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PATENTED FEB. 4, 1908.

J. F. RAYNES.
COMBINED GAGE AND CIRCUIT CLOSER.

APPLICATION FILED MAY 21, 1907.

2 SHEETS—SHEET 1.

Fig. 1.

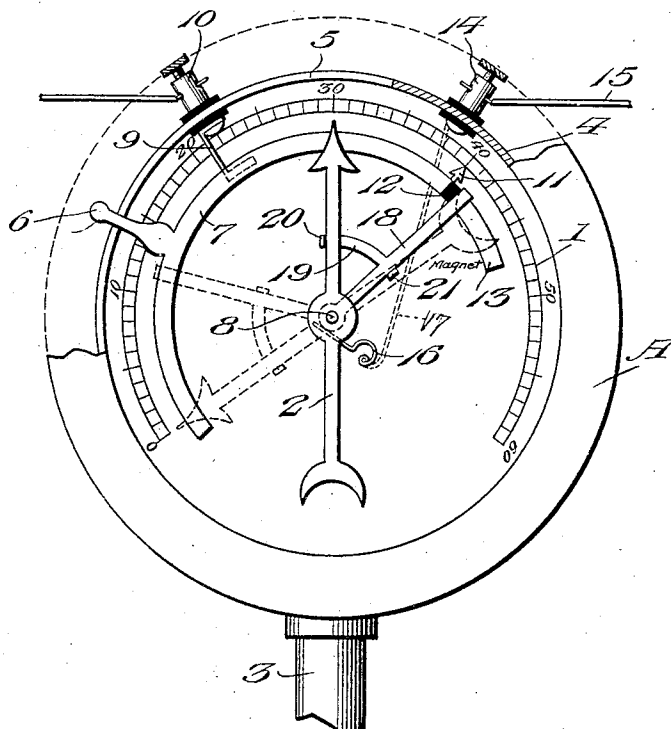


Fig. 2.

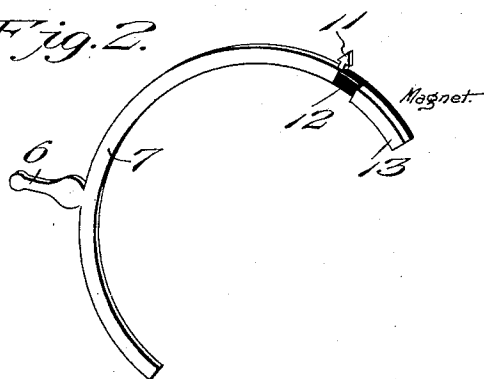
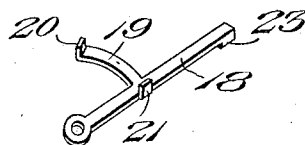


Fig. 3.



Witnesses

Edwin L. McKee
C. Bradway

Inventor
Jos. F. Raynes

By *Victor J. Evans*
Attorney

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2 SHEETS—SHEET 2.

Fig. 4.

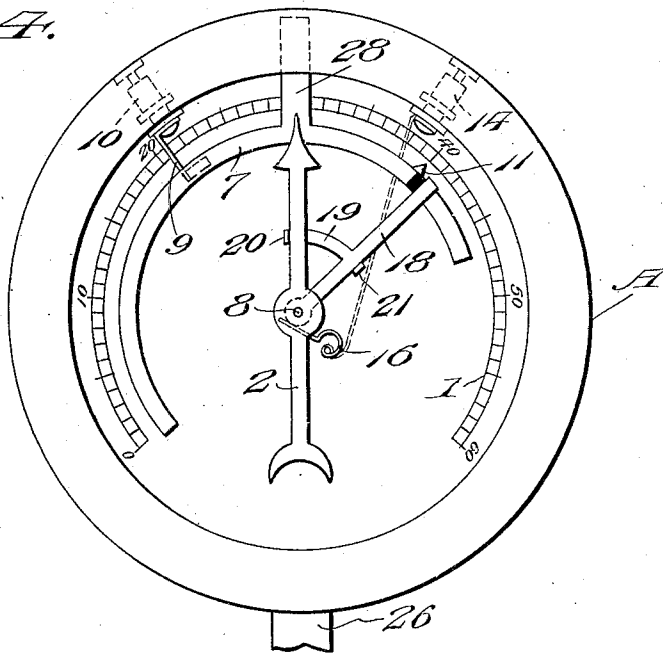
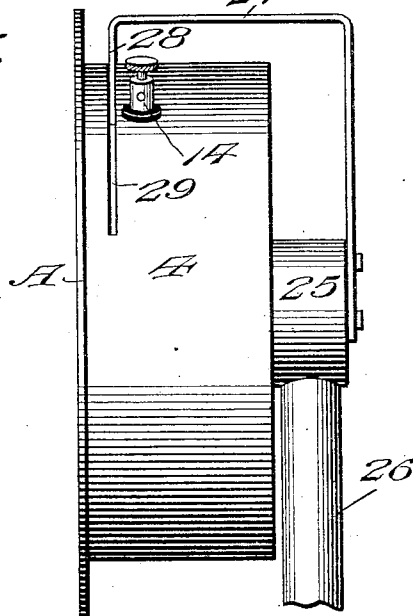


