H. L. BLOOD.

FEED MECHANISM FOR PLANERS.

APPLICATION FILED OCT. 19, 1916.

1,350,540.

Patented Aug. 24, 1920.

2 SHEETS—SHEET 1.

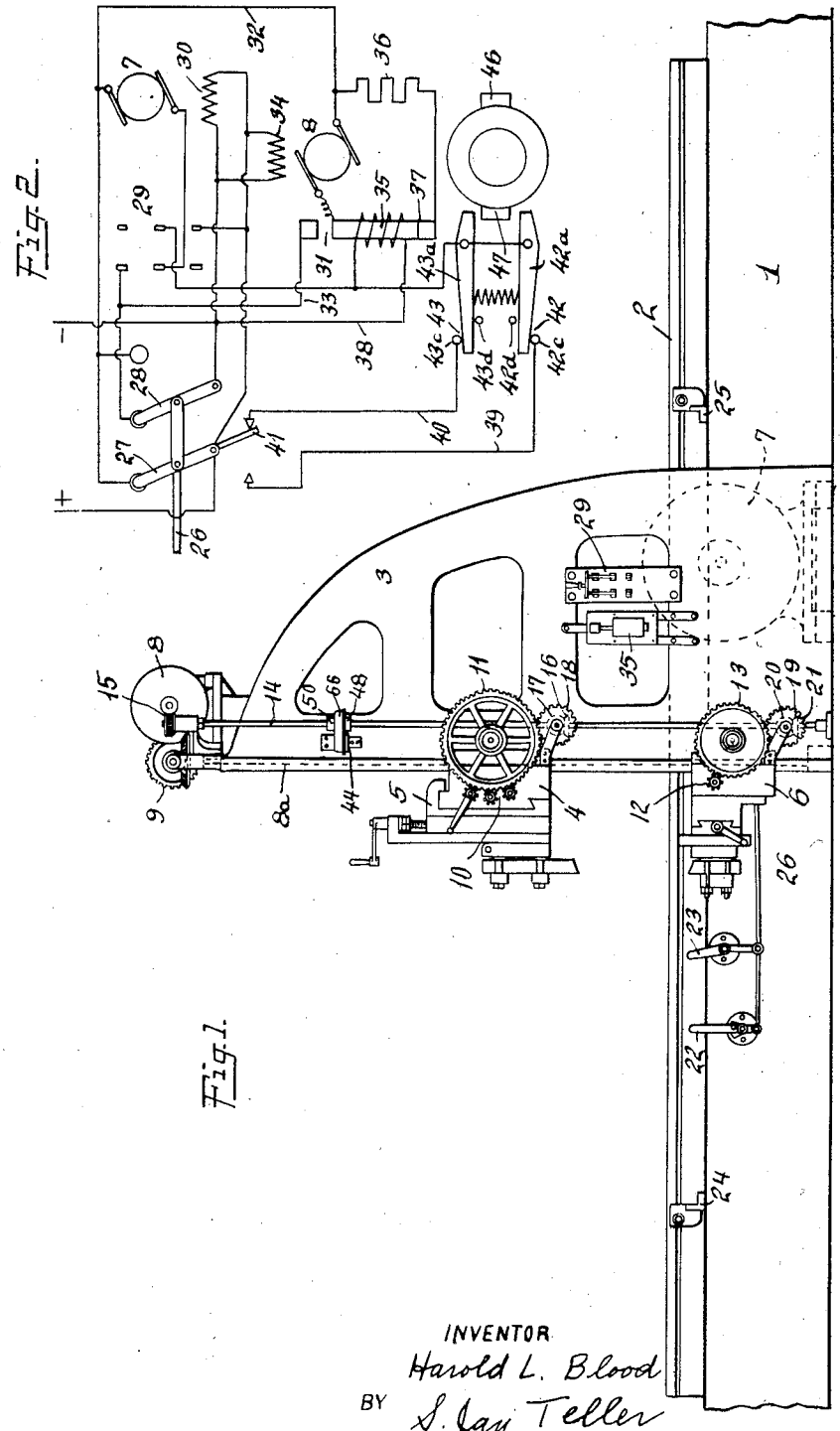


Fig. 2.

