A. P. STECKEL.

ELECTRICAL CONTROLLING MEANS FOR PLANERS AND OTHER MACHINES.

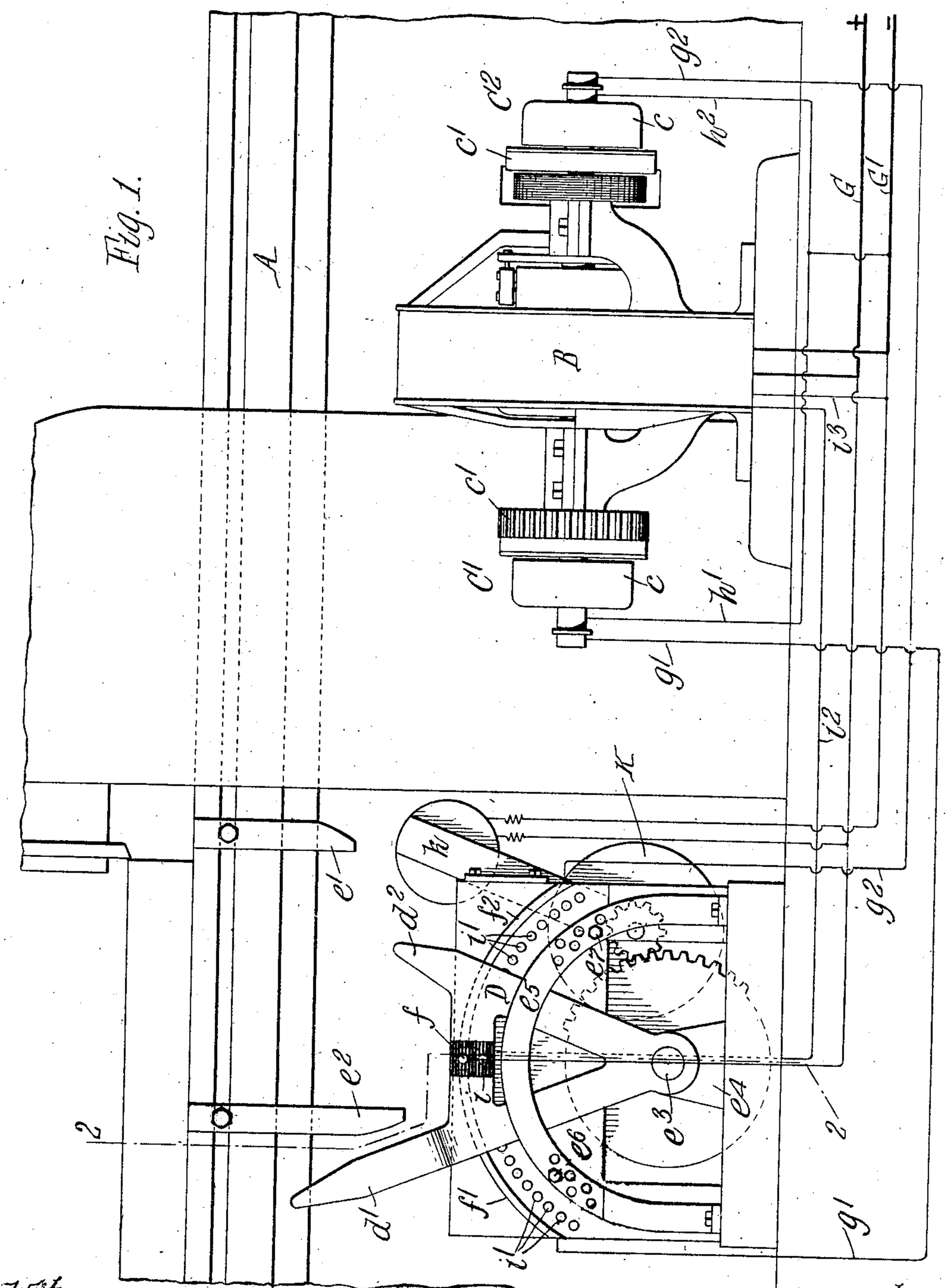
APPLICATION FILED FEB. 10, 1909.

936,577.

