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ROLL MILL SETTING

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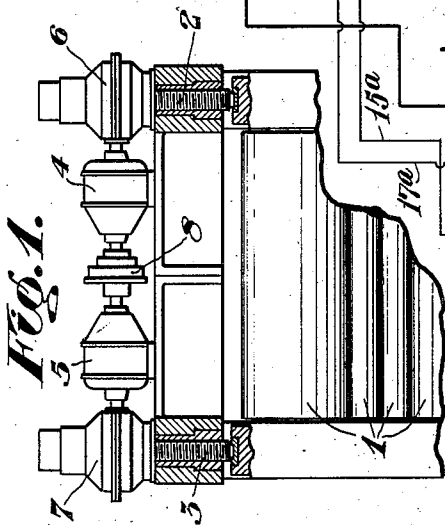
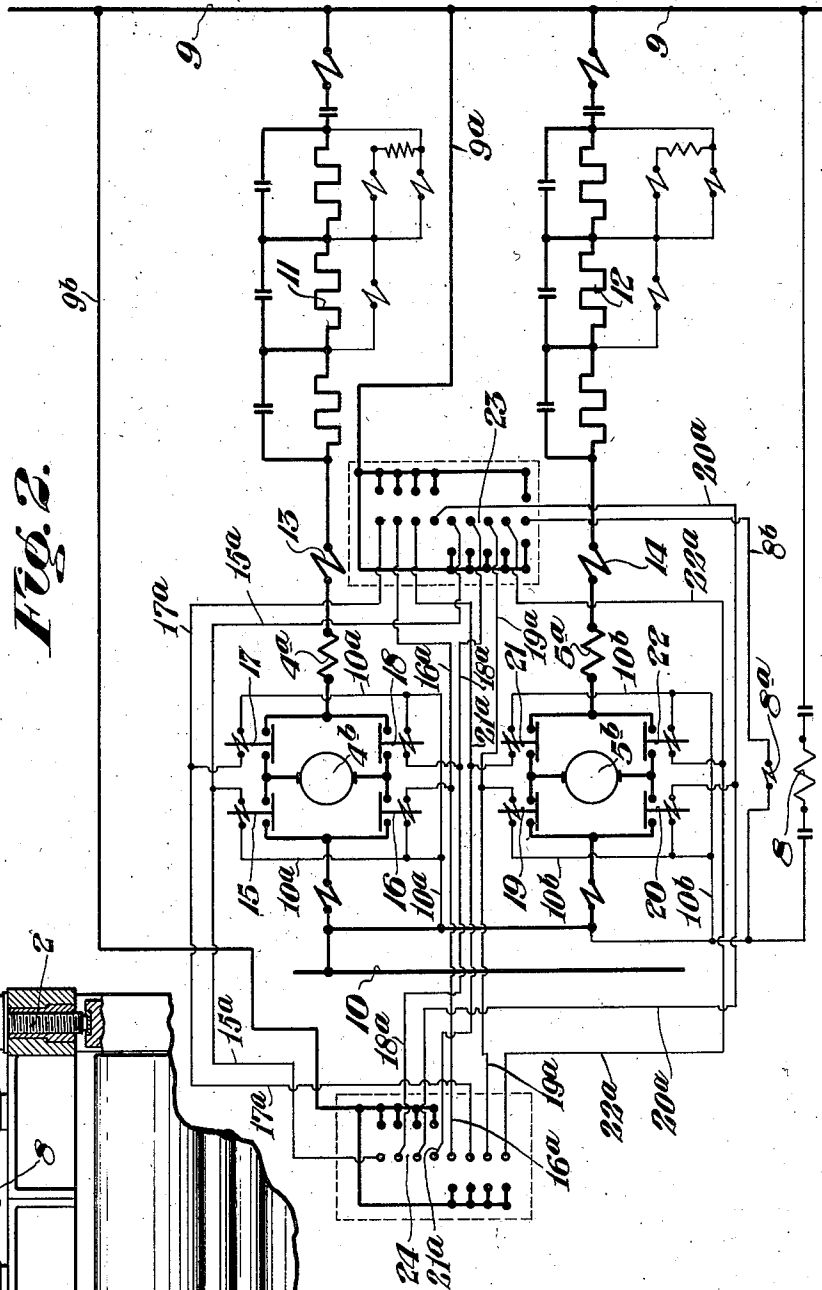


Fig. 2.