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 3.

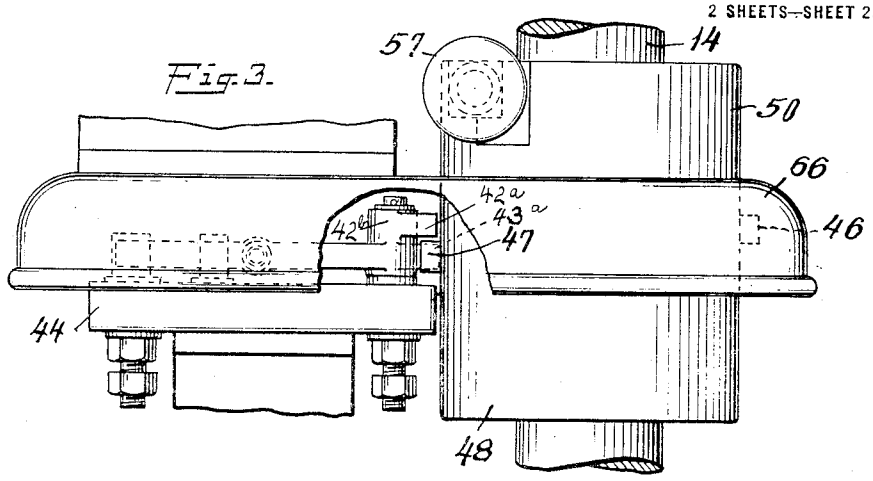


Fig. 4.

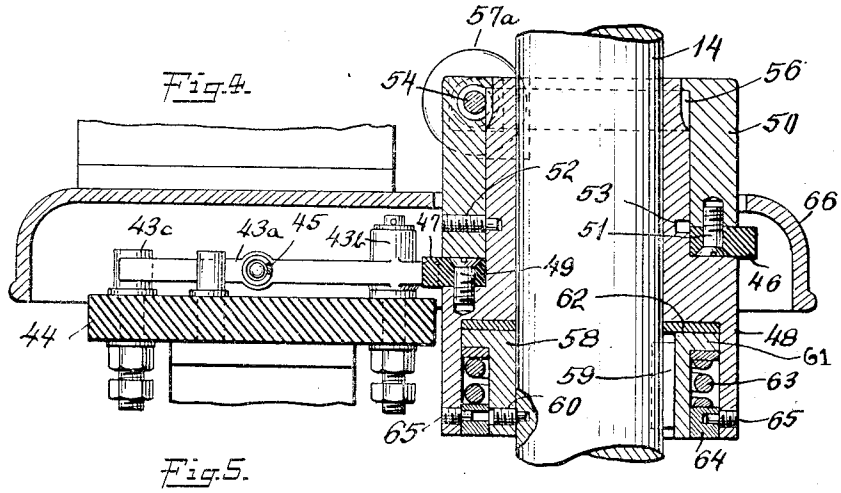
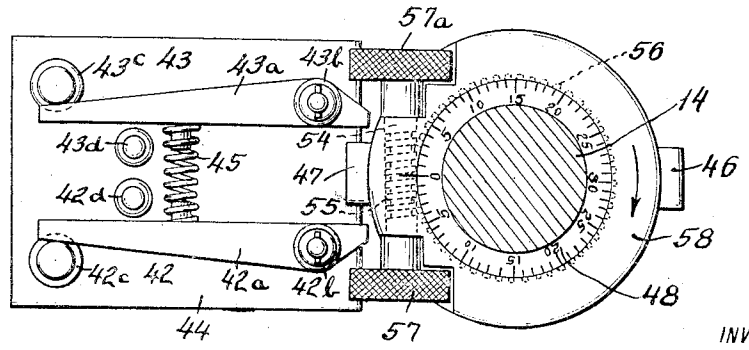


Fig. 5.