Patented Oct. 12, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

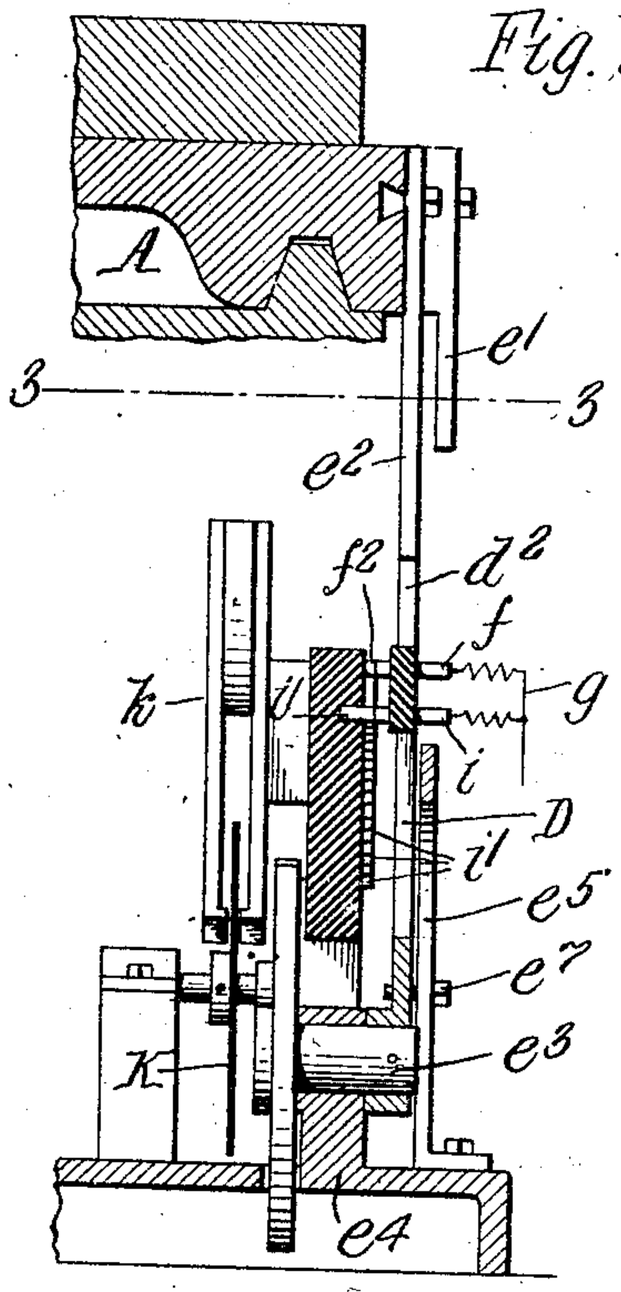


Fig. 3.

