No. 622,760. Patented Apr. 11, 1899.

W. S. DAVENPORT.

STOP MOTION FOR SCREW OR OTHER MACHINES.

(Application filed Apr. 25, 1898.)

(No Model.) 2 Sheets—Sheet 1.

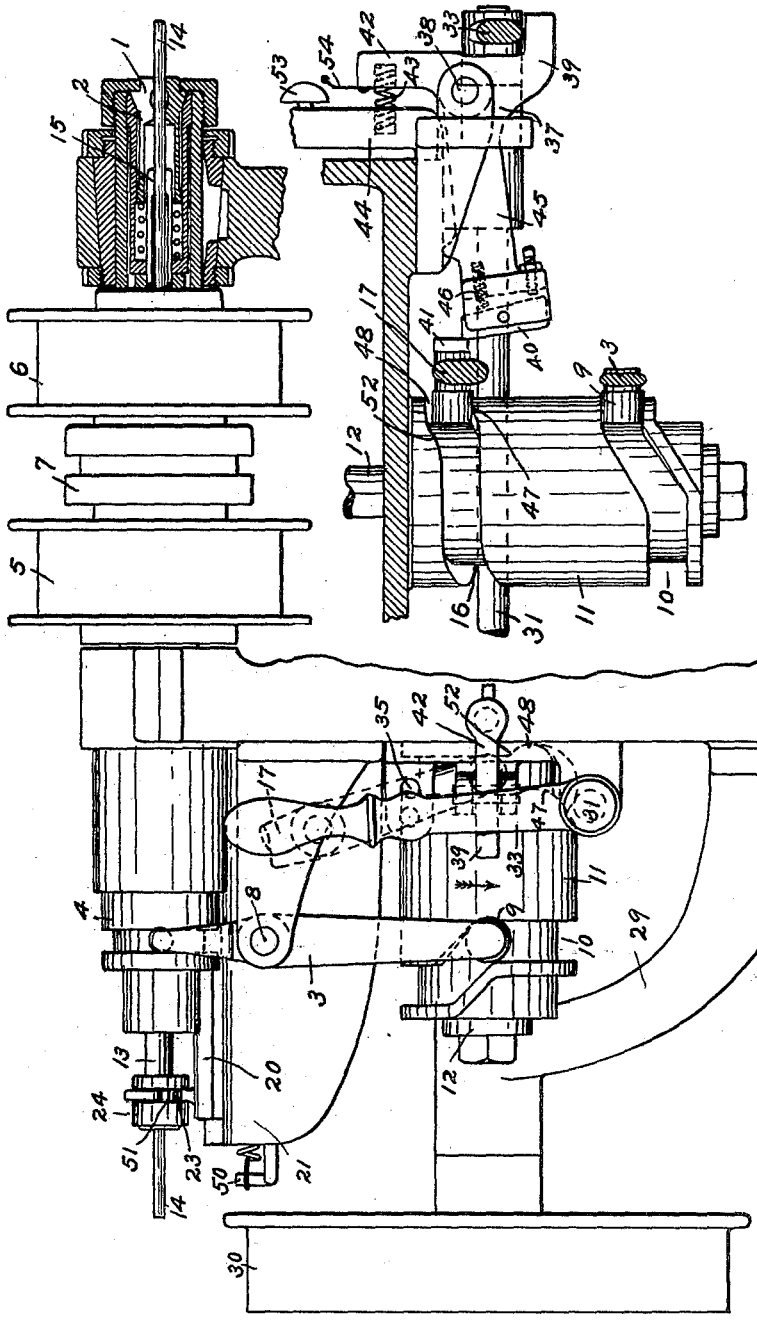

FIG. 2.