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UNITED STATES PATENT OFFICE.

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FEED MECHANISM FOR PLANERS.

1,350,540. Specification of Letters Patent. Patented Aug. 24, 1920.

Application filed October 19, 1916. Serial No. 126,523.

To all whom it may concern:

Be it known that I, HAROLD L. BLOOD, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Feed Mechanism for Planers, of which the following is a specification.

The invention relates particularly to planers having separate motors, preferably electric, for moving the cutting tools either for the purpose of feeding during normal operation or for the purpose of effecting preliminary adjustments preparatory to normal operation.

One of the objects of the invention is to provide in a planer of the type specified, an improved controlling mechanism for the feed motor which is automatically operated to effect the stopping of the motor after movement to a predetermined extent, the said extent of movement being adjustable at will. Other objects of the invention will be apparent from the following specification and the claims.

In the accompanying drawings I have for purposes of illustration, shown one embodiment of the invention, this being the embodiment which I now prefer. It will be understood, however, that the invention can be embodied in other ways and that the drawings and the specification are not to be construed as defining or limiting the scope of the invention, the appended claims being relied upon for that purpose.

Of the drawings:

Figure 1 is a side elevation of a planer embodying the invention.

Fig. 2 is a diagram of electrical connections.

Fig. 3 is a side elevation on an enlarged scale of the controlling or switch mechanism to which the invention particularly relates, certain parts being broken away for the sake of clearness.

Fig. 4 is a vertical sectional view of the switch mechanism.

Fig. 5 is a horizontal view of the switch mechanism, the view being partly in section.

Referring to the drawings, 1 represents the bed of the planer, 2 the reciprocating table, 3 one of the uprights, 4 the cross rail vertically adjustable on the uprights, 5 one of the cross heads transversely adjustable along the cross rail and 6 one of the side heads vertically adjustable on the uprights. Preferably, although not necessarily, the table is driven by an electric motor which is directly connected thereto and which is reversible to effect reciprocation thereof. Such a motor is indicated at 7. An electric motor for controlling the tool carrying heads is indicated at 8, this preferably being mounted on the arch between the two uprights.

For vertically adjusting the cross rail and the heads carried thereby there are provided screws 8^a of which one is indicated in Fig. 1. These screws can be turned to raise or lower the cross rail by means of the motor 8 through suitable gearing such as is indicated at 9. For moving the cross heads transversely along the rail for effecting other adjustments of the tools, any usual or suitable mechanism can be provided. A part of one mechanism adapted for the purpose is shown at 10, this comprising a gear 11 meshing with small pinions. For moving the side heads upward or downward any usual or suitable mechanism can be provided, and in the drawings one mechanism adapted for the purpose is indicated at 12, this comprising a gear 13 meshing with a small pinion.

As concerns the parts already mentioned, there can be wide variation of construction without departing from the spirit of my invention. The construction illustrated is similar to that set forth in the patent of Greenleaf and Keefer for machine tools, No. 1,299,192, dated April 1, 1919, and reference can be had to that patent for a more complete showing of the details.

At one side of the planer there is provided a vertical shaft 14 connected with the motor 8 by means of worm and wheel gearing 15. Splined upon this shaft is a bevel pinion 16 which meshes with a bevel pinion 17 carried by the cross rail 4. This pinion 17 is connected with a gear 18 which in turn meshes with the aforesaid gear 11. Thus when the motor is rotated a movement proportionate to the extent of motor rotation is given to the gear 11. A similar arrangement is provided for rotating the gear 13, this comprising a bevel pinion 19 splined on the shaft 14, a bevel pinion 20 meshing with the said pinion 19 and a gear 21 connected with the pinion 20 and meshing with the gear 13.

