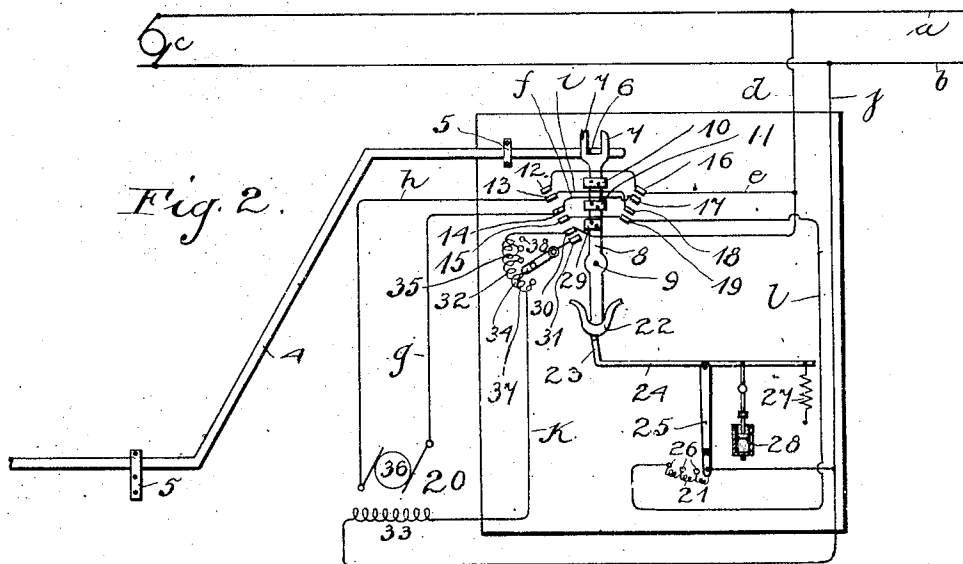
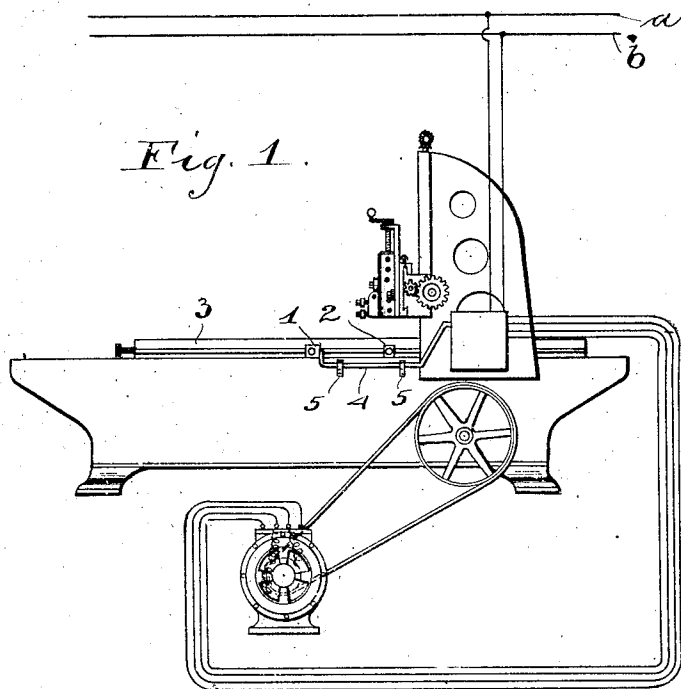


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POWER DRIVEN MACHINERY.
APPLICATION FILED SEPT. 17, 1904.

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Patented June 14, 1910.



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POWER-DRIVEN MACHINERY.

961,353.

Specification of Letters Patent. **Patented June 14, 1910.**

Application filed September 17, 1904. Serial No. 224,774.

To all whom it may concern:

Be it known that I, DUGALD C. JACKSON, citizen of the United States, residing at Madison, in the county of Dane and State of Wisconsin, have invented a certain new and useful Improvement in Power-Driven Machinery, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to power driven machinery and is related to my invention described in Patent No. 739,005, granted to me September 15, 1903. In that patent I provide means for electrically accomplishing the reversal of direction of a reciprocating or reversing member of a machine by means of switching mechanism actuated by the movable part to alternately reverse the direction of current flow through the electric driving motor. I also describe means in said patent for causing the speed in one direction to differ from the return speed.

In certain situations it is desirable to be able to variably adjust the speed in one direction without affecting the speed in the other direction; for instance, in planers or lathes where different depths of cut are taken from the material, where a very slow forward speed would be required for a heavy cut, and a faster speed would be allowable for light cuts, while the return speed should in each case be as rapid as the machine will warrant.

