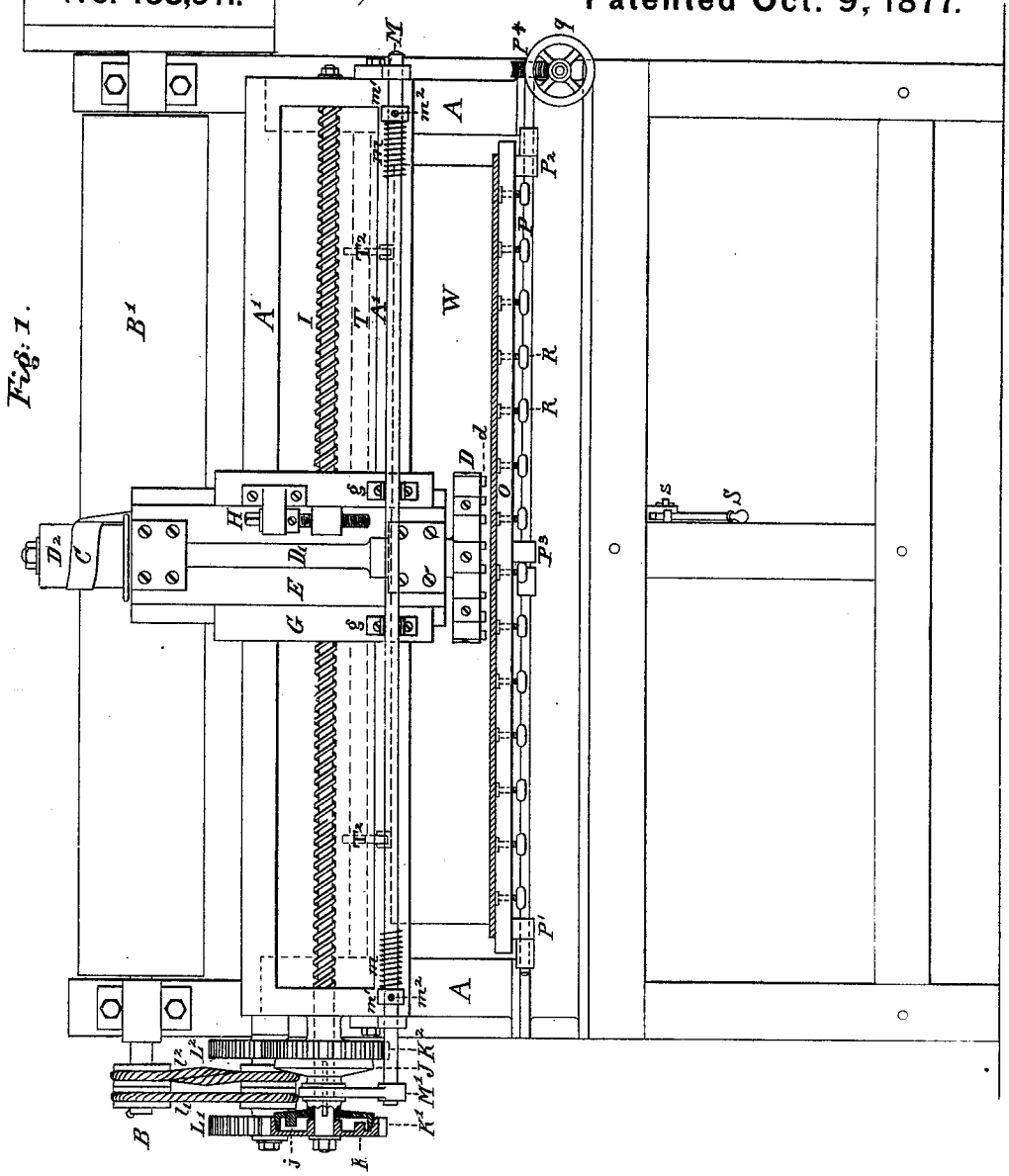
2 Sheets—Sheet 1.

M. G. WILDER & W. H. McNEIL.

Machines for Dressing Piano-Keys.

No. 195,911. **Patented Oct. 9, 1877.**

Fig. 1.



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2 Sheets—Sheet 2.

M. G. WILDER & W. H. McNEIL.

Machines for Dressing Piano-Keys.

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Fig: 3.