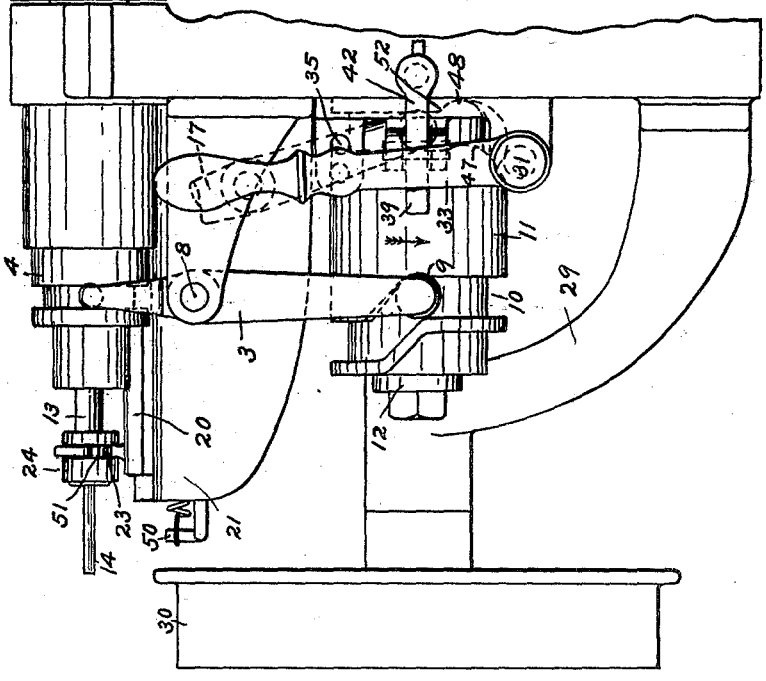

FIG. 1.

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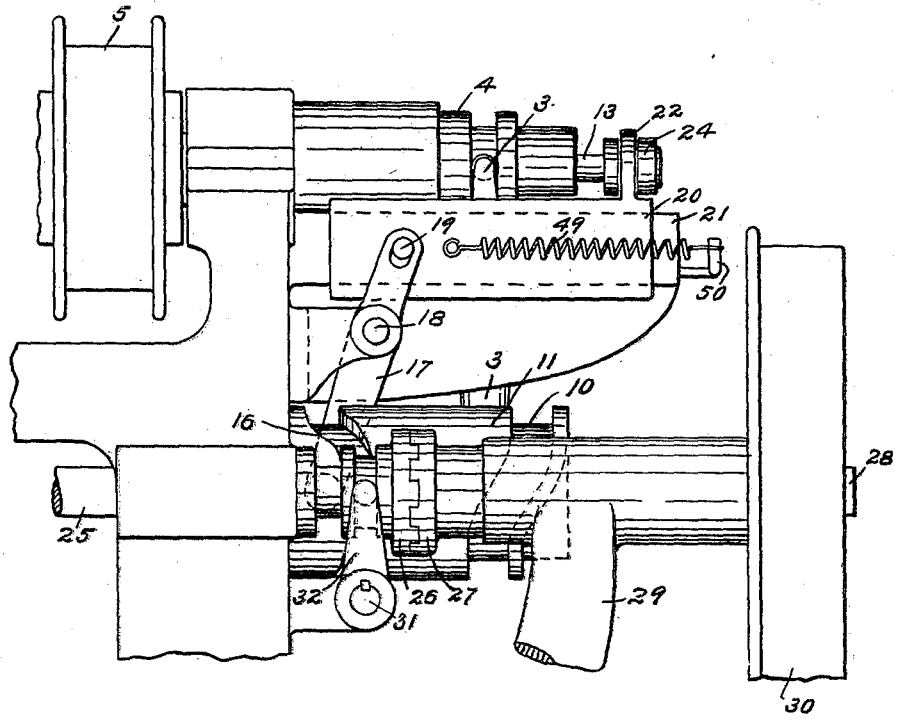

FIG. 3

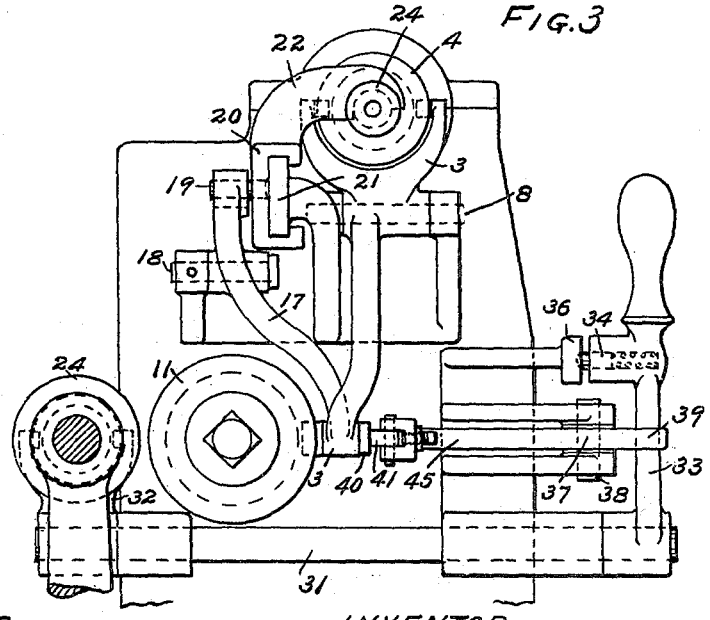

FIG. 4.