The object of my present invention is to provide such variable adjusting means, whereby the operator may at will set the stroke in one direction at any desirable speed, at the same time maintaining a fixed return speed. The manner of accomplishing this will be best understood by reference to the accompanying drawings, wherein an application of my invention to a planer is illustrated, and in which:

Figure 1 shows a motor in driving connection with a planer, and Fig. 2 is a diagrammatic view of the circuit arrangement for varying the forward speed.

In Fig. 1 I have shown dogs 1 and 2, adjustably attached to the planer bed 3 and arranged to come in contact with and to reciprocate an actuating bar 4 adapted to slide in ways 5, 5. A pin 6 (Fig. 2) rigidly

connected to the actuating bar 4 engages the ends 7, 7 of a bifurcated switch arm 8, pivoted at 9 and adapted to oscillate about said pivot when the actuating bar 4 is moved in a lateral direction. The switch arm carries blades 10 and 11 adapted alternately to engage forward contact plates 12, 13 and 14, 15 and return contact plates 16, 17 and 18, 19, respectively. The terminals of this reversing switch are suitably connected with the driving motor 20 and with the main conductors *a*, *b* connected with the source of current *c*, and when the switch arm is to the left the motor will run forward to cause forward motion of the planer bed and when the arm is moved to the right at the end of this forward stroke, the current to the motor will be reversed and the planer bed consequently reverses its direction.

As shown and described in my Patent No. 739,005, referred to, I may also employ a starting resistance 21 adapted to be automatically introduced in and gradually cut out of the armature circuit of the motor, both upon forward and reverse motion thereof, and I, therefore, provide the lower end of the switch arm 8 with a cam 22 shaped as shown and adapted to engage one end 23 of a lever 24 connected with a rheostat arm 25, which is adapted to move over the contact buttons 26 connected with resistance 21. The lever arm 24 may move under the influence of the spring 27 and dash pot mechanism 28 will serve to retard the lever, whereby the resistance 21 is gradually cut from the circuit so that the motor may be suitably started at each reversal. I provide an additional switch blade 29 for the switch arm 8 and terminals 30 and 31 are adapted to be engaged thereby when the arm is in position to cause forward rotation of the motor and of the moving member of the planer. A resistance 32 connects with the switch terminal 30 and with the conductor *k* leading to the field winding 33 of the motor, the other terminal of the field winding connecting through conductor *j* with the supply conductor *b* and the switch terminal 30 connecting with the supply conductor *a*. A switch arm 34 is connected with the switch terminal 31 and is adapted to variably engage the contact buttons 35 connected with the resistance 32.

To start the machine the operator moves the actuating bar 4 to the right, in this case, to cause the switch blades 10 and 11 to engage the terminals 16, 17 and 18, 19, respectively, and current will flow as follows: from the supply conductor *a* to conductor *d* through conductor *e*, through switch terminal 16, switch blade 10, switch terminal 17, conductor *f*, conductor *g* and through the armature 36, through conductor *h*, switch terminal 13, conductor *i*, switch terminal 18, switch blade 11, switch terminal 19, conductor *l*, and through conductor *j* to the supply conductor *b*, the resistance 21 having been gradually cut from this circuit as the motor starts.

The circuit through the field winding may be traced as follows: from the supply conductor *a* to conductor *d*, switch terminal 30, through all the resistance 32, conductor *k*, field winding 33, and through conductor *j* to the supply conductor *b*. As the resistance 32 is thus all included in the field circuit, the speed of the motor will be rapid upon this, which is the return, stroke of the planer.

When the actuating arm 4 is engaged by the dog 2 at the end of the return stroke, the switch arm 8 will be moved to the left into engagement with the forward terminals 12, 13, 14 and 15. The current through the armature of the motor will now be reversed and the motor consequently reversed in direction. At the same time, the switch blade 29 will engage the switch terminals 30 and 31 and a portion of the resistance 32 will be practically short circuited by the switch blade 29, switch terminal 31 and switch arm 34, and only the portion 37 (Fig. 2) will be effective in the field circuit. This diminution of resistance in the field circuit will correspondingly decrease the speed of the motor and consequently will cause the speed of the forward stroke of the planer bed to be decreased. The operator may at will move the switch arm 34 into engagement with any of the contact buttons 35 connected with the resistance 32 and thereby shunt more or less of the resistance from the field circuit, depending upon the speed desired, at the same time, however, maintaining constant return speed. If it is desired to have the forward and return speeds equal, the switch arm 34 could be brought in position over a dead button 38 and thus resistance 32 will be included in the field circuit both upon forward and return strokes.

