C. H. Usher.
STOP MOTION FOR PLANNERS AND THE LIKE.
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WITNESSES:

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To all whom it may concern:

Be it known that I, CHARLES H. USHER, a citizen of the United States of America, and a resident of Chicopee Falls, county of Hampden, and State of Massachusetts, have invented certain new and useful Improvements in Stop-Motions for Planers and the Like, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to stop motions for planers and kindred machine tools, and consists in a novel means for stopping further feeding movements of the cutting tool after feeding movements to a predetermined extent have been imparted thereto.

The main objects of my invention are to simplify and perfect mechanism of this description, to provide a simple mechanism which may be applied indifferently to the vertical or cross feed means, to provide for the ready adjustment of the stop motion means for operation at any predetermined point, and to so construct, connect, and arrange the parts that once the stop motion means has been adjusted, movements of the machine tool parts thereafter in a readjustment of the tool, or other movements not brought about by the ordinary operation of the feed mechanism, will not change or affect the relative adjustment of the stop motion means.

In order that my invention may be fully understood, I will now describe an embodiment thereof, having reference to the accompanying drawings illustrating the same, and will then point out the novel features in claims.

In the drawings: Figure 1 is an end view of a stop motion constructed in accordance with my invention, showing a portion of a planer to which it is attached. Fig. 2 is a view in rear elevation thereof. Fig. 3 is a view thereof in horizontal section upon the plane of the line 3–3 of Fig. 1. Fig. 4 is a view thereof in horizontal section upon the plane of the line 4–4 of Fig. 1. Fig. 5 is a top view of certain parts of the mechanism. Fig. 6 is a view in vertical transverse section upon the plane of the line 6–6 of Fig. 4.

Reference character 10 designates a portion of the planer frame, being a part of one of the vertical standards thereof, 11 the vertically movable cross-rail which is mounted to slide in vertical ways in the frame standards, and 12 the tool carriage saddle which is mounted to slide transversely in horizontal ways in the said cross-rail. Vertical tool feed movements of the tool are effected by moving the cross-rail vertically in the frame, while horizontal tool feed movements are effected by moving the saddle horizontally on the cross-rail,—and these two movements are accomplished by and in the rotational movements of two horizontal shafts 19–14 horizontally mounted in the cross-rail 11, one above the other, the lower shaft 13 effecting the transverse feeding movements and being termed herein the cross feed shaft, and the upper shaft 14 effecting the vertical feeding movements and being termed herein the vertical feed shaft. The intermediate mechanism between the said shafts and the parts moved thereby is not shown in detail herein as being well known, and constituting no part of the present invention.

The means by which the cross and vertical feed shafts are driven comprises a vertically reciprocating rack bar 15, a pinion 16 in constant mesh therewith, the said pinion being secured to a short horizontal shaft 17, at one end thereof, a gear wheel 18 secured to the said shaft at the other end thereof, a gear wheel 19 in constant mesh therewith, and loosely mounted upon the shaft 13, a sleeve 20 also loosely mounted upon the shaft 13, a pinion 21 mounted upon the said sleeve and secured fast thereon, a pinion 22 secured fast upon the shaft 14 and in constant mesh with the pinion 21, and ratchet and pawl mechanism including ratchet wheels 23–24 mounted fast upon the shaft 13 and the sleeve 20 respectively and pawls 25, 25, for respective engagement therewith, the said pawls being carried by an arm 26 secured to the hub 27 of the gear wheel 19.

In the operation of the planer the rack bar 15 is given a constant movement of reciprocation, the effect of which is to oscillate the gear wheel 19 and the pawl carrying arm 26. By adjusting the pawls 25, or either of them, into engagement with their respective ratchet wheels, and in either direction with respect thereto, intermittent step by step feeding movements are imparted to the cross feed shaft 13 or the ver-
tical feed shaft 14 or both of them, all as will be well understood by those skilled in this art.

The mechanism so far described is common in the planer art, being contained either in the precise form shown, or in mere mechanical variations thereof in standard forms of planers, substantially the precise mechanism illustrated and described being found in the well known "Whitcomb" planer.