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UNITED STATES PATENT OFFICE.

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STOP-MOTION FOR SCREW OR OTHER MACHINES.

SPECIFICATION forming part of Letters Patent No. 622,760, dated April 11, 1899.

Application filed April 25, 1898. Serial No. 678,727. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. DAVENPORT, of Providence, county of Providence, and State of Rhode Island, have invented certain new and useful Improvements in Stop-Motions for Screw or other Machines; and I do hereby declare the following specification, taken in connection with the accompanying drawings, forming a part of the same, to be a full, clear, and exact description thereof.

The invention relates to machines for acting upon lengths of stock, and more especially to mechanism for stopping the machine when the stock becomes exhausted.

While the invention may be applied and used in various machines in which the stock is intermittently fed forward, the invention is especially useful in connection with screw-machines or turret-lathes in which a rod of stock is held by the jaws of a revolving chuck while being acted upon by a series of tools and is intermittently fed forward a prescribed distance.

The primary object of the invention is to provide a simple and efficient mechanism for stopping the machine when the rod of stock is exhausted, and this is accomplished by providing mechanism for throwing the driving mechanism out of operation, which is controlled by the disengagement of the feeding devices with the stock.

A further object of the invention is to provide means for stopping the machine when the jaws of the chuck are open, so that the new rod of stock may be quickly inserted without any manual manipulating of the machine.

A further object of the invention is to provide a mechanism for stopping the machine, which is controlled by the action of the feeding devices on the stock, but which does not act to stop the machine until the length of stock which was projected by the forward movement of the feeding devices preceding their disengagement with the stock is acted upon and severed from the stock. This is accomplished by so constructing the stop mechanism that it is thrown into operative position when the feeding devices are disengaged from the stock, but does not operate to stop the machine until the feeding devices are again advanced.

To these ends the invention consists in the features and combinations hereinafter set forth in the claims.

In the accompanying drawings the preferred form of the invention is shown embodied in a metal screw-machine; but it will be understood that the invention is not limited to such machines or to the form and arrangement of devices illustrated.

In said drawings, Figure 1 is a front elevation of so much of a screw-machine or turret-lathe as is necessary to illustrate the application of the present invention thereto. Fig. 2 is a partial plan view. Fig. 3 is a rear elevation, and Fig. 4 an end view.

Referring to the drawings in detail, the jaws 1 of the chuck for holding and rotating the rod of stock to be acted upon by the tools (not shown) are mounted in the spindle 2 and are operated by a lever 3, which engages a sleeve 4, as clearly set forth in my Patent No. 604,306, dated May 17, 1898, and in Patent No. 543,606 to S. L. Worsley, dated July 30, 1895. The spindle is rotated in one direction or the other by pulleys 5 and 6, loosely mounted on the spindle and adapted to be clutched thereto by a clutch-sleeve 7, as in the patents referred to. The lever 3 is pivoted at 8, and the lower end of said lever carries a roll 9, which engages a cam-groove 10, formed in a sleeve 11, secured to a cam-shaft 12. The cam-shaft is revolved a single revolution to open the jaws and allow the feeding forward of the stock and to again close the jaws after the stock has been fed, as set forth in Patent No. 604,306 referred to. The stock is fed forward by means of the feeding-tube 13, which is provided with the usual spring-fingers 15 for engaging the stock 14 and which is reciprocated at the proper time by a cam formed in the sleeve 11. The cam engages a roll on the end of a lever 17, pivoted at 18 and provided at its upper end with a slot which engages a pin 19 on a slide 20. The slide is guided on a bracket 21, secured to the frame, and is provided with a laterally-projecting arm 22, which engages an annular groove 23,

formed in a collar 24, secured upon the end of the feed-tube. While the tools are acting upon the end of the stock which projects from the jaws 1 the parts stand in the position shown in Fig. 1, the shaft 12 being stationary at this time. After the completed article is cut from the end of the stock the cam-shaft 12 makes a single revolution. During this revolution of the cam-shaft the lever 3 is first rocked to open the jaws of the chuck, the lever 17 is then rocked to advance the feeding-tube and feed forward the stock, the lever 3 is then returned to close the jaws of the chuck, and then the lever 17 is moved back to draw the feeding-tube back. When the tube moves back, the stock is held by the jaws of the chuck, and the spring-fingers drag over the stock.

