C. H. NORTON.

MULTIPLE STEADY REST FOR GRINDING MACHINES.

APPLICATION FILED MAR. 20, 1912.

1,045,876.

Patented Dec. 3, 1912.

3 SHEETS—SHEET 1.

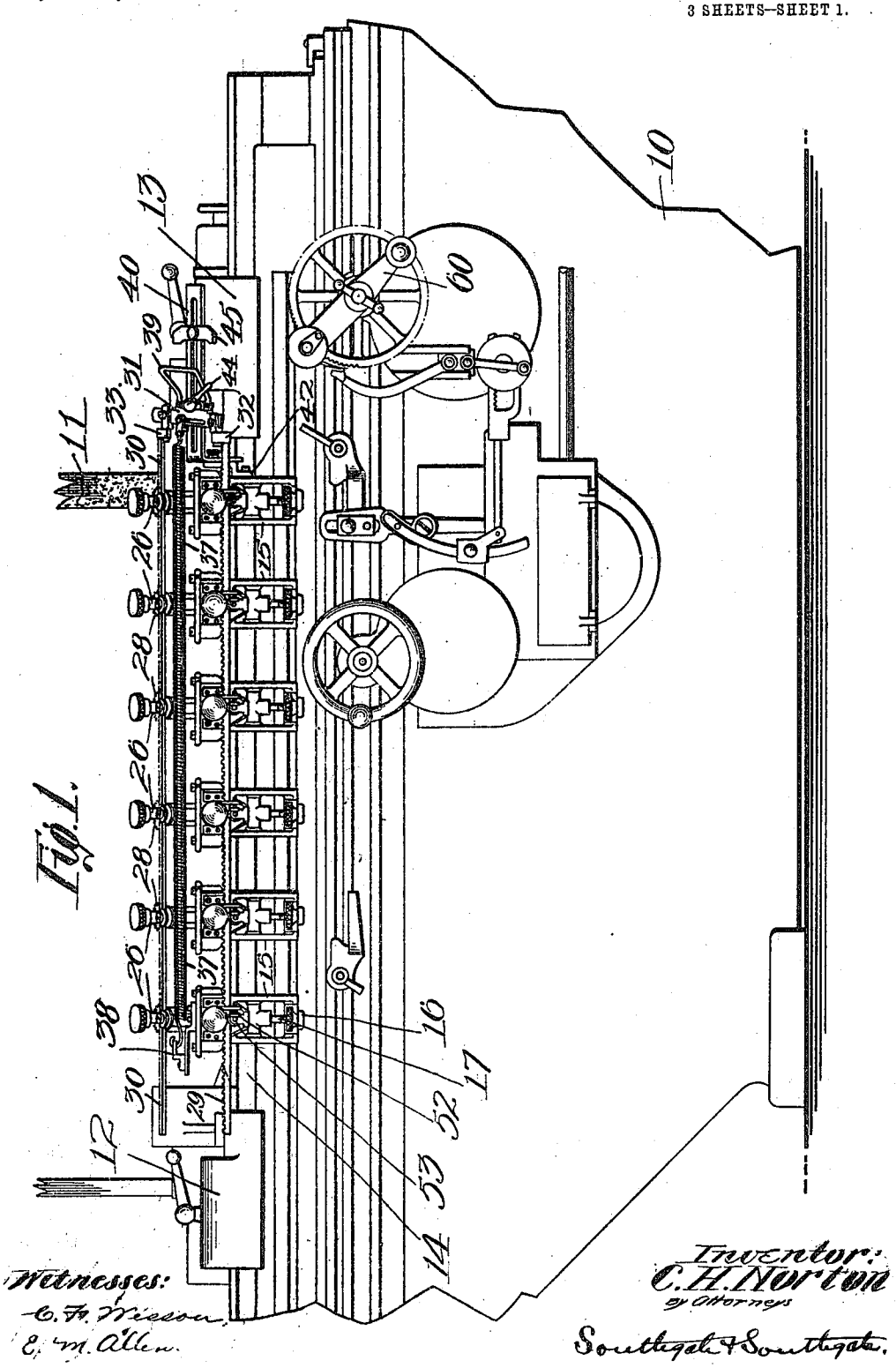

Fig. 1.

