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R. E. PRICE

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AUTOMATIC POSITIVE STOP FOR ROTATING SPINDLES

Filed Sept. 3, 1937

2 Sheets-Sheet 1

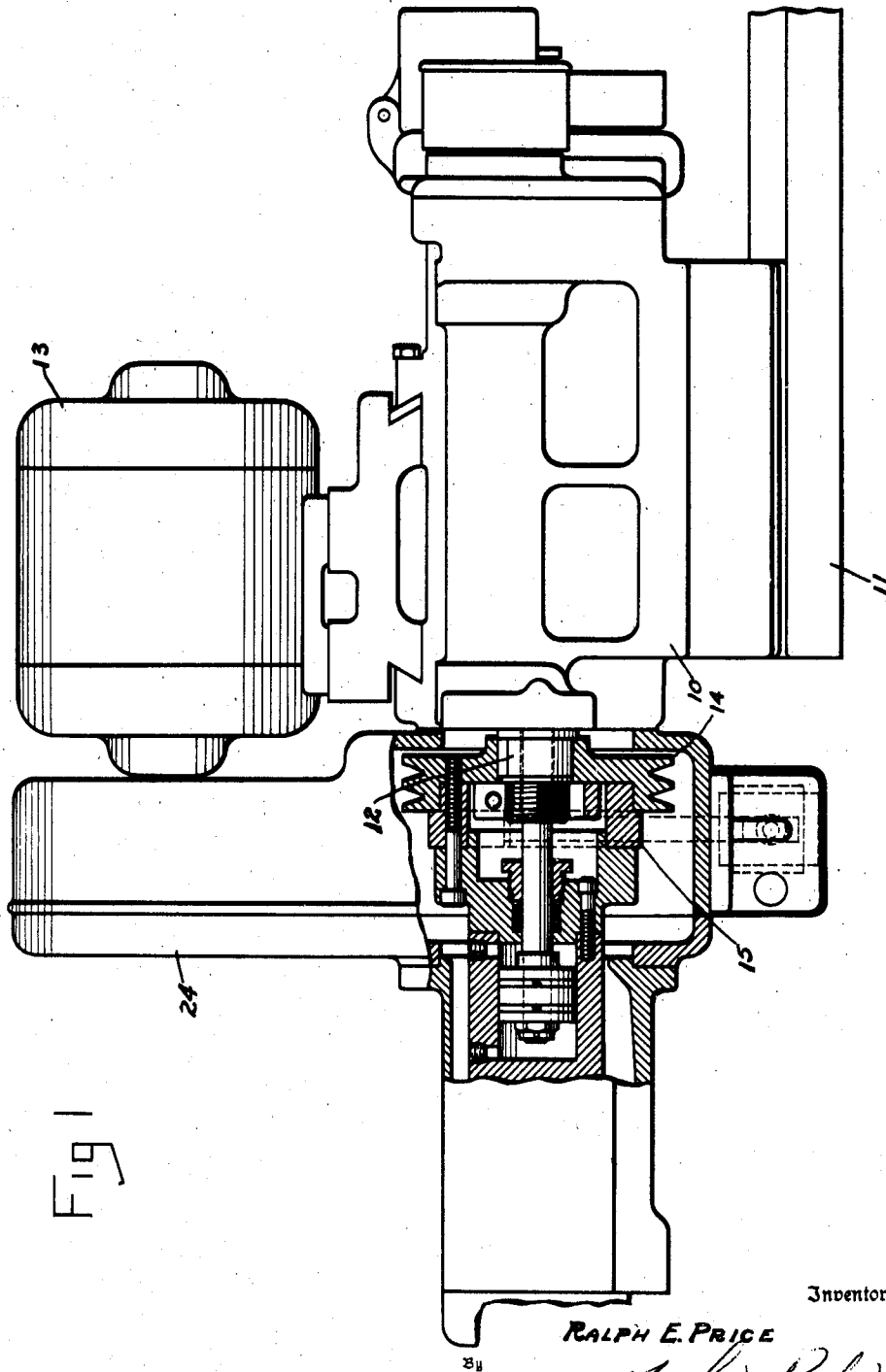


Fig 1

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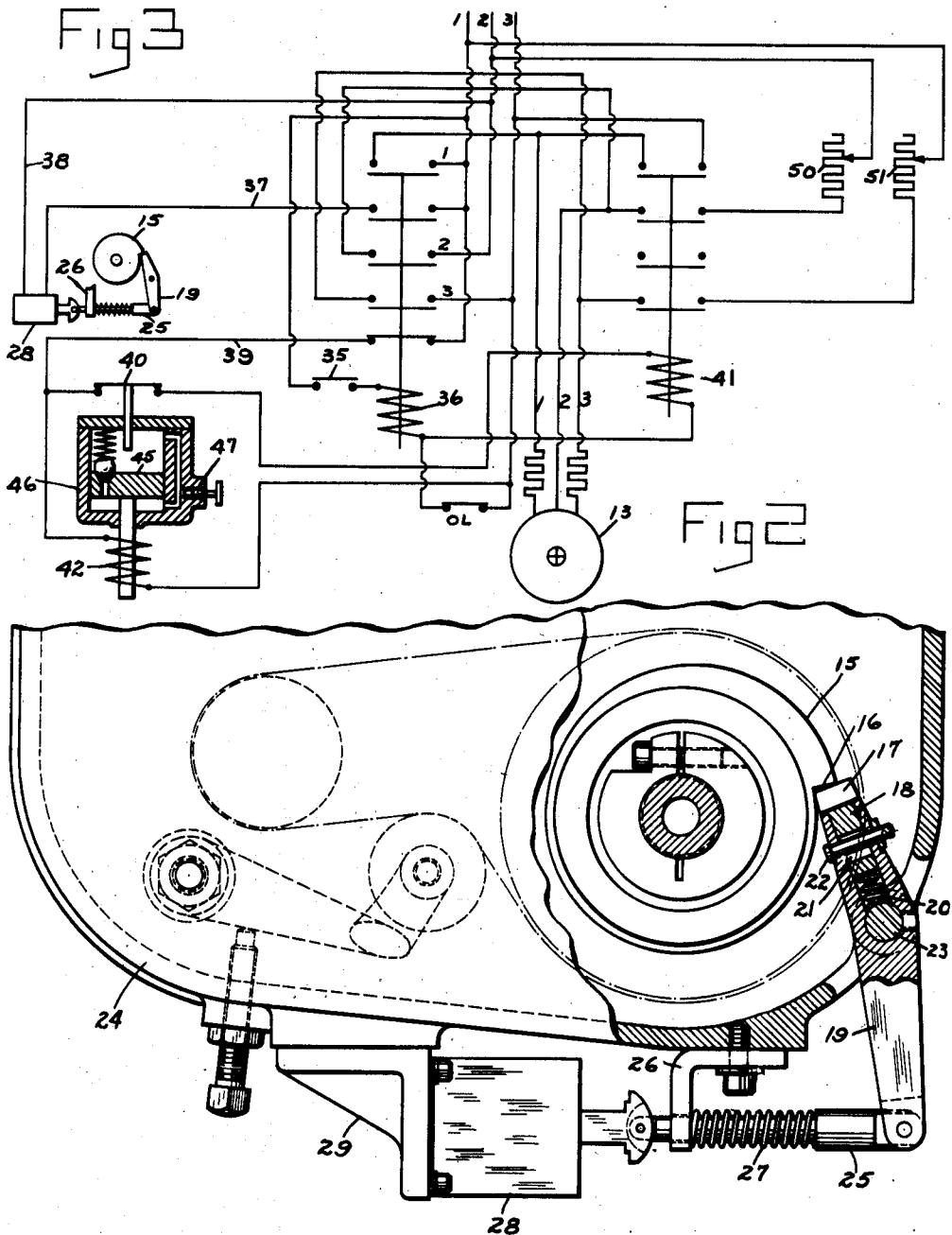
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2 Sheets-Sheet 2



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AUTOMATIC POSITIVE STOP FOR
ROTATING SPINDLESRalph E. Price, Waynesboro, Pa., assignor to
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Application September 3, 1937, Serial No. 162,391

4 Claims. (Cl. 172—179)

My invention relates to an automatic stop mechanism for stopping rotating parts positively in a predetermined position and it is an object of same to provide electric and mechanical devices which will cooperate to effect the desired result.

A further object is to provide means for rendering said stop mechanism operable only after the circuit to the headstock motor has been opened.

A further object is to provide means for positively preventing movement of the headstock spindle beyond a predetermined point.

Previous brakes functioned either through electric circuits such as by plugging or through solenoids which operated friction type brake mechanisms. These types of brakes are satisfactory if the spindle is rotating at a slow speed. However, at high speed such brakes permit a certain amount of drift which is necessary since it is not desirable to stop a rapidly rotating spindle too suddenly. My invention provides a means for stopping such high speed spindles positively and accurately without being too abrupt. The motor is plugged when the switch is opened and reversed through a revolution or less when a stop shoulder engages a positive stop which was dropped into position when the motor was plugged. The reversing current passes through resistances in order to keep down the torque of the motor during the reverse movement and thus reduce the shock of a positive stop. A dash pot relay breaks the reverse circuit a predetermined time after the motor has been reversed and always after the reverse movement has been stopped.