25 represents the main shaft of the machine, from which all the parts except the spindle are driven. A sliding clutch-sleeve 26 is keyed to slide on the end of this shaft and is arranged to engage a clutch-face on a sleeve 27, secured to the end of a short shaft 28, which is mounted in a bracket 29 and has a pulley secured thereto. The clutch-sleeve 26 may be disengaged from the sleeve 27 to throw the driving mechanism out of operation and stop the machine by a rock-shaft 31, extending transversely across the machine and having a yoke 32 at its rear end, the arms of which engage an annular groove in sleeve 26. A shifting-arm 33, provided with a handle, is secured to the shaft 31 at the front of the machine, and said arm may be held in position by a spring-pressed pin 34, mounted therein and engaging recesses 35 in a plate 36. The pin 34 has a conical end, so that said pin will yield when the arm 33 is forcibly moved to rock the shaft 31, but will prevent accidental displacement of the arm.

The construction thus far described is substantially the same as the construction of the machine illustrated in my patent referred to and is selected for the purpose of illustrating one form of machine in which the present invention may be embodied. The changes and additions made in embodying the invention in this machine will now be described.

The lever 37 is pivoted at 38, and one arm 39 of said lever engages the shifter-arm 33 when the driving mechanism is in operation. Another arm 45 of said lever extends rearwardly and is provided with a yielding dog arranged in the path of a shoe 41 on the end of lever 17. The lever 37 has a third arm 42, and a spring 43 is interposed between this arm and a stationary block 44 and holds the lever in its normal position. The dog 40 is pivoted in the end of the arm 45 and is held yieldingly in position by a spring 46. That part 47 of the cam 16 which moves the lever 17 to draw the feeding-tube back is so shaped and arranged that the movement of the lever effected by said cam is not sufficient to carry the shoe 41 back of the dog 40. The side of the cam-groove is cut away, however, at 48 opposite the part 47 to allow the lever to be given a supplemental movement sufficient to carry the shoe 41 back of the dog 40. While a rod of stock is being fed the feeding-tube is reciprocated by the cam 16 and the shoe 41 moves back and forth across the face of the dog 40, said dog being pressed back by the engagement of the shoe 41. When the rod of stock becomes so short that the fingers 15 slip off the end of said stock on their return movement, a mechanism is released which was heretofore restrained by the engagement of said fingers with the stock, and said mechanism moves the end of lever 17 into the recess 48 when said recess comes behind said lever. This movement of lever 17 carries the shoe 41 beyond the end of dog 40, allowing said dog to spring forward in front of said shoe, and puts the stop mechanism into operative position. The shaft 12 now remains stationary until the length of stock projected beyond the face of the chuck has been operated upon and severed from the stock, and then said shaft is again revolved. As shaft 12 revolves cam 10 first opens the jaws of the chuck, and then cam 16 swings lever 17 on its pivot, thus advancing the feeding-tube and at the same time swinging lever 37, the arm 39 of which will operate upon arm 33, thus rocking shaft 31 and throwing the driving mechanism out of operation. Thus the machine will continue to operate after the feeding-fingers are disengaged from the stock until the length of stock projecting beyond the chuck has been finished, and then the machine will be stopped with the feeding-fingers advanced and the jaws of the chuck open ready for the insertion of a new rod of stock. When the machine is again started, the shaft 12 will complete its revolution, thus closing the jaws of the chuck and drawing back the feeding-fingers. With this construction there is less waste of stock and the new stock may be more quickly and conveniently inserted than is the case where the machine is stopped when the feeding-fingers move back out of engagement with the stock.

The means for giving the lever 17 its supplemental movement consists of a spring 49, having one end connected to the slide 20 and the other end connected to a stationary post 50. This spring tends to move the slide 20 and feeding-tube rearwardly, but is restrained by the engagement of the spring-fingers upon the stock, since the tension of the spring is not sufficient to overcome the friction of said fingers upon the stock. When the stock is withdrawn from the end of the feeding-tube, the spring 49 is no longer restrained by the engagement of the fingers with the stock, and said spring draws the slide 20 back and moves the end of lever 17 into the recess 48. Thus the mechanism for throwing the driving mechanism out of operation is controlled by the engagement of the feeding devices with the stock.