When a reversible electric table driving motor is used as indicated, a suitable mechanism is provided for reversing the motor, this mechanism being automatically actuated by the table. As shown there are two levers 22 and 23 connected together and adapted respectively to be moved by dogs 24 and 25 adjustably secured to the table. By means of a connecting rod 26, these levers can operate the controlling mechanism. Under most circumstances it is preferable to provide an electromagnetic controlling mechanism of the type disclosed in the said Greenleaf and Keefer patent. However, such an electromagnetic controlling mechanism by itself constitutes no part of my present invention, and for the sake of simplicity of illustration I have diagrammatically indicated in Fig. 2 a directly acting mechanical reversing switch. As shown, this reversing switch comprises two levers 27 and 28 mechanically connected together and electrically connected respectively with the positive and negative lead wires. A transfer switch is shown at 29 and when this switch is in its upper position the reversing switch, according to its position, establishes a circuit through the main motor armature in one direction or the other. The shunt field 30 of the main motor is continuously energized.

The feed motor 8 is adapted to be operated intermittently as the table reciprocates and preferably the motor is reversible, a suitable table operated reversing mechanism being provided. When there is a reversible drive motor as here shown, it is convenient and preferable to effect the reversing of both motors by means of the same mechanism and such an arrangement is shown in the drawings. Assuming the feed motor circuit to be closed at 31, it will be seen that by means of the wires 32 and 33 the reversing switch serves, according to its position, to establish a circuit through the motor armature in one direction or the other. The shunt field 34 of the feed motor is continuously energized. For interrupting the circuit of the feed motor to stop the motor after a predetermined amount of rotation, a suitable automatic switch mechanism is provided. By preference this mechanism includes an electromagnetic relay switch as indicated at 31, this switch being controlled by the magnet 35. When the magnet 35 is energized the switch 31 is closed, thus establishing the motor circuit in one direction or the other as aforesaid. When the switch 31 is opened the main motor circuit is broken. In order that the feed motor may be quickly stopped after the opening of its circuit, I preferably provide a dynamic short circuit which includes a resistance 36. Preferably this short circuit is established by means of a switch 37 at the lower end of the core of the magnet 35, this switch 37 being closed whenever the switch 31 is opened.

The coil of the magnet 35 is connected at one side with the negative lead by means of the wire 38. The other side of the winding of the magnet is connectible with the positive lead through one or the other of two wires 39 and 40. At 41 is a switch operable simultaneously with the reversing switch and adapted to alternately connect the wires 39 and 40 with the positive lead. For connecting the wires 39 and 40 with the magnet coil, there are provided switches 42 and 43.

Referring more particularly to Figs. 3, 4 and 5, it will be seen that the switches 42 and 43 respectively comprise levers 42^a and 43^a vertically pivoted at 42^b and 43^b to a suitably mounted plate 44. This plate is preferably of insulating material. These levers normally engage contacts 42^c and 43^c mounted on the plate 44 and connected respectively with the wires 39 and 40. The levers are spring pressed against the contacts, there preferably being a single spring 45 extending between the two levers. Stops 42^d and 43^d are provided for respectively limiting the inward movement of the levers for a purpose to be set forth. The forward ends of the levers 42^a and 43^a are so formed as to lie at different elevations and as illustrated, the end of the lever 42^a is high and the end of the lever 43^a is low.

The switches 42 and 43 are located closely adjacent an element movable with the feed motor, the said element preferably being a rotatable shaft. For the sake of convenience and simplicity this shaft can be the shaft 14 already referred to. Mounted on the shaft 14 are two dogs 46 and 47, preferably formed of insulating material, which are located at different elevations so as to be adapted to engage respectively with the forward ends of the said levers 42^a and 43^a. Assuming the reversing switch to be in the position shown in Fig. 2, the switch 41 will be in position to connect the wire 40 with the positive lead. Under these conditions the circuit for the magnet 35 will be complete and the switch 31 will be closed, thus establishing a circuit through the feed motor armature. If the connections be such that the motor drives the shaft 14 in the direction indicated by the arrow in Fig. 5, the dog 47 will be moved against the forward end of the lever 43^a disengaging that lever from the contact 43^c and breaking the circuit of the relay magnet. The switch 31 at once opens and breaks the motor circuit, and the switch 37 closes completing a short circuit to quickly stop the motor. When the reversing switch is again operated, the wire 39 is connected with the positive lead, thus completing the relay circuit through the contact 42^c and the lever 42^a which has remained in the position shown in Fig. 5.