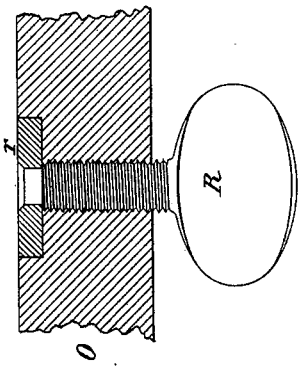
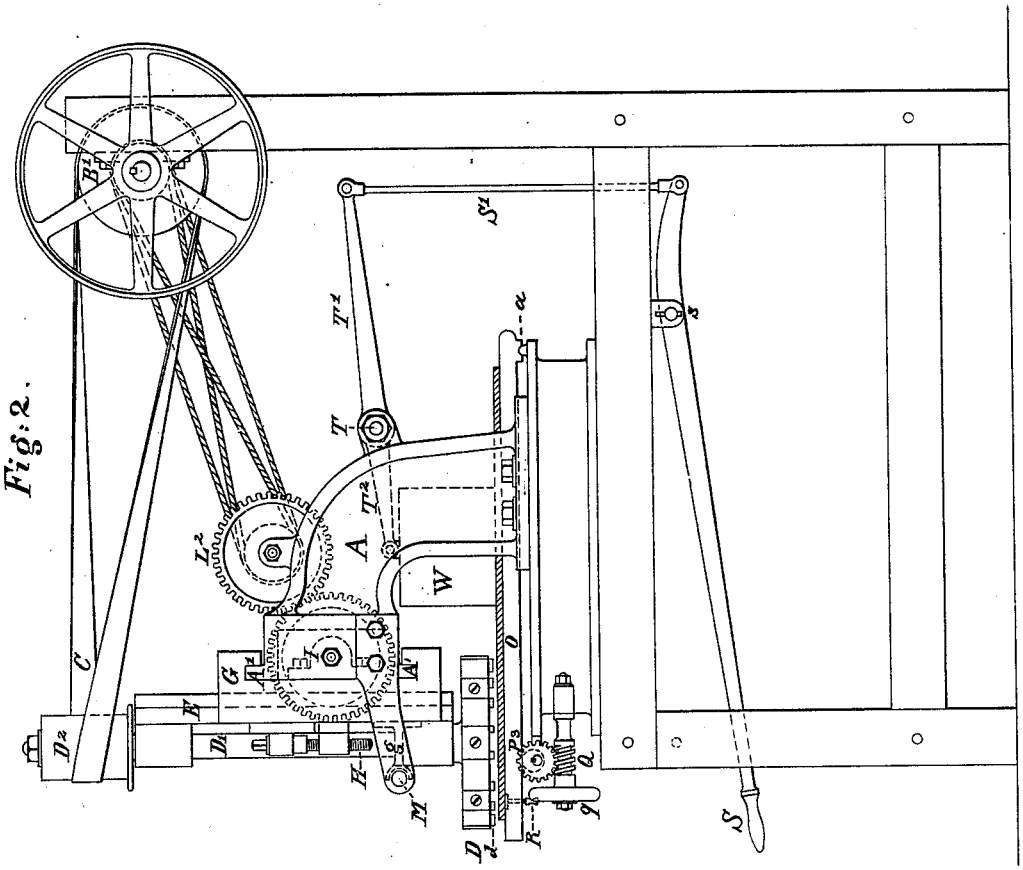


Fig: 2.



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UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN MACHINES FOR DRESSING PIANO-KEYS.

Specification forming part of Letters Patent No. **195,911**, dated October 9, 1877; 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, and WILLIAM H. McNEIL, of Lancaster, Worcester county, Massachusetts, have invented certain Improvements relating to Machines for Dressing Piano-Keys, of which the following is a specification:

The improved planing-machine is especially adapted for use in planing the upper surfaces of the keys of pianos and analogous instruments. As is well known, the entire set of keys for a piano is ordinarily made in one piece, called a "key-board." The surfaces which are exposed to view are coated with thin pieces of ivory, firmly glued. After this is effected it is important to reduce the surfaces of the whole to a plane, or very nearly a plane, condition.

We effect the reduction of the surface by mounting a circular series of suitable cutters or scrapers in a disk fixed on an upright spindle, with means for imparting a rapid rotary motion thereto, and with provisions for feeding the spindle and its connections forward and backward along the surface of the keys. We provide means for automatically reversing the traverse of this mechanism, so as to move gradually backward and forward several times over the surface. There are, furthermore, provisions for gradually lowering the spindle and cutters as the work proceeds.