When the slide 20 moves the feeding-tube

rearwardly, the arm 22 presses against the shoulder formed by the side 51 of the groove 23, and should this pressure not be relieved the feeding-tube is liable to work back to a more or less degree to relieve this pressure. This working back of the feed-tube results in an inaccuracy in the feed, so that the amount of stock fed forward may vary slightly. While this slight inaccuracy may not be material upon some classes of work, yet in work requiring a high degree of accuracy it is objectionable, and means are therefore provided for relieving the rearward pressure upon the feed-tube after the feed-tube has been drawn back. This is accomplished by providing a cam-surface 52 just in advance of the surface 47, which former cam-surface moves the end of the lever 17 in the opposite direction or in a direction to advance the slide 20 slightly and then hold said lever in this position. This advancing of the slide 20 not only insures accuracy of feeding, but also relieves the friction upon the feeding-tube, so that the spindle runs more freely.

In order to notify the operator when the stock is exhausted, an alarm, in the form of a gong 53, is mounted on the block 44 in position to be struck by a hammer 54, secured to the arm 42 of lever 37, as shown in Fig. 2. When the stock becomes exhausted and the lever 37 is rocked, as above described, the hammer 54 strikes the gong 53, thus notifying the operator that a new rod of stock is required.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination with the driving mechanism, of reciprocating feeding devices engaging the stock, and mechanism controlled by the disengagement of the feeding devices from the stock for throwing said driving mechanism out of operation when the feeding devices are advanced, substantially as described.

2. The combination with the driving mechanism, of a reciprocating device frictionally engaging the stock, and means controlled by the disengagement of said device from the stock for throwing the driving mechanism out of operation when the feeding devices are advanced, substantially as described.

3. The combination with the driving mechanism, of a reciprocating feeding-tube provided with spring-fingers for engaging the stock, and mechanism controlled by the disengagement of said fingers from the stock for throwing the driving mechanism out of operation when the feeding-fingers are advanced, substantially as described.

4. The combination with the driving mechanism, of a chuck for holding the stock, a reciprocating device frictionally engaging the stock, and mechanism controlled by the disengagement of said device from the stock for throwing the driving mechanism out of operation when the feeding-fingers are advanced, substantially as described.

5. The combination with the driving mechanism, of a chuck for holding the stock, a reciprocating feeding-tube provided with spring-fingers for engaging the stock, and mechanism controlled by the disengagement of said fingers from the stock for throwing the driving mechanism out of operation when the feeding-fingers are advanced, substantially as described.

6. The combination with the driving mechanism, of reciprocating feeding devices for engaging the stock, mechanism for throwing the driving mechanism out of operation when the feeding devices are advanced, and means restrained by the engagement of said feeding devices with the stock for rendering said mechanism active, substantially as described.

7. The combination with the driving mechanism, of reciprocating feeding devices frictionally engaging the stock, mechanism for throwing the driving mechanism out of operation when the feeding devices are advanced, and means restrained by the engagement of said feeding devices with the stock for rendering said mechanism active, substantially as described.

8. The combination with the driving mechanism, of a reciprocating feeding-tube provided with spring-fingers for engaging the stock, a spring tending to move said tube and restrained by the engagement of said fingers with the stock, and mechanism made active upon the release of said spring for throwing said mechanism out of operation when the feeding devices are advanced, substantially as described.

9. The combination with the driving mechanism, of a feeding device frictionally engaging the stock, means for reciprocating said feeding device, means restrained by the frictional engagement of feeding device with the stock for giving said feeding device an additional movement, and mechanism made active by the further movement of said feeding device for throwing the driving mechanism out of operation when the feeding device is advanced, substantially as described.

10. The combination with the driving mechanism, of reciprocating feeding devices for engaging the stock, mechanism for operating said feeding devices, mechanism controlled by the engagement of the feeding devices with the stock, and operated by the said operating mechanism for throwing the driving mechanism out of operation, substantially as described.

11. The combination with the driving mechanism, of reciprocating feeding devices for engaging the stock, an intermittently-revolving cam for operating said feeding devices, mechanism for throwing the driving mechanism out of operation, mechanism controlled by the engagement of the feeding devices with the stock for connecting said latter mechanism and said cam, substantially as described.

12. The combination with the driving mech-

anism, of a chuck for holding the stock, reciprocating feeding devices for engaging the stock, intermittently-revolving cams for operating the jaws of the chuck and the feeding devices, mechanism operated by the feeding-cam and controlled by the engagement of the feeding devices with the stock for throwing the driving mechanism out of operation, substantially as described.

