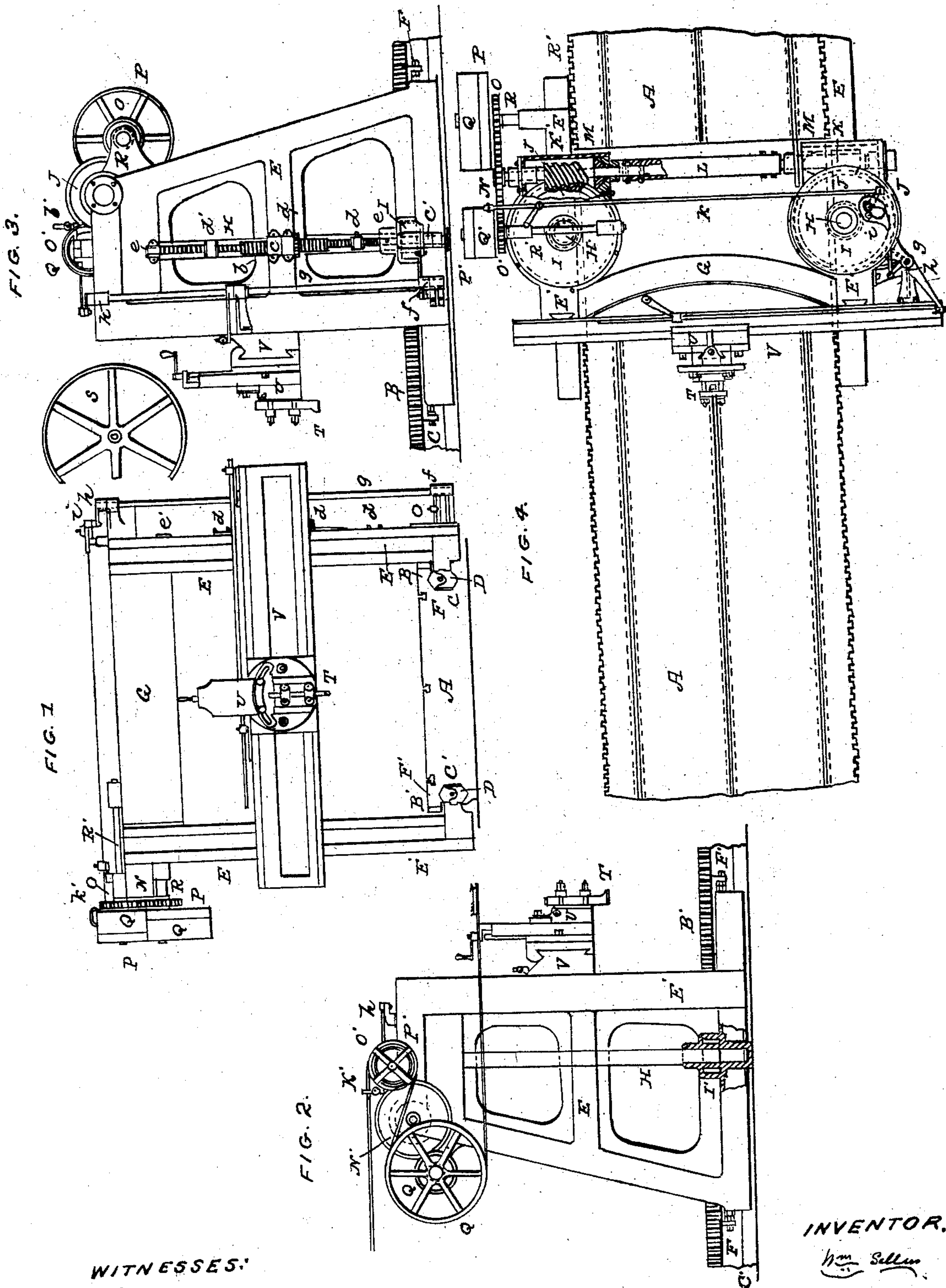


W. SELLERS.
Machine for Planing Metal.

No. 55,723.

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WITNESSES:
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IMPROVEMENT IN PLANING-MACHINES.

Specification forming part of Letters Patent No. 55,723, dated June 19, 1866.

To all whom it may concern:

Be it known that I, WILLIAM SELLERS, of the city of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Machines for Planing Metal; and I do hereby declare that the following is a full and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the figures and letters of reference marked thereon.

In nearly all planing-machines for metal the work is fastened to a table sliding back and forth on ways which control its position. To the ways are secured uprights, and to the uprights are fastened what is termed the "cross-head," this being the cross-slide of the compound slide-rest holding the planing-tool. The cross-head is adjusted upon the uprights at varying distances above the table to suit the size of the work to be planed.