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ROLL MILL SETTING

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2 Claims. (Cl. 80—56)

This invention relates to rolling mills and particularly to a large mill having its pressure screws operated by electric motors and cold rolling wide metal strip in long lengths. One of the objects 5 is to provide a means for obtaining the proper initial roll setting prior to rolling so as to eliminate some of the labor involved and provide for more accurate adjustments. Other objects may be inferred from the following illustrative example of one form of the invention.

Referring to the drawing:

Figure 1 is a partial elevation of a mill's pressure screws and their operating motors.

Figure 2 is a wiring diagram for controlling 15 these motors.

The drawing illustrates only the essentials needed to effect the disclosure. A four-high set of cold rolls 1 is housed in the conventional manner of large mills. The pressure screws 2 and 3 20 are respectively connected to electric motors 4 and 5 by suitable gearing 6 and 7.

The motors 4 and 5 have their drive shafts provided with an electromagnetically operated clutch 8 suitably arranged so that its operation inter- 25 connects the shafts for mutual rotation. The gearing 6 and 7 is effected so that when the motors 4 and 5 are so interclutched the pressure screws 2 and 3 will be mutually raised and lowered.

Referring now to the wiring diagram which illustrates one means of effecting the control of the 30 motors 4 and 5 and attaining the inventor's stated object. It also provides other advantages which may be appreciated by anyone who has attempted to set the rolls of such heavy mills by the usual process of manipulating a number of push but- 35 tons.

Power lines 9 and 10 provide the current for the motors 4 and 5. The line 9 is connected to their series fields 4^a and 5^a through the usual accelerating resistances 11 and 12, overload switches and the like. These are thus briefly mentioned because their conventionality assures their proper arrangement by any mill electrician. These motors 45 also include the usual series braking fields 13 and 14. The armature 4^b of the motor 4 is connected to the line 10 through electromagnetic switches 15 and 16 and to the line 9 through similar switches 17 and 18. The armature 5^b of the motor 5 is also connected to the line 10 50 through electromagnetic switches 19 and 20, and to the line 9 through switches 21 and 22 of the same type.

It will be seen that the motor 4 is operated in 55 one direction when the switches 15 and 18 are

closed and is reversed when the switches 16 and 17 are closed. This relationship also applies to the motor 5 when the switches associated therewith are similarly operated.

The control of these various electromagnetic 5 switches is effected by two drum controllers 23 and 24. The one numbered 23 might be termed the "master controller" while the other might be termed the "leveling controller".

The rotative plural contact drums of these con- 10 trollers are in each instance connected to the line 9 and are thereby energized. The stationary contacts are arranged in circuit with the various electromagnetic switches controlling the two motors and with the coil 8^a of the clutch 8 so that 15 the following sequence of operations obtains. When the drum of the master controller is turned in one direction the switches 15 and 18 of the motor 4 and the switches 19 and 22 of the motor 5 are closed so that the two motors are simulta- 20 neously operating with the two pressure screws moved in the same vertical direction. The solenoid 8^a of the electromagnetic clutch 8 is simultaneously operated so that the two motors are interclutched and positively equal pressure screw 25 movement results.

When the drum is reversed its contacts simultaneously energize the switches 16 and 17 of the motor 4 and the switches 20 and 21 of the motor 5 as well as the solenoid 8^a of the magnetic clutch, 30 whereby the two motors operate as before but in a reverse direction.