We also provide for slightly tilting the table on which the key-board rests, so that the front of the exposed tops of the keys shall be planed down more or less than the back, as required by the conformation of the wood or other cause.

We provide for holding the key-board very firmly by a heavy weight, which is lowered upon the key-board behind the surface to be dressed. This weight forms a clamp, which not only seizes the board by its gravity, but also, by its inertia, affords a valuable resistance to any vibration which might otherwise be experienced.

Very gradual undulations in the finished surface of the keys can be tolerated.

It is important to connect the level, and also the inclination, of each key so that it shall correspond with the adjacent key upon each side; but it would be in many cases a needless labor, and would, in some cases perhaps, plane quite through the thin ivory, if, without any further provision, the planing or scraping cylinder were to run backward and forward over the surfaces until all the parts have been touched and sufficiently dressed.

We find that the work may be satisfactorily done with the low portions of the surface gently sprung upward by means applied with sufficient delicacy and firmness below, and thus the planing may be effected with the board held in a slightly-contorted position.

We use the term "tempering" as applied to this mode of holding the board, and employ a set of adjustable screws, which we term "tempering-screws," bearing, by sufficiently wide bearing-pieces, against the under surface of the key-board.

In effecting the reversing of the traverse, we mount on the screw or helically-threaded feed-shaft a feathered piece, which is conical at each end, with means for moving it endwise. It is moved by the cutter-carriage alternately in opposite directions as the cutter-carriage approaches the ends of its path.

Moved in one direction, one cone engages in a corresponding conical cavity in a feed-wheel driven in one direction. Moved in the opposite way, the other conical surface engages in a corresponding gear-wheel driven the other way. The screw-feed thus gets a motion alternately in opposite directions. The attendant can, at will, make it reciprocate without traversing the whole length of its path, by moving the double conical piece by hand, to cause the cutter-wheel to reciprocate more over one part of the board than over another.

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 a front view of the machine with a key-board in place; and Fig. 2 an end view of the entire machine. Fig. 3 represents one of the temper-screws on a larger scale.

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

A is the fixed frame-work of the machine. B is the main driving-shaft, receiving motion from a belt (not represented) on a pulley and loose pulley, and carrying a long drum, B′, extending the whole length of the key-board, upon which drum the belt C may traverse, giving motion, by means of the pulley D^2, to the upright spindle D^1, which carries, at its lower end, the cutter-wheel D, with the cutters *d* projecting from its lower face.

The spindle D^1 and its connections are mounted in bearings in a vertically-adjustable carriage, E, which, in turn, is mounted in a horizontally-traversing carriage, G, traversing on guideways A′, formed on a fixed portion of the framing. A screw, H, taking hold by suitable collars on a lug on the carriage G, is tapped through a lug on the carriage E, and by turning this screw in one direction or the other the carriage E, and consequently the plane in which the lower edges of the cutters *d* work, is raised or lowered. The carriage G is threaded to receive the feed-screw I, which is mounted in fixed bearings in the frame-work. A double conical piece, J, is feathered on the feed-shaft I, so that it may move loosely endwise thereon, and compels the feed-shaft to revolve with it. The coned ends of this piece J match in corresponding cavities in gear-wheels K^1 K^2, which are mounted loosely on the feed-shaft, and receive motion from the wheels L^1 L^2, revolving loosely in opposite directions on a fixed stud, by the open and cross belts l^1 l^2.

M is a movable rod, held by two bearings on the frame-work, and extending along the front of the machine, with an arm, M′, taking hold by its forked end in an annular groove in the feathered piece J.

The attendant can at will cause the carriage G and its connections to commence slowly traversing in either direction by simply grasping the rod M and moving it forcibly to one side or the other, which will cause the feathered piece J to engage with the adjacent gear-wheel K^1 or K^2.

In the absence of any such attention, the machine automatically changes its traverse. This is done by the arms *g*, which extend out from the carriage G, and after the carriage has traversed the entire length of the key-board strikes against one of the coiled springs *m*, or a movable collar attached thereto, and, continuing its motion, compresses the spring, and imparts sufficient force to move the rod M in the direction requisite to reverse the motion. There are two of the springs *m*, and each is attached to a collar, m^1, which is adjustable in different positions on the rod M by means of the pinching-screw m^2.

One arm *g* may be made to serve in lieu of two by mounting the springs *m* so that each shall be struck by it alternately.