13. The combination with the driving mechanism, of a feeding device for engaging the stock, a lever for reciprocating the feeding device, a cam for giving said lever a definite throw, a spring for giving said lever a supplemental movement, said spring being restrained by the engagement of the feeding device with the stock, and mechanism connected with said lever by its supplemental movement for throwing the driving mechanism out of operation upon the return movement of said lever, substantially as described.

14. The combination with the driving mechanism, of a shifter for throwing said mechanism out of operation, a lever for operating said shifter, a device for engaging the stock, a lever for reciprocating said device, and means for connecting said levers when the feeding device and stock are disengaged, substantially as described.

15. The combination with the driving mechanism, of a shifter for throwing said driving mechanism out of operation, a lever for operating said shifter, a yielding dog on said lever, a reciprocating shoe engaging said dog, a feeding device for engaging the stock, and means for moving said shoe beyond the end of said dog when the feeding device and stock are disengaged, substantially as described.

16. The combination with the driving mechanism, of a feed-tube provided with spring-fingers for engaging the stock, a lever connected with said tube, a cam for giving said lever a definite throw, a spring connected to said lever for giving said lever a supplemental throw, said spring being restrained by the engagement of the spring-fingers with the stock, and mechanism rendered active by the supplemental movement of said lever and operated by the advance movement of said lever for throwing the driving mechanism out of operation, substantially as described.

17. The combination with the driving mechanism, of intermittently-reciprocating feeding-fingers engaging the stock, cams for reciprocating said feeding-fingers, a spring for giving the feeding-fingers a supplemental movement and restrained by the engagement of the fingers with the stock, a cam for restraining said spring after the rearward movement of the fingers, and mechanism made active by the supplemental movement of the feeding-fingers for throwing the driving mechanism out of operation, substantially as described.

18. The combination with a feeding device for engaging the stock, a shoulder on said feeding device, an intermittently-reciprocating arm engaging said shoulder to move the feeding device rearward, and means for moving and holding said arm out of engagement with said shoulder after the backward movement of the feeding device, substantially as described.

19. The combination with the driving mechanism, of a feeding device for engaging the stock, a shoulder on said feeding device, a reciprocating arm engaging said shoulder to move the feeding device rearward, a spring forcing said arm rearward, and restrained by the engagement of the feeding device with the stock, means for moving and holding said arm out of engagement with said shoulder after the backward movement of the feeding device, and means rendered active by the release of the spring for throwing the driving mechanism out of operation, substantially as described.

20. The combination with the driving mechanism, of a feeding device for engaging the stock, a shoulder on said feeding device, an arm for engaging said shoulder to move the feeding device rearward, a spring forcing said arm rearward and restrained by the engagement of the feeding device with the stock, a cam for reciprocating said arm provided with a surface for slightly advancing said arm after its backward movement, substantially as described.

21. The combination with the driving mechanism, of a chuck for holding the stock, a feeding device for feeding the stock, and means for opening the jaws of the chuck when the stock is exhausted and throwing the driving mechanism out of operation while said jaws are open, substantially as described.

22. The combination with the driving mechanism, of a chuck for holding the stock, a reciprocating feeding device for engaging the stock, means for opening the jaws of the chuck, and means controlled by the engagement of the feeding device with the stock for throwing the driving mechanism out of operation when the jaws are open, substantially as described.

23. The combination with driving mechanism, of a chuck for holding the stock, a reciprocating feeding-tube provided with spring-fingers, means for opening the jaws of the chuck, and means controlled by the engagement of said fingers with the stock for throwing the driving mechanism out of operation when the jaws are open, substantially as described.

24. The combination with the driving mechanism, of a chuck for holding the stock, reciprocating feeding devices for advancing the stock, mechanism for opening the jaws of the chuck and advancing the feeding devices, and mechanism controlled by engagement of the feeding devices with the stock for throwing the driving mechanism out of operation when the jaws of the chuck are open and the feeding devices advanced, substantially as described.

25. The combination with the driving mechanism, of an intermittently-reciprocating feeding device for engaging the stock, mechanism restrained by the engagement of the feeding devices with the stock for giving the feeding devices a supplemental backward movement, means for relieving the feeding devices from the action of said latter mechanism after the rearward movement of the feeding devices, and mechanism made active by the supplemental movement of the feeding devices for throwing the driving mechanism out of operation, substantially as described.

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Witnesses:
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R. A. BATES.