The leveling controller 24 is constructed like the master controller. It is arranged in connection with the two motors, however, so that 35 when its drum is thrown in one direction the switches 15 and 18 of the motor 4 and the switches 20 and 21 of the motor 5 will be closed, the solenoid 8^a of the magnetic clutch remaining unenergized. Thus, the two motors will simul- 40 taneously operate in opposite directions so that the pressure screws 2 and 3 are simultaneously driven in opposite vertical directions. When the drum of this controller is thrown in the opposite direction the reverse effect is secured. That is 45 to say, the descending pressure screw is now the ascending one, while the opposite applies to the other.

From the foregoing, it will be seen that the invention essentially contemplates the provision of 50 control means for the motors 4 and 5 which is operated in a simplified manner by a unitary manual control in each instance. This enables one man to quickly set or adjust the pressure rolls of the mill both before rolling and while 55

rolling. He may stand in a position where he can observe the relative positions of these screws and rapidly secure the setting desired by proper manipulation of the control handles of the master
 5 and leveling controls, he having a hand on each. It is to be understood that these controllers are of the conventional type with small pistol grip handles at their tops, each easily manipulated with one hand.

10 The invention is believed novel in that it provides a means for leveling the pressure rolls of a mill quickly by simultaneously raising one of the movable roll's ends while lowering the other. It also provides a means for raising and lowering
 15 this roll while maintaining its parallel relationship with the others.

A more detailed description of the circuits of the wiring diagram and the operation involved follows:

20 The manually operable contactors of the master controller 23 connect with the line 9 by way of a line 9^a. These contactors are shown as they appear when they are out of contact with the fixed contacts.

25 When this master controller is operated so that the left-hand contactors contact the fixed contacts a circuit is formed from the line 9^a through lines 15^a and 18^a, the solenoids of the switches 15 and 18, line 10^a and so to the line 18. This
 30 causes the contacts of the switches 15 and 18 to close so that a power circuit is established from the line 9 through the resistances 11, series braking field 13, series field 4^a and armature 4^b of the motor 4, and so to the line 10. This causes the motor
 35 4 to operate. Also, a circuit is simultaneously formed from the line 9^a, through lines 19^a and 22^a, the solenoids of the switches 19 and 22, line 10^b and so to the line 10. This closes the contacts of the switches 19 and 22 and forms a power
 40 circuit from the line 9 through the resistances 12, series braking field 14, the series field 5^a and armature 5^b of the motor 5, and so to the line 10. This causes operation of the motor 5 in the same rotative direction as that of the motor 4.

45 When the master controller is operated so that the right-hand contactors contact the fixed contacts, a circuit is formed from the line 9^a through lines 16^a and 17^a, the solenoids of the switches 16 and 17 and through the line 10^a to the line
 50 10. This causes the contacts of the switches 16 and 17 to close and form a power circuit from the line 9 through the resistances 11, the series braking field 13, the series field 4^a and armature 4^b of the motor, and so to the line 10. This again
 55 causes operation of the motor 4 but in a reverse rotative direction to that which was obtained when the left-hand contactors contact the fixed contacts. Also, a circuit is simultaneously
 60 formed from the line 9^a, through the lines 20^a and 21^a, the solenoids of the switches 20 and 21 and so through the line 10^b to the line 10. This causes the contacts 20 and 21 to close and form a power circuit from the line 9 through the resistances 12, the series braking field 14, the series
 65 field 5^a and armature 5^b of the motor 5, and so to the line 10. This again causes operation of the motor 5, this, however, also being in a reverse direction to that obtained when the left-hand contactors contact the fixed contacts of the
 70 controller 23.

The manually operable contactors of the leveling controller 24 connect with the line 9 by way of a line 9^b. These contactors are also shown out of contact with the fixed contacts.