To better insure the engagement of the double conical piece J with the gear-wheels K^1 K^2, we provide, in addition to the friction before described, two sets of positive stops, *j* *k*, each set fixed, one on the gear-wheel K^1 or K^2, and the other on the feathered double conical piece J. These are so related that on moving the piece J endwise in either direction it disengages or unclutches from one of the gear-wheels and engages with the other. We thus obtain a combination of a friction-clutch with a positive-clutch action, which serves very efficiently.

O is a thick broad table, of cast-iron or other suitable rigid material. Its rear end is mounted on a ridge, *a*, on the fixed frame-work A, which ridge is semi-cylindrical, and supports the back at a fixed elevation, while the front can be raised or lowered. The front of the table rests on cams or eccentrics P^1 P^2 P^3, which are fixed on a shaft, P, mounted in bearings on the framing A. One end of this shaft P is a worm-wheel, P^4, which receives motion from a worm, Q, which is operated by the hand-wheel *q*. By turning the wheel *q* the eccentrics P^1 P^2, &c., may be made to raise or lower the front edge of the table O. This movement changes the inclination of the table. The change of elevation accompanying this adjustment is easily compensated for by correspondingly turning the screw H, and thus raising or lowering the cutters *d*.

A series of temper-screws, R, tapped through the table O near its front edge, carry on their upper ends broad plane-faced disks or bearing-pieces *r*, which may be lowered so as to sink with their upper surfaces flush with the general surface of the table O, or may be raised one-eighth of an inch (more or less) above it, according as the corresponding portion of the key-board requires to be lowered or held up to the work.

S is a hand-lever, turning on the fulcrum *s*, and connected by a link, S′, to an arm, T^1, keyed on a shaft, T, capable of rocking a little in bearings in the frame-work. Arms T^2 T^2 extend forward from the shaft T, and are hinged, at their forward ends, to a long and massive weight, W. The under face of this weight is plane; and the weight, being hinged to the arms, is at liberty to accommodate itself to the slight changes of inclination of the table O, and, consequently, of the key-board supported thereon.

To plane a key-board, the wheel D, with its cutters *d*, is elevated, and the weight W being also elevated, a key-board is thrust in under both, and the weight W lowered upon it, thus holding it firmly upon the table O. The machine being set in operation, the cutter-wheel D is gradually lowered until the cutters *d* commence to touch the ivory, when the bar M is pushed to one side or the other, and the feed-screw I commences to reciprocate the carriage G and its connections backward and forward. The carriage E and its connections being lowered by degrees, it soon appears that portions of the surface of the key-board are lower than others, and require to be tempered up. The hand of the attendant is ap-

plied to the wheels on the corresponding temper-screws R, and by turning them a little the low portions of the key-board are raised. If it is found that the front ends of the ivories become dressed sooner than the back ends, the attendant applies his hand to the wheel *q*, and, by turning the eccentrics P^1 P^2, &c., lowers the front edge of the table O a little, following it by an adjustment of the screw H to correspondingly lower the cutters *d*, until the whole upper surface of the ivories on the top of the key-board is smoothly planed. Then the carriage E is run up to a sufficient height to allow the free removal of the key-board; and on raising the weight W the key-board is free to be removed and a new one inserted.

We claim as our invention—

1. The carriages E and G, in combination with the depressing-screw H, work-supporting table O, cutters *d*, shaft D^1, pulley D^2, and feed-shaft I, for traversing them backward and forward on the table, as herein specified.

2. The temper-screws R, with the bearing-pieces *r*, in combination with work-supporting table O and cutters *d*, as and for the purpose specified.

3. In combination with the cutters *d* and their operating means, the tilting table O and operating means P P^1 P^2, arranged to support the key-board at different inclinations, as herein specified.

4. The gravity-clamp W and means for operating it, in combination with the tilting table O and cutters *d*, as herein specified.

5. The arms *g g*, in combination with the carriages G and E, and rod M, arm M′, collars m^1 m^1, and springs *m m*, as and for the purposes specified.

In testimony whereof we have hereunto set our hands this 26th day of December, 1874, in the presence of two subscribing witnesses.

MOSES G. WILDER.
WM. H. McNEIL.

Witnesses to signature of M. G. Wilder:
WM. C. DEY,
CHAS. PLACE.

Witnesses to signature of W. H. McNeil:
S. R. MERRICK,
A. P. MARION.