The stop motion mechanism is as follows: Mounted fast upon the cross feed shaft 19 and the sleeve 20 respectively, are two pinions 28—29, either one of which, as will presently appear, is adapted for intermeshing engagement with a spur gear 30. In the drawings (see Fig. 4) the pinion 28 is shown in such intermeshing relation therewith. The spur gear 30 is mounted fast upon a shaft 31 (see Fig. 6), the said shaft being rotatably mounted in a bearing in a bracket 32, secured to the rear face of the cross-rail 11. Mounted upon the opposite end of the shaft 31 in splined relation therewith, is a worm 33, the teeth of which are disposed in mesh with the teeth of a worm wheel 34. The worm wheel 34 is mounted upon a short horizontal shaft 35 to the opposite end of which is secured a pinion 36. The shaft 35 is rotatably mounted in a bracket 37, which bracket also carries a horizontal fixed bearing stud 38 whose axis is at right angles to the axis of the shaft 35.

A crown toothed gear wheel 39 is freely mounted upon the said stud 38, the teeth thereof being arranged to intermesh with the teeth of the pinion 36. Pivotedly mounted upon an arm of the bracket 37 is a bell crank lever, one arm 40 of which is in pivotal engagement with a vertical latch 41 and the other arm 42 of which has its extremity arranged for engagement with a cam projection 43 which extends radially from the periphery of the gear wheel 39. The lower end of the vertical latch 41 extends into the bearing for the shaft 17, and is arranged to be normally received within an annular groove 44 in the said shaft. The length of that portion of the shaft 17 between the pinion 16 and the gear wheel 19 is greater than the length of the bearing for the shaft, whereby the shaft may have a longitudinal movement in the said bearing as well as its normal rotational movement. The extent of this movement is such as to permit the pinion 16 to be moved out of mesh with the rack bar 15 when desired. A spring pressed pin 45 (see Fig. 3) normally bears against the side face of the gear wheel 18 to force the shaft 17 in a direction to disengage its pinion 16 from the rack 15, but the vertical latch 41 in its engagement with the groove 44 normally holds the parts against such movement. A spring 46 acts, with the force of gravity, to hold the latch in its normal operative position.

While the teeth of the crown toothed gear wheel 39 are normally in mesh with the teeth of the pinion 36, the gear wheel 39 may be moved longitudinally along its supporting stud 38, against the resistance of a spring 47, to temporarily relieve it from such engagement, a knob 48 being provided as a convenient means by which it may be manipulated. By this means the wheel may be adjusted angularly about its axis, either in one direction or the other, to initially adjust the position of the cam projection 43 with respect to the arm 42 of the bell crank lever. The spur gear 30 is likewise provided with an operating knob 49, by which it may be grasped and adjusted with its shaft, longitudinally of the axis thereof, from the position in which it is in intermeshing relation with the pinion 28, and in which position it is shown in the drawings, to a position in which it is in intermeshing relation with the pinion 28. The splined connection between its shaft 31 and the worm 33, above referred to, permits this longitudinal movement, and a spring pressed stud 50 (see Fig. 6) holds the shaft in whichever of the two positions it is adjusted at the time. By this means the stop motion is immediately adapted for coaction with either the vertical or the cross feed mechanism, as will be well understood.

In use the spur gear is first adjusted for engagement with either the pinion 28 or the pinion 29, in accordance with the feed with which it is to be employed, i. e. cress or vertical feed. The wheel 39 is angularly adjusted about its axis, so that theengagement of the cam projection 43 from the arm 42 of the bell crank lever will be proportional to the amount of feed required before the machine is to be stopped. Then, care being taken that the shaft 17 is the proper position for the intermeshing of the pinion 16 with the teeth of the rack bar 15, and is being properly held in such position by the latch 41, the machine is started into operation. In the normal operation of the planer the feeding movements transmitted through the reciprocating rack bar and its correlated parts, cause the tool to move gradually through a given plane, and during such times relative movements of rotation will be imparted to the wheel 39, until just as the tool reaches a predetermined point in its feed, the cam projection 43 upon the wheel 39 will engage the arm 42 of the bell crank lever, and in rocking the bell crank lever about its axis, against the action of the spring 46, will lift the latch 41 from its engagement with the groove 44 in the shaft 17. The shaft 17 with its gear wheel 18 and pinion 16 will be immediately moved longitudinally under the action of the spring
pressed pin 45, and the pinion 16 will be released from its engagement with the rack bar 15. This will disconnect the feeding train, and further operation of the planer will be ineffective with respect to feeding movements of the tool carrier.