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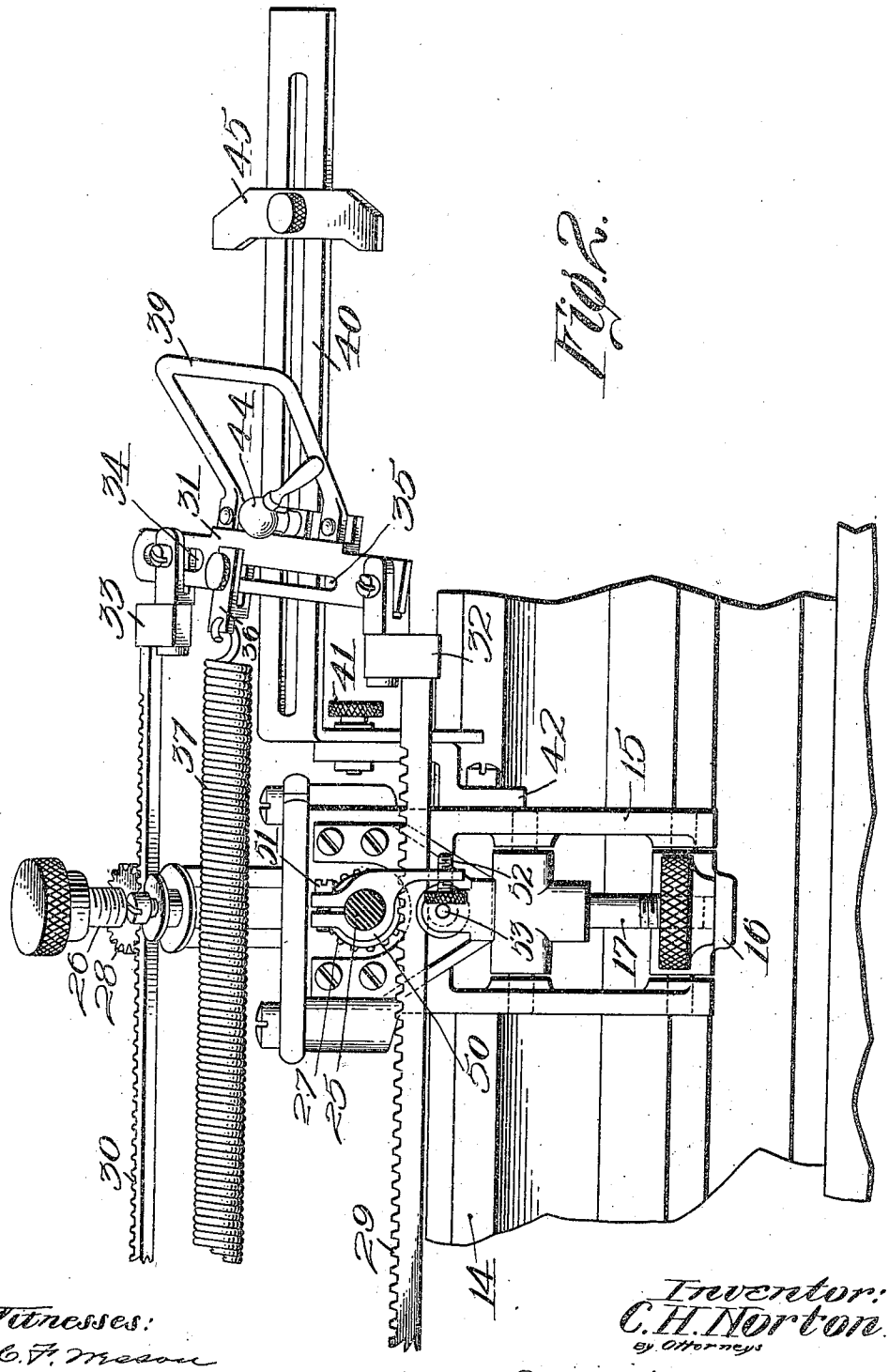

Fig. 2.