The motor now starts in the opposite direction turning the shaft 14 in the direction opposite to that indicated by the arrow. The lever 43^a is disengaged by the dog 47 and the spring 45 forces it into reëngagement with the contact 43^c. The continued movement of the shaft 14 carries the dog 46 into engagement with the lever 42^a, moving the lever to disengage it from the contact 42^c. In this way the relay circuit is broken and the motor is stopped as before. It will be seen that by means of the mechanism described, the motor is moved alternately in opposite directions, and after a predetermined amount of rotation is automatically stopped. By means of suitable mechanical connections the motion of the motor is transmitted to move the tools to a definite distance at each actuation, or at each alternate actuation.

It is necessary to provide means whereby the extent of movement of the tools at each actuation can be varied, and in accordance with my invention such variation is effected by relatively adjusting the two dogs 46 and 47. As shown in the drawings, there is an inner sleeve 48 connected with the shaft, and one of the dogs, as for instance 47, is directly connected with this sleeve by suitable means such as the screw 49. Rotatably mounted on the sleeve 48 is a second sleeve 50 to which the other contact 46 is directly connected by suitable means such as the screw 51. In order to prevent vertical movement of the sleeve 50 with respect to the sleeve 48, there is preferably provided a screw 52 threaded into the sleeve 50 and provided with an extended end which projects into the annular groove 53 in the sleeve 48. In this way the two sleeves are locked against endwise movement without, however, interfering with relative angular movement. For convenience in effecting relative movement of the two sleeves to adjust the dogs I provide a manually operable device, and preferably this device also serves to lock the two sleeves in adjusted positions. The preferred mechanism as shown, comprises a shaft 54 having a working fit in a horizontal aperture through one side of the sleeve 50. The central part of this shaft 54 is provided with screw or worm threads 55 which are adapted to mesh with a toothed wheel 56 which is preferably an integral part of the sleeve 48. At the ends of the shaft 54 are suitable wheels 57 and 57^a adapted to be manually engaged to turn the shaft and move the sleeve 50 with respect to the sleeve 48. The two wheels make it possible for adjustment to be conveniently effected with the shaft in any position. Preferably one of the sleeves, as for instance the sleeve 48, is provided with graduations by means of which the angle between the two dogs can be determined.

It will be observed that the construction is such that neither dog interferes in any way with the relative movement of the other. The relatively movable dog can be adjusted angularly with respect to the other dog to any desired position and can even be moved to a position vertically above it should that be required for a very fine feed. The dogs can therefore be so positioned relatively as to provide any effective included angle between them from zero to maximum. By the effective included angle I refer to the angle which the shaft is permitted to move before opening the feed motor circuit.

It will be obvious that the feed motor cannot stop instantly upon the breaking of the relay circuit. In accordance with my invention I provide means whereby the motor can continue to move until stopped by the dynamic braking without affecting or in any way interfering with the action of the limiting switch mechanism. Preferably I accomplish this result by providing a yieldable connection between the shaft 14 and the operating dogs 46 and 47. It will be observed that this yieldable connection is thus permanently interposed between the motor and the switch operating device comprising the dogs 46 and 47, and that the switch operating device therefor starts movement simultaneously with the motor. When the dogs 46 and 47 are mounted on sleeves 50 and 48 as described, the sleeve 48 is connected with the shaft 14 by means of a suitable yieldable device, this device preferably being in the form of a friction power transmitter. As shown, the sleeve 48 is recessed to receive a collar 58 which is suitably secured to the shaft, as for instance, by means of the key 59 and the screw 60. The collar 58 is provided with an outward extending annular flange 61, and between this flange and the surface of the recess in the sleeve 48 there is interposed a friction washer 62. A coil spring 63 tends to force together the surfaces on each side of the washer, thus providing a strong frictional resistance against relative rotative movement. The lower end of the spring 63 is supported by means of a collar 64 connected to the lower end of the sleeve 48 by means of screws 65. It will be seen that when one of the dogs, as for instance 47, has moved the corresponding lever 43^a into engagement with the corresponding stop 43^d, further movement of the dogs and of the sleeves which carry them, is prevented, slipping taking place at the friction surfaces provided at 62. In this way I prevent the movement of the motor from interfering in any way with the action of the switch mechanism. Each dog is stopped at a definite point irrespective of the amount of motor movement, and therefore the next stopping action takes place after a definite angular movement in the other direction,