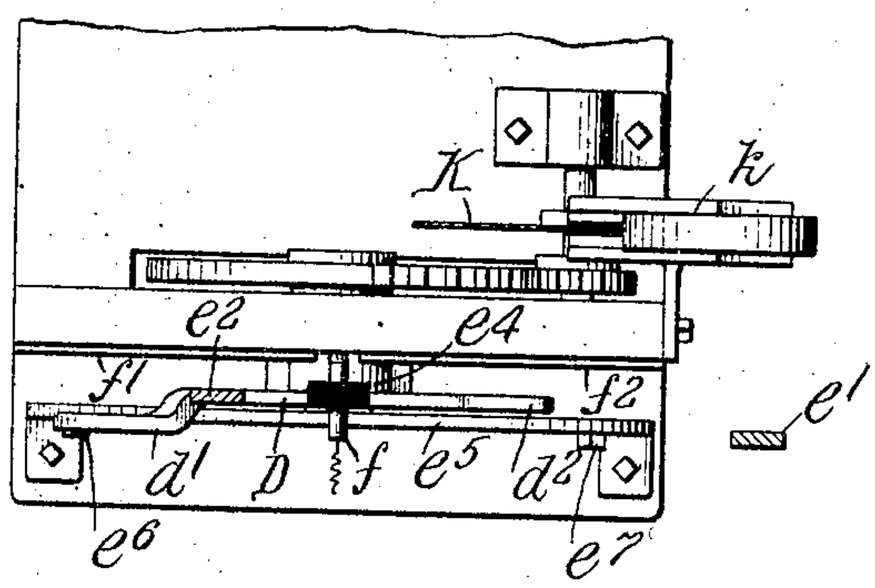
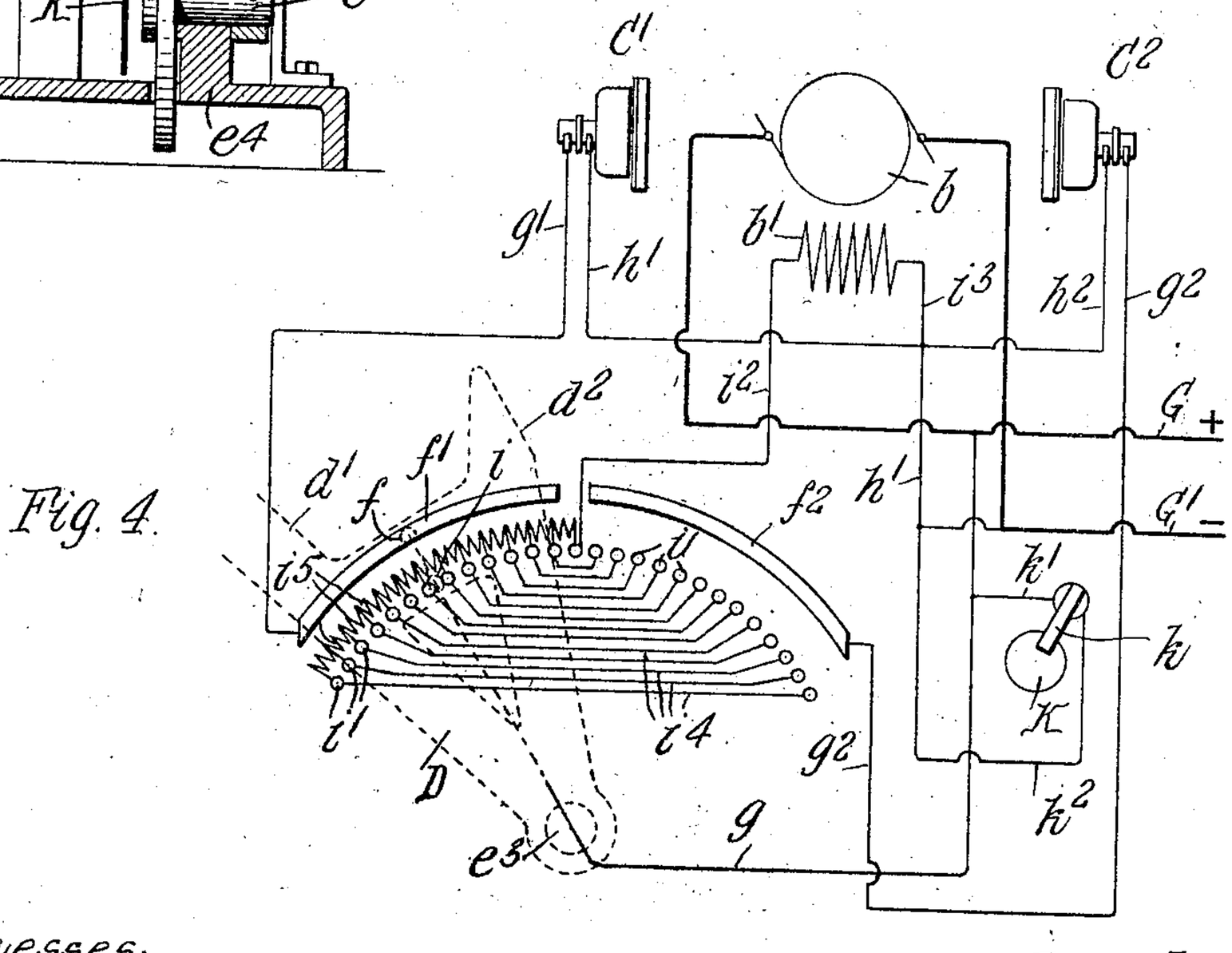


Fig. 4.



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UNITED STATES PATENT OFFICE.

ABRAM P. STECKEL, OF NEW YORK, N. Y.

ELECTRICAL CONTROLLING MEANS FOR PLANERS AND OTHER MACHINES.

936,577. Specification of Letters Patent. **Patented Oct. 12, 1909.**

Application filed February 10, 1909. Serial No. 477,176.