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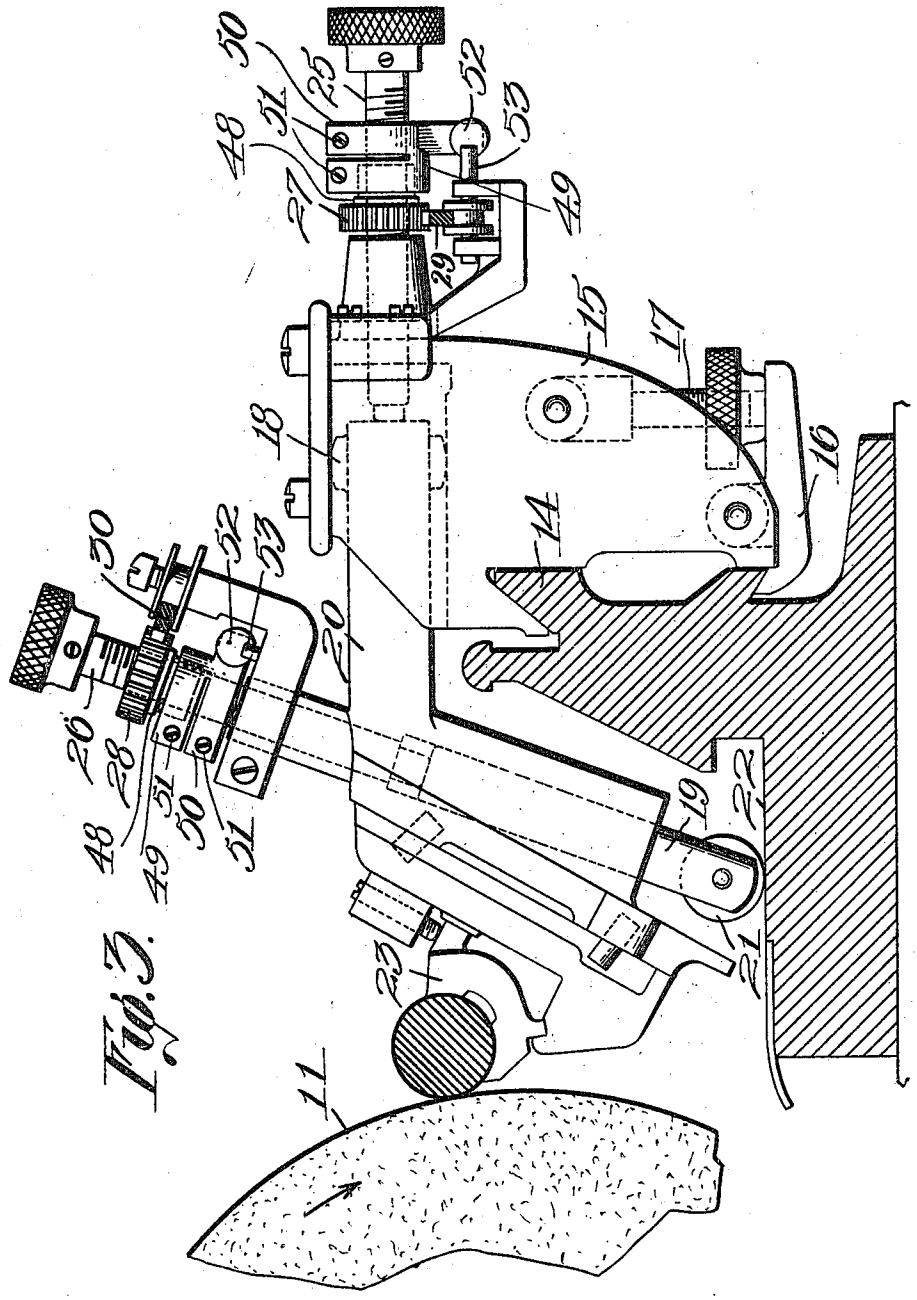

Fig. 3.