Some few machines have been built with the cross-head attached to slides moving and guided in ways fastened to walls of masonry, motion being communicated to the slides and cross-head by means of screws or chains attached to and supported by the ways, and the materials to be planed resting on platforms in the pit formed by the side walls. The cross-head having no vertical adjustment, the platforms which support the work are raised or depressed to suit the varying heights of the material. A modification of this form has also been employed—that is to say, in order to decrease the depth of the pit, short uprights have been used, sliding in ways on top of the walls, the cross-head having an adjustment vertically upon these; but all machines of this class have heretofore used platforms to support the material to be operated upon, which are either adjustable in height to suit the varying heights of the material, or require that this, when small, should be elevated above the platform to come within reach of the planing-tool.

Supposing the disadvantages overcome in this form of machine, it would be found well adapted to the heavier class of work, as it would take up much less room, the moving parts could always be of the same weight, and generally much lighter than the work to be

operated upon, so that it would require less power to drive it.

The object of my invention is to overcome the disadvantages in this class of planing-machines; and the nature of it consists in supporting the work to be operated upon on a stationary platform and the cross-head upon uprights or posts, as in machines of ordinary construction; but these uprights are so arranged as to slide in ways provided for that purpose in the sides of the stationary platform, so that the slides which govern the position of the tool are below the work to be operated upon in place of above it, as heretofore, and the cross-head can be elevated and depressed upon the uprights to suit the varying heights of the work, in place of elevating and depressing the platform.

The nature of my improvement, and the method adopted by me for moving the uprights and cross head so as to perform the work required, will be more clearly understood from the following description, with the accompanying drawings, in which—

Figure 1 is a front elevation. Figs. 2 and 3 are side elevations. Fig. 4 is a plan of the machine.

Similar letters in each figure refer to similar parts.

The bed of the machine A A, Figs. 1 and 4, upon which the work to be planed is fastened, has on either side of it racks B B' and planed ways C C'. In the ways C C' are fitted slides D D', to which the uprights E E' are firmly bolted.

The slides D D' are made to fit the ways C C' accurately by means of tapered shoes F F' on their upper side. At the top the uprights E E' are secured together by means of a cross-girt, G. In each of the uprights E E' are vertical shafts H H', at the lower end of which are driving-pinions I I', gearing with the racks B B', while on the upper end of the shafts are worm-wheels J J' inclosed in cases in the uprights. These cases are to retain the oil used in lubricating.

The two worm-wheels J J' are driven by worms K K', one being right and the other left hand thread. The two worms are united by a sleeve, L. Each of the worms K K' is provided with a step-plate, M M', to receive

the thrust, which step-plate is made of a spherical form on its back part, to insure a perfect fit on the rubbing-surface next to the worm.

The shaft of the worm K' extends through its case, and has at its outer end a spur-wheel, N . The wheel N has on its opposite sides two pinions of the same size gearing into it, O and O' , the one, O , running loose on a stud, R , attached to the uprights, but having fast to it a narrow-faced pulley, P . Outside of P , on the same stud, runs a loose pulley, Q , of double the width of face of the pulley P . The other pinion, O' , is fast to a shaft, R' , which is carried by bearings in the top of the upright. This shaft has also, outside of the pinion O' , a fast pulley, P' , and a loose pulley, Q' , of the same width face as the pulleys P and Q , but so placed as to have each fast pulley opposite to the loose pulley of the other set.

The pulleys P and Q are twice as large as the pulleys P' and Q' . The top of the small set of pulleys P' Q' is somewhat above the top of the pulleys P and Q , so that a belt passing clear of the large pulley and around the small pulley, then back around the large pulleys P Q , in the manner shown in the drawing, and running continuously in the direction indicated by the arrow, will turn one set of pulleys in one direction and the other set in the opposite direction. The two loose pulleys Q and Q' being twice as wide as the fast pulleys P and P' , the belt being somewhat narrower than the face of the fast pulleys, if it be shifted to run on the fast pulley P , its other turn will be on the loose pulley Q' . In this condition the pinion O will drive the spur-wheel N , giving motion through the worm and worm-wheels to the pinions I I' , which gear with the racks B B' of the table, and will thus drive the uprights in one direction, which should be in the direction of cut. If the belt be now shifted off the fast pulley P its own width only, it will run on the two loose pulleys Q Q' , thus giving no motion to the worm; but upon shifting it still farther until it drives on the small fast pulley P' , its other turn will be still on Q , and the uprights will be driven back at twice the velocity with which they were carried forward.

The driving-belt, which is to run continuously in one direction, can pass around a large pulley, S , at one end of the limit of motion of the machine, and over a small one, S' , at the other end. Either of them may be made the driver.

The cutting-tool T is carried in a slide-rest, U , which is arranged in reference to the cross-head V precisely as in ordinary planing-machines, and the cross-head V can be raised or lowered by screws in the uprights, and may have clamping-screws to hold it fast at any desired height.