The applications of my invention to the driving of machines of different characters require individual modifications from the embodiment illustrated which will occur to one skilled in the art.

I do not wish to be limited to the exact arrangements and circuits shown in the figures, as different arrangements may be em-

ployed for producing the desired result without departing from the spirit of my invention.

I claim as new and desire to secure by Letters Patent:

1. In electric driven machinery, the combination with a moving member thereof, of switching mechanism controlled by the position of said member whereby the electric motor driving said machinery is controlled to alternate the direction of motion of said moving member, a resistance all included in the field circuit of the motor upon the return stroke of the machine, means forming part of the switching mechanism for shunting part of said resistance from the field circuit upon the forward stroke of the machine, whereby the forward speed is less than the return speed, and means for varying the amount of resistance shunted from circuit.

2. In electric motor driven machinery, the combination with a moving member thereof, of a switch lever actuated by said member, reversing switch terminals adapted for engagement by said lever to cause the motor driving said machinery to be controlled to alternate its direction and the direction of travel of said member, contact terminals adapted to be engaged by said switch lever upon forward stroke of the machine, a resistance connected with one of said terminals and all included in the motor field circuit upon return stroke of the machine, and a switch arm connected with the other terminal and adapted for variable engagement with said resistance, said switch arm upon forward stroke completing a shunt circuit about part of said resistance.

3. In electric motor driven machinery, the combination with a moving member thereof, of a main switching mechanism mechanically and automatically controlled by the position of said moving member, a motor connected with a main circuit and contacts of the main switch mechanism to have its direction of rotation reversed upon operation of the switch mechanism by the moving member, and variable resistance mechanism associated directly with the main switching mechanism and connected with the motor to cause different speeds of the motor in one direction.

4. In electric motor driven machinery, the combination with a moving member thereof, of a main switching mechanism mechanically connected with the moving member and automatically controlled upon movement thereof, forward and reverse contacts for the main switching mechanism, a motor for driving the moving member connected with said forward and reverse contacts and with a main supply circuit to have its direction of rotation alternated during operation of the moving member and switch mechanism connected therewith, a rheostat connected

with said motor but with only the forward contacts of the main switch mechanism to be controlled during forward movement of the moving member to cause reduced speed of the motor and member connected therewith, said rheostat being adjustable to produce varying effects on the speed of the motor in a forward direction.

5. In electric motor driven machinery, the combination with a reciprocating member thereof, of main switching mechanism, a switch lever mechanically connected with the moving member to be reciprocated thereby upon operation thereof, switch contacts carried by said lever, forward and reverse switch contacts to be engaged by said lever, contacts upon reciprocation thereof, a motor connected with said forward and reverse contacts and with a main circuit to be alternately reversed in its direction of rotation, a resistance connected with forward contacts of the main switch and with the motor to be effective upon reverse movement of the motor to cause increased speed thereof, and upon forward rotation of the motor to cause reduced speed thereof, and means for varying the effect of said resistance.

6. In electric motor driven machinery, the combination with a reciprocating member thereof, of main switch mechanism controlled thereby, a switch lever connected with the reciprocating member to be reciprocated thereby, contacts on said switch lever, forward and reverse contacts adapted to be alternately engaged by the lever contacts upon reciprocation of the lever, a motor connected with the forward and reverse contacts and with a main supply circuit to have its direction of rotation alternately reversed on reciprocation of the switch lever, additional contacts at the forward side of the switch mechanism, a resistance connected with said contacts and with the motor circuit, said resistance during the reverse movement and position of the switch lever being all effective to thereby cause maximum speed of the motor, engagement of the additional contacts by a companion contact on the switch lever causing a reduction in the amount of resistance effective during the forward position of the switch lever whereby the forward speed of rotation of the motor is reduced, and means for varying the effect of the resistance during forward rotation of the motor.

7. In electric motor driven machinery, the combination of a reciprocating member thereof, of switch mechanism associated therewith, a switch lever for said switch mechanism connected with the reciprocating member to be reciprocated thereby, switch contacts on said switch lever, forward and reverse stationary contacts, a motor having its armature connected with said forward and reverse switch contacts with a main cir-

cuit to have its direction of rotation alternately reversed upon reciprocation of the switch lever, additional contacts at the forward side of the switch lever and a contact on the switch lever for engaging said additional contacts, a rheostat connected with said additional contacts and with a field circuit of the motor, said resistance during reverse position of the switch lever being all effective whereby the speed of the motor is maximum in reverse direction, forward movement of the switch lever causing the additional contact thereon to engage the additional contacts connected with the rheostat to short circuit part of the rheostat resistance whereby the forward speed of the motor is reduced, the amount of resistance short circuited being variable upon adjustment of the rheostat switch arm.