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UNITED STATES PATENT OFFICE.

CHARLES H. NORTON, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO NORTON GRINDING COMPANY, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

MULTIPLE STEADY-REST FOR GRINDING-MACHINES.

1,045,876. Specification of Letters Patent. Patented Dec. 3, 1912.

Application filed March 20, 1912. Serial No. 685,073.

To all whom it may concern:

Be it known that I, CHARLES H. NORTON, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Multiple Steady-Rest for Grinding-Machines, of which the following is a specification.

This invention relates to that class of grinding machines in which the work is held in position to be operated upon by an axially movable rotary grinding wheel, the work preferably being rotated also.

The principal objects of the invention are to provide means whereby a plurality of steady rests for the work can be operated simultaneously in such a way that when the machine is put into operation the steady rests will hold the work firmly and continuously throughout the grinding operation while it decreases in size and will be automatically checked at a definite point so that if the attendant does not stop the machine immediately after this point is reached the wheel, and also the work, can continue to rotate, but without performing any further grinding operation; and to provide a simple and convenient means for adjusting the limiting point at which the operation ceases.

The invention also involves improvements in operating means for the steady rests applicable either to a plurality of steady rests or to a single one and other improvements in details of construction as will appear hereinafter.

Reference is to be had to the accompanying drawings in which—

Figure 1 is side elevation of a grinding machine constructed in accordance with this invention; Fig. 2 is a side elevation of one of the steady rests and operating devices on enlarged scale, and Fig. 3 is an end elevation thereof showing certain parts in transverse section.

The invention is shown as applied to a grinding machine having a base or frame 10 and a rotary grinding wheel 11, a head-stock 12 and a tail-stock 13 for supporting the work, of ordinary construction, are shown. Mounted on ways 14 on the bed are a plurality of back rests 15 each having a pivoted gib 16 adapted to be adjusted, as by screw and nut 17, the former being pivoted to the back rest to permit the back rest to be guided along the ways and to be dismounted from the frame. In this instance a plurality of these back rests are shown each being provided with a steady rest 20 having a spherical surface 18 on which the steady rest can swing and a movable rod 19 carrying at its lower end a roller 21 adapted to move on a flat surface 22 on the bed. The steady rest 20 is provided with a work support shoe 23 removably mounted thereon to engage the work and hold it firmly between centers. The details of this part of the device are not described in full as they do not constitute a feature of this invention.

For the purpose of working the several steady rests together and operating upon them simultaneously and equally, each of them is provided with a transverse adjusting screw 25 and with an inclined adjusting screw 26 by which the steady rest can be moved forward, or up, and toward the work. The screw 25 engages the end of the steady rest so that as the screw is fed forward it eventually comes into position to hold the steady rest firmly up to the work. The screw 26 is threaded into an upwardly inclined arm on the steady rest and presses on the end of the rod 19, so that when it is fed forward it exerts an upward pressure on the steady rest and holds it firmly in position. These screws 25 and 26 are provided with knurled heads for hand adjustments.

For the purpose of providing for the simultaneous adjustment of these several screws each one has a gear or pinion as 27 or 28 fixed thereon. The rotation of these pinions obviously will rotate the screws and adjust them longitudinally. To operate these pinions a frame is provided comprising two racks 29 and 30, connected at one end by a yoke 31 pivoted to heads 32 and 33 on the racks. One of these connections is made adjustable by providing the yoke with a slot 34. This yoke also is provided with another slot 35 in which is adjustably connected a member 36 to which is secured the end of a spring 37, the front end of which is hooked into an eye in a bracket 38 fixed to the back rest 15 located at the opposite end of the machine. The yoke 31 is provided with an operating handle 39 which is adapted to move along a slotted guide 40 fixed by a screw 41 to a bracket 42 or the like on the front end back rest 15. The yoke is pro-

vided with a screw clamp 44 and the slotted guide with an adjustable stop 45.