In order to make the machine automatic in its backward and forward motion, and to readily alter its length of stroke to suit the work to be planed, a hollow screw, b , is provided, the nut c of which is attached to the upright, and motion is given to this screw by means of

spur-wheels d , one of which is on the vertical shaft H' , the other in a sleeve feathered to the screw b . The number of threads in the length of screw b must be in excess of the number of revolutions the driving-pinions I I' will make in running the whole length of the bed. At both ends of the screw b are clutches, and through the center of the screw passes a vertical shaft, e , with a thread cut on it of the same pitch as that of screw b . This screw is provided with a stationary nut, e' , fast to the upright at its upper end, and its lower end is supported in bearings, between which is held a lever, c' , through the hub of which the shaft e is feathered. Upon the screw of shaft e are two adjustable nuts, one above and the other below the hollow screw b , as at d' d'' . These are provided with clutch-projections to match those on the screw b , and are arranged to be clamped fast to the screw e at any position. The lever c' is connected by a link to the lever f at the foot of a vertical shaft, g . At the top of g is a similar lever, h , united by a link to a belt-shifter cam, i . This in vibrating back and forth actuates a lever, j , thus giving motion to the belt-shifter rod k , carrying at its other end the fork or eye k' , through which the belt passes, this arrangement of cam and lever i and j being the same as that patented by me for belt-shifting motion December 16, 1862.

The operation of this belt-shifting machinery is as follows: As the planing machinery advances along the bed in either direction the screw b , revolving, advances toward one of the stationary nuts d' until it comes in contact with its clutch-projection. It will then turn the shaft e , screwing its upper end in the nut e' in the same direction as the screw b has been moving, and at the same time, through the various levers and cam f , g , h , i , and j , to the belt-fork k' , shifting the belt and starting the machine in the opposite direction, when the screw b will recede from the nut d' , with which it had been engaged, and advance toward the other nut, d'' , which should have been so placed as to be at the other desired limit of the planer-motion, the adjustment of these nuts in their position on the upright shaft e determining the stroke of the planer.

In a planing-machine arranged as above described the bed of the machine upon which the work is placed sets above the floor of the shop. Upon this it can be readily adjusted, with no side walls to interfere with the handling of the mass when it is large and unwieldy.

This machine takes up less room than planers of ordinary construction, as it will plane a length equal to its own length less the length of the base of the upright, while in planing-machines with the tool stationary and the work movable the space required in length is equal to twice the longest length the machine is capable of planing. Thus, in my form of machine, if the base of the upright is eight feet, to plane fifty feet would require a length of shop-room of fifty-eight feet, while, on the

old style of machine, to plane fifty feet the space occupied would be one hundred feet. The racks on the opposite sides of the platform for the work, with the two spur-pinions, in connection with the worm-wheels and worms above, insure a perfect parallelism of the movement of the machine. The endless belt, with the peculiar arrangement of fast and loose pulleys, gives motion to the machine in an efficient manner, and with less weight of machinery than in any heretofore-devised plan of conveying motion from a fixed power to the similarly-moving part of a machine. The peculiar manner of operating the stops which control the length of movement and reversal of the planing machinery has great advantages.

In all planing-machines for metal where the work moves under the cutting-tool the shifting-stops are attached to the movable platform upon which the work to be operated upon is supported, and they operate the belt-shifter by coming in contact with it, or a connection from it, as the stops move with the platform, while in machines where the tool moves over the work the arrangement of shifting-stops is the converse of the former, the connection from the belt-shifter extending the whole length of the bed, and is provided with adjustable stops, with which the moving parts come in contact, the method of shifting the belt being substantially the same in both cases. I have described this as being accomplished by the screw *b*, shaft *d*, and nut *d'*; but it must be evident to any ingenious mechanic that other devices could be arranged to accomplish the same purpose, the theory of operation consisting in operating the stops for reversal from some revolving shaft on the traversing uprights which has a movement proportioned to the total longitudinal movement of the planing-machine. Hence I do not limit my claim to the special device described, nor to the peculiar method described for conveying the motion from a fixed power to

the movable uprights, as it is evident that where machines of very great capacity are required it might be more desirable to place a steam-engine and boiler or other prime mover upon the movable uprights, and in connection with any of the revolving shafts suitable for the purpose, and apply the shifting or reversing movement to the valve of the engine in place of the belt.

Having thus fully described my invention, I desire it to be understood that I do not claim the use of a planing-machine in which the cutting-tool traverses over the work, that having been done before; but

What I do claim as new, and desire to secure by Letters Patent, is—

1. The use in planing-machines for metal of traversing uprights to support the cross-head, and upon which the cross-head may be elevated and depressed to suit the varying heights of the material to be operated upon, in combination with a fixed platform provided with ways, slides, or their equivalents, arranged so as to avoid the necessity of raising the materials to be operated upon from the platform so as to come within reach of the cutting-tool, all constructed, arranged, and operating substantially as described.

2. Actuating the traversing uprights of the planing-machines for metal herein described from a revolving shaft or shafts attached to and moving with the uprights, substantially as described.

3. The use of an endless belt, in combination with fast and loose pulleys, or their equivalents, when applied to the planing-machines herein described, substantially in the manner and for the purpose specified.

4. Reversing the direction of the movement of the cutting-tool by means substantially as described, and for the object specified.

WM. SELLERS.

Witnesses:

THEODORE BERGNER,
COLEMAN SELLERS.