To all whom it may concern:

Be it known that I, ABRAM P. STECKEL, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented a new and useful Improvement in Electrical Controlling Means for Planers and other Machines, of which the following is a specification.

This invention relates to mechanisms for reversing and controlling the speed of machines, such, for example, as metal planers, which have a reciprocating work bed or part that travels alternately in opposite directions, and is driven by a motor that runs continuously in one direction.

Metal planers are ordinarily designed or geared so that the bed travels at a slower speed during the cutting stroke than during the return stroke. It is often desirable or advantageous to be able to cut at different speeds, some metals or classes of work permitting of higher speeds of the bed than others, and to return the bed as rapidly as permitted by the nature of the work, and the planer can be operated with the greatest efficiency when the speed of the bed in both the cutting and return strokes can be independently regulated as calculated to be most suitable for the particular work in hand.

One object of this invention is to provide efficient and desirable means of simple construction which operate automatically to reverse the motion of the bed of a planer, or analogous reciprocating part in other machines, and which can be readily set or adjusted to independently regulate the speed of the forward and backward strokes of the bed as may be desired without necessitating a change of gears.

Other objects are to provide a controlling mechanism of exceedingly simple construction which insures the reverse being effected only when the motor is operating at its slowest speed and with its greatest strength; and to improve controlling mechanisms of the character stated in the respects hereinafter described and set forth in the claims.

In the accompanying drawings, consisting of two sheets: Figure 1 is an elevation of an electrically driven planing machine equipped with controlling means embodying the invention. Fig. 2 is a sectional elevation of the controlling means in line 2—2, Fig. 1. Fig. 3 is a sectional plan view thereof in line 3—3, Fig. 2. Fig. 4 is a diagrammatic view of the electrical connections.

Like letters of reference refer to like parts in the several figures.

A represents the reciprocatory bed of a metal planing machine, B a driving motor therefor which runs continuously in one direction, and C' and C^2 two electrical clutches or devices for transmitting motion from the motor to the machine. The motor is preferably of the shunt-wound field type for a reason which will appear later. In Fig. 4, b represents the motor armature and b' the shunt field winding. The clutches C' C^2 have driving members c which are fast on the motor shaft or are otherwise positively driven by the motor and loose driven members c' which are geared to the planer bed so as to drive it in opposite directions. This is the usual arrangement in planers driven by a continuously running motor and two clutches, and, as usual, the gearing is designed to give a faster travel of the bed on the backing stroke than on the cutting stroke. The clutches C' C^2 are preferably of the induction type disclosed in Patent No. 744,423, granted to me November 17, 1903, but electrically controlled clutches or transmitting devices of other sorts could be used.

D represents a regulating tumbler or lever which is pivoted in any suitable manner and is provided with arms d' and d^2 arranged adjacent to the planer bed respectively in the paths of movement of tappets e' and e^2 which are adjustably secured on the planer bed. The tumbler is preferably secured to a shaft e^3 journaled in a suitable frame e^4, and a curved bar e^5 is arranged in front of the tumbler provided with a number of holes in which stop pins e^6 and e^7 for the tumbler are adapted to be placed to independently limit the swing of the tumbler in either direction as may be desired. The tumbler D controls the electrical current to the clutches C' C^2, and when the bed approaches the limit of its cutting stroke the backing tappet e^2 will engage the arm d^2 of the tumbler and move the tumbler in one direction to throw the cutting clutch C' out of action and the backing clutch C^2 into action to reverse the motion of the bed, and when the bed approaches the limit of its backing stroke the cutting tappet e' will

engage the other arm d' of the tumbler and move the tumbler in the opposite direction to throw the backing clutch out of action and the cutting clutch into action again. The tumbler also constitutes the movable lever of a rheostat for controlling the speed of the motor B.