When the operator desires to move the screws back to permit taking out the work or replacing it he loosens the clamp 44 and pulls the handle 39 back until the yoke strikes the stop 45, then he tightens the clamp 44 to hold the yoke in that position. This, as will be obvious, turns all the screws and draws them back or up. This relieves the steady rests from the pressure from the screws 25, and permits them to turn downward about the pivoting surfaces 18. At this time a new piece of work can be inserted if desired and if this is done the only thing the operator has to do in order to insure that the work shall be held steady throughout the operation to produce a duplicate piece of work is to loosen the clamp 44 and allow the spring to pull the yoke and racks forward as fast as the grinding operation will permit.

It will be obvious of course that all of the screws will go forward together. In order to insure that each grinding operation thus performed shall be exactly like those previously performed, a stop device is provided constructed as follows. Each of the gears or pinions 27 and 28 is provided with a hub 48, on each of which is located a split ring 49 integrally connected with a split ring 50. The split rings are adapted to be firmly clamped to the hub and screw by fastening screws 51. This is provided with an adjustable screw 52 adapted to come into contact with a fixed stop 53 on the back rest. As the spring draws the yoke and racks forward, these screws 52, which of course have been adjusted previously to proper position, will swing toward the stops 53 and when they reach them will positively stop the further feed of the screws.

It will be understood of course that the usual, or any, device 60 is employed to stop the feed of the grinding wheel, and it is so adjusted that it stops the feed at the time when the several screws 52 of both series come into engagement with their respective stops. This results in bringing the work exactly to the same position every time and leaving it in such condition that if the machine continues to operate it will be an idle operation not performing any further work. On this account it has been found possible to put several of these machines in charge of one man as there is no danger of the work being spoiled if he does not get back to each machine when its operation is completed. Moreover, the removal of the work from the grinding wheels is an almost instantaneous operation, all of the steady rests coming back together, and there is no possibility of an operator performing this operation in a wrong way so as to injure the work. Consequently an absolutely uniform series of operations can be performed. Moreover all the steady rests move together as one and this movement is controlled by the two end ones, which rest against the work where it is centered and where it can not be bent. Therefore if the work is bent or otherwise out of true at any point between the centers the steady rest at that point cannot follow up, the low place on the work, beyond the point to which the end rests are limited.

Although I have illustrated and described a preferred form of the invention, I am aware that many modifications can be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to all the details of construction herein shown and described but—

What I do claim is:—

1. In a grinding machine, the combination with the head and tail centers for holding the work, of a plurality of steady rests for the work, and means for controlling the position of all the steady rests by the position of those near said centers.

2. In a grinding machine, the combination with the head and tail centers for holding the work, of a plurality of steady rests for the work, and yielding means controlled by the end center rests for continuously holding the steady rests up to the work both horizontally and vertically as the work is being ground.

3. In a grinding machine, the combination with a series of steady rests, of means controlled by the end center rests for simultaneously forcing the whole series of steady rests horizontally toward the work and raising them.

4. In a grinding machine, the combination with the grinding wheel, of a plurality of steady rests for the work, and means for simultaneously moving all of said steady rests to keep them firmly in contact with the work as it decreases in size.

5. In a grinding machine, the combination of a plurality of steady-rests for the work, and yielding means for simultaneously forcing the steady rests toward the work.

6. In a grinding machine, the combination with a plurality of steady rests for the work, of means for forcing said steady rests toward the work simultaneously and equally and in two directions.

7. In a grinding machine, the combination of a plurality of steady-rests for the work, and means for simultaneously withdrawing all of said steady rests directly back from the work and at the same time allowing said steady rests to drop down by gravity.