In the drawings Figure 1 is a front elevation of a headstock for a grinding machine.

Figure 2 is a partial end elevation.

Figure 3 is a wiring diagram for the headstock motor.

Numerals 10, Figure 1, indicates a headstock casting mounted on a work table 11 and rotatably supporting a spindle 12. Said spindle is driven through suitable gearing by a motor 13 mounted on housing 10. The final drive to the spindle is through a pulley 14 mounted thereon. A cam 15, secured to said pulley has a radial face portion 16 which serves to engage a removable positive stop 17 during a reverse movement of said spindle. Said stop has a shank portion 18 which is inserted in the hollow end of a pivoted arm 19. A spring 20 urges stop 16 outwardly from arm 19. A slot 21 in said shank permits the insertion of a pin 22 through the arm and shank to limit the movement of said

stop. Said arm rotates about a pivot 23 in the belt guard 24. The other end of said arm is attached to a link 25 which is supported from housing 24 by a bracket 26. A spring 27 one end of which bears against said bracket and the other end against a shoulder on link 25 urges said link to the right and the stop 17 into contact with cam 15. Movement of said link in the opposite direction is effected by a solenoid 28 which is secured to housing 24 by bracket 29.

The operation of my device is as follows:

The operator starts motor 13 by means of switch 35. This energizes relay coil 36 and closes the circuits between feed lines 1, 2 and 3 and motor 13. A circuit is also closed through lines 37 and 38 to solenoid 28 which when energized is effective to hold stop 17 out of contact with cam 15. A normally closed circuit through line 39 through normally closed time delay switch 40 to reverse relay coil 41 is opened thus rendering said relay inoperative. At the same time coil 42 which operates said switch 40 is deenergized permitting same to be closed by gravity. Since the supply to line 39 has been opened, closing switch 40 at this time has no effect. When it is desired to stop the spindle, the operator opens switch 35 deenergizing coil 36 and cutting off the supply of current to motor 13. The circuit through line 37 is also broken at this time to deenergize solenoid 28 and thus permit stop 17 to be shifted into contact with cam 15 by means of spring 27. Deenergizing coil 36 also results in closing a circuit through line 39 and normally closed switch 40 to coil 41 which reverses the supply of current to the armature and thus the direction of rotation of said armature. This reverse current passes through resistances 50 and 51 for the purpose of effecting the reverse movement at reduced torque thus reducing the shock of a positive stop. This reverse movement continues until shoulder 16 on cam 15 engages stop 17. Line 39 also supplies current to energize coil 42 to initiate movement of piston 45 in cylinder 46. After a predetermined time depending on the adjustment of valve 47, said piston engages switch 48 and breaks the circuit to coil 41, deenergizing same and opening the circuit to motor 13.

I claim:

1. Means for stopping a rotating spindle in a predetermined position comprising a motor for driving said spindle, control means for said motor including a start and stop switch, means operable upon closing said switch to start said motor and means operable upon opening said switch to

reverse said motor and a positive stop for stopping said reverse movement.

2. A driving mechanism for a spindle comprising a motor, control means for said motor including a start and stop switch, a stop on said spindle means for engaging said stop to positively stop rotation of said spindle, means operable upon closing said switch for withdrawing said stop engaging means from the path of said stop and for starting said motor, and means operable upon opening said switch for releasing said stop engaging means and for effecting a reverse movement of said motor.

3. A driving mechanism for a spindle comprising a motor, control means for said motor including a start and stop switch, a stop on said spindle means for engaging said stop to positively stop rotation of said spindle, means operable upon closing said switch for withdrawing said stop engaging means from the path of said stop and for starting said motor, means operable upon opening said switch for releasing said stop engaging means and for effecting a reverse move-

ment of said motor, and means for effecting said reverse movement at a lower torque than the forward movement.

4. A mechanism for stopping a rotating spindle comprising a motor for driving said spindle, a stop on said spindle, a stop engaging element normally in the path of said stop, a control mechanism for said motor including a starting switch, circuits operable upon closing said switch for moving said stop engaging means to inoperative position and for starting said motor, a normally closed circuit, a normally closed time delay switch in said circuit, means including said time delay switch for effecting a reverse movement of said motor and means operable upon opening said starting switch for releasing said stop engaging means, stopping the flow of current to said motor and for closing the circuit through said time delay switch whereby to effect said reverse movement and after a predetermined time to open said reverse circuit.

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