8. In electric motor driven machinery, the combination with a reciprocating member thereof, of switch mechanism controlled thereby, a switch lever for the switch mechanism connected with the reciprocating member, forward and reverse switch contacts adapted for engagement with the switch lever upon reciprocation thereof, a motor connected with said forward and reverse contacts and with the main supply circuit to have its direction of rotation alternated upon reciprocation of the switch lever, and starting rheostat mechanism mechanically associated directly with the switch lever to cause its resistance to effect gradual starting of the motor upon movement of the switch lever to connect said motor with the supply circuit.

9. In electric motor driven machinery, the combination with a reciprocating member thereof, of switch mechanism controlled thereby, a switch lever for the switch mechanism connected with the reciprocating member, forward and reverse switch contacts adapted for engagement with the switch lever upon reciprocation thereof, a motor whose connection with a supply circuit is controlled by said forward and reverse contacts, starting rheostat mechanism mechanically directly associated with the switch lever to be actuated thereby to cause gradual starting of the motor upon connection with the supply circuit by the switch mechanism, additional forward contacts for the switch mechanism, a resistance connected with said additional contacts and with the motor circuit, resistance during reverse movement of the reciprocating member being ineffective by the switch mechanism, said resistance being effective by the switch mechanism upon forward movement of the reciprocating member to reduce the speed of the motor, and adjustable means for varying the effect of the resistance.

10. In electric motor driven machinery, the combination with a moving member

thereof, of switching means controlled by the position of said member for controlling the electric motor driving said machinery so as to alternate the direction of said moving member, and variable resistance means associated with said motor and said switching means whereby the forward speed of the motor may be set at any rate independently of the reverse speed.

11. In electric motor driven machinery, the combination with a moving member thereof, of switching means controlled by the position of said member for controlling the electric motor driving said machinery so as to alternate the direction of motion of said moving member, variable resistance means associated with said motor and said switching means whereby the forward speed of the motor may be set at any rate independently of the reverse speed, and a rheostat introduced into the armature circuit automatically as the motor stops and excluded gradually as the motor starts.

12. In electric motor driven machinery, the combination with a reciprocating member thereof, of automatically controlled switching means for alternating the direction of current through said electric motor whereby said motor is alternately reversed to cause reciprocation of said reciprocating member, automatic means for introducing resistance in the armature circuit of said motor as the motor stops and gradually removes the same as the motor starts, and variable adjusting means for causing the forward and reverse speeds of the motor to differ.

13. In combination, an electric motor, machinery driven thereby, a moving member for said machinery, automatic means actuated by said machinery for controlling switching means to alternate the direction of current flow to said motor whereby said motor is alternately reversed and said moving member reciprocated, a resistance associated with said switching mechanism and with said motor, and variable adjusting means for said resistance for causing different amounts thereof to be included in circuit with said motor on forward and reverse motion.

14. In electric motor driven machinery, the combination with a moving member

thereof, of switching means controlled by the position of said member for alternating the direction of motion of said moving member, variable resistance means associated with said motor and said switching means whereby the forward speed of the motor may be set at any rate independently of the reverse speed, and a rheostat introduced into the armature circuit automatically as the motor stops and excluded gradually as the motor starts.

15. In combination, a machine having a reciprocating member, a single electric motor for driving said member alternately in forward and reverse directions, a switch arm automatically operated upon reciprocation of the moving member, contacts carried by said switch arm, forward and reverse contacts associated with the switch arm contacts, circuits connected with said contacts and with the armature and field parts of the motor so that said motor parts will be connected in shunt relation, a resistance associated with the circuits and contacts, said switch arm being actuated at the end of a forward stroke of the moving member to engage the reverse contacts and to thereby adjust the circuits to reverse the direction of current flow through the armature and to cause all said resistance to be included in the field circuit so that upon subsequent reverse movement of the member the motor will operate at high speed, said switch arm being actuated at the end of the reverse movement of the moving member to engage the forward contacts and to thereby adjust the circuits to again reverse the direction of current flow through the armature whereby the moving member will then move in forward direction, and an adjusting arm connected with the forward contacts and adapted to be set with reference to said resistance to exclude part of said resistance from the field circuit during the forward movement of the member.

In witness whereof, I hereunto subscribe my name this twelfth day of September A. D., 1904.

DUGALD C. JACKSON.

Witnesses:

HARVEY L. HANSON,
CHARLES J. SCHMIDT.