this angular movement being in no way affected by the extent of prior movement of the motor under inertia.

Preferably, there is provided a casing or housing 66 which extends over and partly covers the switching mechanism.

Referring again to Fig. 2, it will be noted that when the switch 29 is moved to its lower position the circuit of the main motor is broken and a circuit is established through the relay magnet coil entirely independently of the wires 39 and 40. Thus when the said switch 29 is moved to its lower position the main motor is rendered inoperative and the automatic stopping mechanism for the feed motor is also rendered inoperative. The feed motor can now be operated continuously in either direction as desired by manually moving the reversing switch. In this way it is possible to effect preliminary adjustments of the tools.

What I claim is:

1. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of a motor for feeding the tool, a table controlled mechanism for starting the motor at intervals as the table reciprocates, a device driven by the motor and connected to start simultaneously therewith, the said device serving after movement to a predetermined extent to stop the motor, and means whereby the amount of movement of the said device is limited independently of the amount of movement of the motor.

2. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of an electric motor for feeding the tool, a table controlled switch for closing the motor circuit at intervals as the table reciprocates, a device driven by the motor and connected to start simultaneously therewith, the said device serving after movement to a predetermined extent to operate the switch to open the motor circuit, and means whereby the amount of movement of the said device is limited independently of the amount of movement of the motor.

3. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of a reversible motor for feeding the tool, a table controlled mechanism for starting the motor alternately in opposite directions at intervals as the table reciprocates, a reversible device driven by the motor and connected to start simultaneously therewith, the said device serving after movement in either direction to a predetermined extent to stop the motor, and means whereby the amount of movement of the said device in either direction is limited independently of the amount of movement of the motor.

4. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of a motor for feeding the tool, a table controlled mechanism for starting the motor at intervals as the table reciprocates, a device serving after movement to a predetermined extent to stop the motor, yieldable driving means permanently connecting the motor and the said device, and means whereby the amount of movement of the said device is limited independently of the amount of movement of the motor.

5. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of a motor for feeding the tool, a table controlled mechanism for starting the motor at intervals as the table reciprocates, a device serving after movement to a predetermined extent to stop the motor, frictional driving means permanently connecting the motor and the said device, and means whereby the amount of movement of the said device is limited independently of the amount of movement of the motor.

6. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of a motor for feeding the tool, a table controlled mechanism for starting the motor alternately in opposite directions at intervals as the table reciprocates, means operated by the motor and movable alternately in opposite directions and comprising two dogs alternately serving to stop the motor after movement thereof to the desired extent, and means whereby one of the dogs may be moved angularly relatively to the other to provide any effective included angle from zero to maximum.

7. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of a motor for feeding the tool, a table controlled mechanism for starting the motor alternately in opposite directions at intervals as the table reciprocates, means operated by the motor and movable alternately in opposite directions and comprising two dogs alternately serving to stop the motor after movement to the desired extent, and means for moving one of the dogs angularly relatively to the other to provide any effective included angle from zero to maximum and for automatically locking it in adjusted position.

8. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of a motor for feeding the tool, a table controlled mechanism for starting the motor alternately in opposite directions at intervals as the table reciprocates, a device movable alternately in opposite directions and comprising two dogs alternately serving to stop

the motor after movement to the desired extent, and yieldable driving means permanently connecting the motor and the said device whereby the dogs serve to determine the amount of movement of the device independently of the amount of movement of the motor.

9. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of a motor for feeding the tool, a table controlled mechanism for starting the motor alternately in opposite directions at intervals as the table reciprocates, a device movable alternately in opposite directions and comprising two dogs alternately serving to stop the motor after movement to the desired extent, yieldable driving means permanently connecting the motor and the said device whereby the dogs serve to determine the amount of movement of the device independently of the amount of movement of the motor, and means for moving one of the dogs relatively to the other and locking it in adjusted position.

10. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of an electric motor for feeding the tool, a table controlled switch means for establishing the motor circuit alternately in opposite directions at intervals as the table reciprocates, switch means supplemental to that aforesaid, means operated by the motor and rotatable alternately in opposite directions and comprising two dogs alternately serving to operate the last said switch means to open the motor circuit after rotation of the motor to the desired extent, and means for moving one of the dogs angularly with respect to the other to provide any effective included angle from zero to maximum and for automatically locking it in adjusted position.

11. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of an electric motor for feeding the tool, a table controlled switch means for establishing the motor circuit alternately in opposite directions at intervals as the table reciprocates, switch means supplemental to that aforesaid, a device operated by the motor and rotatable alternately in opposite directions and comprising two dogs alternately serving to operate the last said switch means to open the motor circuit after rotation of the motor to the desired extent, and yieldable driving means permanently connecting the motor and the said device whereby the dogs serve to determine the amount of rotation of the device independently of the amount of rotation of the motor.

12. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of an electric motor for feeding the tool, a table controlled switch means for establishing the motor circuit alternately in opposite directions at intervals as the table reciprocates, switch means supplemental to that aforesaid, a device operated by the motor and rotatable alternately in opposite directions and comprising two concentric sleeves respectively carrying two dogs which alternately serve to operate the last said switch means to open the motor circuit after rotation of the motor to the desired extent, and means comprising a worm and wheel for rotating one of the sleeves on the other and automatically locking it in adjusted position.

13. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of an electric motor for feeding the tool, a table controlled switch means for establishing the motor circuit alternately in opposite directions at intervals as the table reciprocates, switch means supplemental to that aforesaid, two concentric sleeves respectively carrying two dogs, a shaft on which the sleeves are rotatably mounted, driving connections from the motor to the shaft, a yieldable power connection between the shaft and one sleeve whereby the two dogs are alternately caused to operate the last said switch means to open the motor circuit after movement of the motor to the desired extent, and means for moving one of the dogs angularly with respect to the other and locking it in adjusted position.

14. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of an electric motor for feeding the tool, a table operated controlling switch for starting the motor alternately in opposite directions at intervals as the table reciprocates, and adjustable means comprising two independently movable switches alternately operable to stop the motor after rotation to any predetermined extent.

15. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of an electric motor for feeding the tool, a table operated controlling switch for starting the motor alternately in opposite directions at intervals as the table reciprocates, means comprising two independently movable switches alternately operable to stop the motor after rotation to a predetermined extent, and means driven by the motor and comprising two movable dogs adapted respectively to operate the said switches.

16. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of an electric motor for feeding the tool, a table operated controlling switch for starting the motor alternately in opposite direc-

tions at intervals as the table reciprocates, two independently movable switches normally spring held in closed positions, and adjustable means operated by the motor and serving to open the said switches alternately to stop the motor after rotation to any predetermined extent.

17. In a planer or other machine having a reciprocating table and an adjustable tool, the combination with the table and the tool, of an electric motor for feeding the tool, a table operated controlling switch for starting the motor alternately in opposite directions at intervals as the table reciprocates, two independently movable switches normally spring held in closed positions, means operated by the motor and serving to open the said switches alternately to stop the motor after rotation to a predetermined extent, and stops serving respectively to limit the movements of the switches and also serving to limit the movement of the switch opening means.

In testimony whereof I hereto affix my signature.

HAROLD L. BLOOD.