75 When the right-hand contactors of this level-

ing controller contact the fixed contacts a circuit is formed through the lines 15^a and 18^a, the solenoids of the switches 15 and 18 and so, through the line 10^a, to the line 10. Also, a circuit is simultaneously formed through the lines
 5 20^a and 21^a, the solenoids of the switches 20 and 21 and so, through the line 10^b, to the line 10. This causes the contacts of the solenoids 15 and 18 to close so that the previously described power circuit effects operation of the motor 4 in the
 10 same direction as occurs when the master controller 23 is operated so that its left-hand contactors contact the fixed contacts. Simultaneously it causes the contacts of the switches 20 and 21 to close so that the previously described
 15 power circuit effects operation of the motor 5. This motor, however, operates in the direction it does when the right-hand contacts of the master controller 23 contact the fixed contacts of this controller. Hence it will be seen that although
 20 the leveling controller 24 also effects simultaneous operation of the motors 4 and 5, these motors operate in opposite directions.

When the left-hand contactors of the leveling controller 24 contact the fixed contacts of this
 25 controller, a circuit is formed through the lines 16^a and 17^a, the solenoids of the switches 16 and 17 and so to the line 10 through the line 10^a. This causes the contacts of the switches 16 and 17 to close so that the motor 4 is powered by the circuit
 30 previously described. Also, a circuit is simultaneously formed through the lines 19^a and 22^a, the solenoids of the switches 19 and 22 and so to the line 10 by way of the line 10^b. This causes the contacts of the switches 19 and 22 to close
 35 so that the motor 5 is also operated by the circuit which has been previously described in connection with these particular switches. It is to be noted that here again the two motors are simultaneously operated in mutually reverse di-
 40 rections.

When either of the groups of the contactors of the master controller 23 are closed with the fixed contacts of this controller, a circuit is
 45 formed from the line 9^a through the line 8^b, the solenoid 8^a of the electro-magnetic clutch 8 and so to the line 10. This causes the clutch to operate and interconnect the two motors 4 and 5 so that they are mechanically forced to operate
 50 at the same speeds. This circuit is not established upon operation of the leveling control 24. Hence the clutch remains inoperative during leveling operations.

I claim:

1. A rolling mill including the combination of
 55 a set of rolls, at least two screws arranged to apply pressure to the opposite ends of said set, at least two electric motors one of which is geared to one of said screws and the other of which is geared to the other of said screws, and means
 60 for energizing said motors, said means including a controller providing a manually operable operating member that is movable in at least two directions and which is so constructed and so arranged in circuit with said motors that move-
 65 ment of said member in one direction effects simultaneous operation of said motors in opposite directions, whereby said screws are simultaneously driven in opposite directions, while move-
 70 ment of said member in another direction effects simultaneous operation of said motors in opposite directions which are the reverse of the directions in which they were operated upon movement of said member in the first named direction, where-
 75 by said screws are simultaneously driven in op-

posite directions which are the reverse of the directions in which they were driven upon movement of said member in the first named direction, said means being characterized in that it effects the named operations continuously as long as said member is moved in either of said directions regardless of the extent said screws are driven.

2. A rolling mill including the combination of a set of rolls, at least two screws arranged to apply pressure to the opposite ends of said set, at least two electric motors one of which is geared to one of said screws and the other of which is geared to the other of said screws, and means for energizing said motors, said means including a controller providing a manually operable operating member that is movable in at least two directions and which is so constructed and so arranged in circuit with said motors that movement of said member in one direction effects simultaneous operation of said motors in opposite directions,

whereby said screws are simultaneously driven in opposite directions, while movement of said member in another direction effects simultaneous operation of said motors in opposite directions which are the reverse of the directions in which they were operated upon movement of said member in the first named direction, whereby said screws are simultaneously driven in opposite directions which are the reverse of the directions in which they were driven upon movement of said member in the first named direction, said means being characterized in that it effects the named operations continuously as long as said member is moved in either of said directions regardless of the extent said screws are driven, and being further characterized in that it effects acceleration of said motors to their top speeds whenever said member is moved in either of said directions.

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