8. In a grinding machine, the combination with a plurality of independently mov-

able steady rests, of yielding means for moving all of said steady rests toward the work, and means for positively limiting said motion of each steady rest.

9. In a grinding machine, the combination of a plurality of steady rests for a single piece of work, a slide, and means whereby when said slide is moved said steady rests will be simultaneously released from contact with the work.

10. In a grinding machine, the combination with a plurality of steady rests for a single piece of work, of a slide, means whereby when said slide is moved in one direction said steady rests will be simultaneously released from the work, and means connected with said slide for yieldingly forcing the steady rests simultaneously toward the work.

11. In a grinding machine, the combination with a plurality of steady rests for the work, of yielding means for forcing said steady rests toward the work simultaneously and equally, and a stop for each steady rest to limit its motion toward the work.

12. In a grinding machine, the combination with a plurality of steady rests for the work, of yielding means for forcing said steady rests toward the work simultaneously and equally, and a stop for each steady rest to limit its motion toward the work, said stops being independently adjustable.

13. In a grinding machine, the combination of a plurality of steady-rests for the work, means for simultaneously releasing all of said steady rests from the work, means for yieldingly forcing said steady rests back toward the work, and two independently adjustable stops for each steady rest, one for limiting its motion directly toward the work, and the other for arresting its downward motion, whereby when the yielding means is put into operation each steady rest will be caused to move up to a predetermined position both horizontally and vertically as fast as the grinding will permit, and cease moving farther from that point.

14. In a grinding machine, the combination of a plurality of movably mounted steady rests, a screw for operating each steady rest toward the work, a gear or pinion fixed on each screw and a reciprocable rack meshing with all of said pinions for simultaneously adjusting the several steady rests.

15. In a grinding machine, the combination with a plurality of independently movable steady rests, of two screws at an angle to each other for moving each steady rest toward the work, a gear or pinion on each screw, a reciprocable frame having a rack thereon, one meshing with each set of gears or pinions, whereby when said frame reciprocates all of said gears and pinions will be rotated and all of said steady rests adjusted equally, and means whereby the relative positions of said racks on the frame with respect to each other can be adjusted.

16. In a grinding machine, the combination with a plurality of independently movable steady rests, of a screw for moving each steady rest toward the work, a gear or pinion on each screw, a reciprocable frame having a rack thereon, meshing with each gear or pinion, whereby when said frame reciprocates all of said gears and pinions will be rotated and all of said steady rests adjusted equally, and resilient means for normally moving said frame to turn the screws in a direction to force the steady rests toward the work.

17. In a grinding machine, the combination with a plurality of independently movable steady rests, of a screw for moving each steady rest toward the work, a gear or pinion on each screw, a reciprocable frame having a rack thereon, meshing with said gears or pinions, whereby when said frame reciprocates all of said gears and pinions will be rotated and all of said steady rests adjusted equally, a longitudinal guide for said frame, and means for clamping the frame at any desired point along said guide.

18. In a grinding machine, the combination with a plurality of independently movable steady rests, of a screw in contact with each steady rest, a gear or pinion on each screw, a reciprocable frame having a rack thereon, meshing with said gears or pinions, whereby when said frame reciprocates all of said gears and pinions will be rotated and all of said steady rests adjusted equally, a longitudinal guide for said frame, and an adjustable stop on said guide for limiting the motion of the frame in one direction.

19. In a grinding machine, the combination with a plurality of independently movable steady rests, of a screw in contact with each steady rest, a gear or pinion on each screw, and a reciprocable frame having a rack meshing with said gears or pinions, whereby when said frame reciprocates all of said gears and pinions will be rotated and all of said steady rests adjusted equally, a longitudinal guide for said frame, an adjustable stop for limiting the motion of the frame in one direction, and resilient means for forcing the guide away from the stop to cause the steady rests to be moved yieldingly toward the work.

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

CHARLES H. NORTON.

Witnesses:
ALBERT E. FAY,
C. FORREST WESSON.