The electrical connections are as follows, see particularly Fig. 4: f' f^2 represent two separated curved clutch contact strips which are insulated from each other and against one of which a contact piece f on the tumbler D is adapted to bear except when the tumbler is in its central position with the contact piece f between the separated ends of the clutch contacts f' f^2. G and G' represent the opposite sides of an electrical supply circuit, and g a branch conductor connecting one side G of the main circuit with the contact piece f on the tumbler D. The clutches C' and C^2 are respectively connected by conductors g' and g^2 to the clutch contacts f' and f^2, and by conductors h' and h^2 to the other side G' of the main circuit, so that when the tumbler is moved to one side from its central position its contact f will engage the clutch contact f' and close the circuit through the clutch C', thus energizing this clutch and causing the bed to travel in one direction, and when the tumbler is moved to the opposite side from its central position its contact piece f will engage the clutch contact f^2 and close the circuit through the other clutch C^2, which will then be energized, and drive the bed in the oposite direction. The tumbler is also provided with a contact piece i which is connected to the conductor g but is insulated from the contact piece f, and is adapted to engage a series of rheostat contacts i' arranged in an arc beside the tumbler. The opposite terminals of the field winding b' of the motor B are connected by conductors i^2 and i^3 respectively to the central rheostat contact i' and to the side G' of the main circuit. The corresponding rheostat contacts i' at opposite sides of the central ones are connected by conductors i^4 which are joined by resistance coils i^5. The motor armature b is connected directly across the main circuit, as clearly shown in Fig. 4. The tumbler D and contacts i' with their connecting resistance means thus constitute a controlling rheostat for the motor and more or less resistance will be interposed in the field circuit, depending upon the position of the tumbler, the field having the least resistance and greatest strength when the tumbler is in the central position, and the field resistance being increased and its strength lessened in proportion as the tumbler is moved farther from the central position in either direction. The motor therefore operates at the slowest speed and with the greatest field strength when the tumbler is moved from one clutch contact, f' or f^2, to the other for reversing the motion of the bed.

The operation of the controlling means is as follows: The motor can be started and stopped by an ordinary switch (not shown). When the tumbler D is in the central position with its contact piece f out of engagement with both clutch contacts f' and f^2 neither clutch will be energized and the planer will be at rest. To start the planer the tumbler is moved to one side of its central position, for instance, in the direction for its contact f to engage the clutch contact f' and energize the cutting clutch C', and is then allowed to fall by gravity until arrested by engagement with the adjustable stop e^6. During the fall of the tumbler its contact piece i engages one after another of the rheostat contacts i' and gradually increases the resistance in the motor field circuit and consequently gradually increases the speed of the motor until the maximum desired speed is attained, which is dependent upon the adjustment of the stop e^6. When the bed approaches the limit of its cutting stroke the backing tappet e^2 engages the arm d^2 of the tumbler and returns the tumbler, moving it beyond its central position, so as to cause its contact piece f to engage the clutch contact f^2, thereby placing the cutting clutch C' out of circuit and the backing clutch into the circuit, and the tappet then leaves the tumbler to fall by gravity until arrested by the other stop e^7. During the return of the tumbler toward its central position it gradually cuts out the field resistance, thereby increasing the field strength of the motor and decreasing its speed, and during its fall to the opposite side of the central position the field resistance is gradually cut in again and the motor speeded up as before. When the bed approaches the limit of its backing stroke the cutting tappet e' engages the other arm d' of the tumbler and returns it and allows it to fall as before, but in the opposite direction. Thus the controller operates automatically to reduce the motor speed, then reverse the motion of the bed and then gradually increase the motor speed again irrespective of the direction of travel of the planer bed, and the reverse always takes place when the motor is operating at its slowest speed and greatest field strength. The speed of travel of the planer bed in either direction can be regulated as desired by proper adjustments of the stops e^6, e^7, and the speed of the bed in one direction is in no wise dependent upon its speed in the opposite direction.

The described controlling means are exceedingly simple in construction, the tumbler being the only movable part, and there are no latches, trips or other parts to get out of order or give trouble. Furthermore, the speed of the planer bed in either direction

is effected with the least possible trouble, it being only necessary to change the position of the stop pins e^6 e^7.

While the electrical induction clutches referred to are preferred because of the better results incident to their use, the invention is not restricted to the employment of clutches of this type, for the control could be effected in a similar manner by the use of other devices for reversing the motion of the bed which are electrically controlled in a similar manner by the tumbler D.