It will be noted that because the wheel 39 is connected in direct geared relation with one or the other of the feed shafts 13 or 14, in accordance with which is being used at the time, any return movement of the shafts to readjust for starting a new series of cuts, or for any other purpose, will cause a corresponding reverse movement of the wheel 39, so that its proper relationship of position will always be maintained, and the stop motion will always be ready to start into operation at the proper point with relation to the position of the tool, when the machine is again started up. Once the wheel 39 has been primarily adjusted it matters not how much the machine is operated, the original adjustment is retained.

After the stop motion has operated, the machine is readjusted for a new series of cuts, and the shaft 17 with its gears 16 and 18 is pushed back longitudinally to its original position to cause the pinion 16 to again intermesh with the teeth of the rack bar 15.

The precise moment at which this latter movement is effected is immaterial, as it does not affect the relative position of the stop motion mechanism in any way. Nor does it matter how far back the tool is moved to begin its new cut as the stop mechanism will arrest the automatically driven movement of the tool at the same point regardless of the points at which such movements begin.

It will of course be understood that in applying my stop motion to different forms of planers, modifications in the structure thereof will be necessary in conformity with the modifications in the structure of the feeding means, and in any event it will be understood that the precise form and construction shown is but one of many possible embodiments of my invention.

What I claim is:

1. The combination with tool feed mechanism, of a stop motion including a rotatably mounted cam, means connecting the same in rotative relation with the tool feed mechanism, and means for manually adjusting the said cam with relation to the tool feed mechanism, and means operated by the said cam at a predetermined point in its movement of rotation for stopping further tool feeding movements.

2. The combination with transverse tool feeding means, vertical tool feeding means, and common operating means therefor, of a stop motion including a rotatably mounted cam, means for connecting the same in rotative relation with the said transverse tool feeding means or with the said vertical tool feeding means, means for manually adjusting the said cam with relation to the tool feeding means with which it is connected, and means operated by the said cam at a predetermined point in its movement of rotation for stopping further tool feeding movements.

3. The combination with transverse tool feeding means, vertical tool feeding means, and common operating means therefor, of a stop motion including a rotatably mounted cam, means for connecting the same in rotative relation with the said transverse tool feeding means or with the said vertical tool feeding means, means for manually adjusting the said cam with relation to the tool feeding means with which it is connected, and means operated by the said cam at a predetermined point in its movement of rotation for disconnecting the tool feed mechanism from its said operating means.

4. The combination with vertical and transverse tool feeding mechanism, of a stop motion comprising a reciprocatory rack and a pinion adapted to be moved axially into or out of engagement with said rack, and means automatically actuated at a predetermined point in the operation of said tool feeding mechanism for arresting further movements thereof, and means for connecting the said stop motion with either the vertical or the transverse tool feeding mechanism.

5. The combination with common operating means for transverse tool feeding mechanism and vertical tool feeding mechanism, of a stop motion for the feeding mechanism comprising a reciprocatory rack and a pinion adapted to be moved axially into or out of engagement with said rack, and means for connecting the said stop motion with said transverse or vertical tool feeding mechanisms, the said stop motion comprising means automatically actuated at a predetermined point in the operation of the tool feeding mechanism for arresting further movements thereof.

6. The combination with tool feeding mechanism comprising a reciprocatory rack and a pinion in engagement therewith adapted to be axially disengaged therefrom, of a stop motion including means automatically actuated at a predetermined point in the operation of the tool feed mechanism for withdrawing the pinion upon engagement with said rack.

7. The combination with tool feeding mechanism comprising a reciprocatory rack and a pinion adapted to engage said rack, of a stop motion comprising a rotatable cam and means operated thereby at a predetermined point in its movement of rotation for arresting further movements of said tool feeding mechanism.
8. The combination with tool feeding mechanism comprising a reciprocatory rack and a pinion adapted to be moved axially, into or out of engagement with said rack, of a stop motion comprising a rotatable cam and means operated thereby at a predetermined point in its movement of rotation for disengaging the pinion from the rack.

9. The combination with tool feed mechanism comprising a reciprocatory rack and a pinion adapted to be moved axially into or out of engagement with said rack, of a stop motion comprising a rotatable cam, and means operated thereby at a predetermined point in its movement of rotation for disengaging the pinion from the rack.

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Copies of this patent may be obtained for five cents each, by addressing the “Commissioner of Patents, Washington, D. C.”