A retarding device is preferably employed to prevent the tumbler from falling too rapidly when actuated by the tappets. The device shown for this purpose consists of a rotary disk K of copper or other conducting material suitably mounted and geared to the tumbler so as to be turned thereby, and an electromagnet k having poles straddling the disk and a winding connected across the supply circuit by conductors k' k^2. When this disk K is rotated by the movement of the tumbler the electrical currents induced in it by the magnet k tend to retard its rotation, and likewise the motion of the tumbler to which it is geared. Any other suitable means can be used to cause the tumbler to move slowly when falling.

I claim as my invention:

1. The combination of a motor which runs in one direction, a part which is driven in opposite directions by said motor through one or another of two transmission devices, and electrical means for controlling said motor and said transmission devices including a device which is moved in opposite directions past a central position by the movement of said reciprocating part for placing one transmitting device out of action and the other into action and which determines the speed of the motor in accordance with the extent of its displacement in either direction from its central position, substantially as set forth.

2. The combination of a shunt field motor which runs in one direction, a part which is driven in opposite directions by said motor through one or another of two transmission devices, and electrical means for controlling said motor and said transmission devices including a device which is moved in opposite directions past a central position by the movement of said reciprocating part for placing one transmission device out of action and the other into action and which introduces resistance into the motor field circuit in proportion to its displacement in either direction from its central position, substantially as set forth.

3. The combination of a motor which runs in one direction, a part which is driven in opposite directions by said motor through one or another of two transmission devices, and electrical means for controlling said motor and said transmission devices including a tumbler which is moved in opposite directions past a central position by the movement of said reciprocating part for placing one transmission device out of action and the other into action, said tumbler being left free to fall after it is carried past its central position and determining the speed of the motor in accordance with the extent of its movement in either direction from its central position, substantially as set forth.

4. The combination of a shunt field motor which runs in one direction, a part which is driven in opposite directions by said motor through one or another of two transmission devices, electrical means for controlling said motor and said transmission devices including a tumbler which is moved in opposite directions past a central position by the movement of said reciprocating part for placing one transmission device out of action and the other into action, said tumbler being left free to fall after it is carried past its central position and acting to introduce resistance into the motor field circuit in proportion to the extent of its movement in either direction from its central position, and adjustable means for limiting the movement of said tumbler, substantially as set forth.

5. The combination of a shunt field motor which runs in one direction, a part which is driven in opposite directions by said motor through one or another of two transmission devices, electrical means for controlling said motor and said transmission devices including a tumbler which is moved in opposite directions past a central position by the movement of said reciprocating part for placing one transmission device out of action and the other into action, said tumbler being left free to fall after it is carried past its central position and acting to introduce resistance into the motor field circuit in proportion to the extent of its movement in either direction from its central position, and independently adjustable stops for independently limiting the movement of said tumbler in opposite directions, substantially as set forth.

6. The combination of a shunt field motor which runs in one direction, a part which is driven in opposite directions by said motor through one or another of two transmission devices, electrical means for controlling said motor and said transmission devices including a pivoted tumbler which is movable in opposite directions past a central position for placing one transmission device out of action and the other into action, tappets on said reciprocating part which engage said tumbler and move it past its central position and then leave it to fall, said tumbler acting to introduce resistance into the motor field circuit in proportion to the extent of

its movement in either direction from its central position, and adjustable stops for limiting the movement of said tumbler, substantially as set forth.

7. The combination of a shunt field motor which runs in one direction, a part which is driven in opposite directions by said motor through one or another of two transmission devices, electrical means for controlling said motor and said transmission devices including a tumbler which is moved in opposite directions past a central position by the movement of said reciprocating part for placing one transmission device out of action and the other into action, said tumbler being left free to fall after it is carried past its central position and acting to introduce resistance into the motor field circuit in proportion to the extent of its movement in either direction from its central position, and means for retarding the motion of said tumbler, substantially as set forth.

8. The combination of a shunt field motor which runs in one direction, a part which is driven in opposite directions by said motor through one or another of two electrical clutches, and electrical means for controlling said motor and clutches including a tumbler which is moved in opposite directions past a central position by the movement of said reciprocating part for deënergizing one clutch and energizing the other clutch, said tumbler being left free to fall after it is carried past its central position and acting to introduce resistance into the motor field circuit in proportion to the extent of its movement in either direction from its central position, substantially as set forth.

Witness my hand, this 5th day of February, 1909.

ABRAM P. STECKEL.

Witnesses:

WM. HINCKLEY MITCHELL,

WALLACE BUELL.