Fig. 5.



Inventor

Jos F. Raynes

Witnesses

Edwin L. McKee

C. Bradway

By

Victor J. Evans

Attorney

UNITED STATES PATENT OFFICE.

JOSEPH FRANCIS RAYNES, OF HYDE PARK, MASSACHUSETTS.

COMBINED GAGE AND CIRCUIT-CLOSER.

No. 878,423.

Specification of Letters Patent.

Patented Feb. 4, 1908.

Application filed May 21, 1907. Serial No. 374,872.

To all whom it may concern:

Be it known that I, JOSEPH F. RAYNES, a citizen of the United States, residing at Hyde Park, in the county of Norfolk and State of Massachusetts, have invented new and useful Improvements in Combined Gages and Circuit-Closers, of which the following is a specification.

This invention relates to a combined pressure gage and electric switch adapted for use in connection with air compressing machines driven by electric motors, the gage serving to indicate the pressure and the switch to open the motor circuit when the pressure reaches a maximum, and to close the circuit when the pressure falls to a certain minimum.

The device has been found especially serviceable for air compressing systems used for air brushes in engraving work, but it is to be understood, however, that the invention is not necessarily limited to this use.

The invention has for one of its objects to improve and simplify the construction and operation of devices of this character so as to be comparatively easy and inexpensive to manufacture, thoroughly reliable and efficient in use, and readily adjusted for permitting the switch to be opened or closed at any desired pressure.

A further object of the invention is the provision of a circuit closing mechanism adapted for use in connection with a pressure gage of ordinary construction and including means whereby the pointer or hand of the gage causes the opening and closing of the circuit.

A still further object is the employment of a switch comprising an adjustable contact normally, and a movable contact adapted to be actuated by the movable element of the gage, in connection with a magnet coöperating with the movable contact for holding the circuit open until the pressure indicated by the gage falls to a predetermined minimum, whereupon the circuit is again closed by the movable element of the gage, and the pressure restored.

With these objects in view and others, as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawings, which

illustrate certain of the embodiments of the invention, Figure 1 is a front elevation partially in section of the device. Fig. 2 is a perspective view of the stationary contact member. Fig. 3 is a perspective view of the movable contact member. Fig. 4 is a front elevation of a modified form of the device, wherein the gage is adjusted with respect to the stationary contact member. Fig. 5 is a side elevation of a modified form of the combined gage and switch device.

Similar reference characters are employed to designate corresponding parts throughout the several views.

Referring to the drawings, A designates generally an ordinary pressure gage of the Bourdon type, of which 1 is the dial and 2, the hand or index. The gage is connected with an air pressure pipe 3 in the usual manner and the needle 2 responds to variations in pressure and indicates by means of the dial, the number of pounds per square inch in the system in which the gage is employed. The casing 4 of the gage has a peripheral slot 5 through which extends a knob or finger hold 6 for adjusting the stationary contact 7 of the circuit closing device or switch. This stationary contact is in the form of half a ring or other segment and is suitably guided on the dial or other part of the gage to move about the center or arbor 8 of the gage. This contact is connected at one side of the electric circuit by means of a member 9 having a wiping engagement therewith, the said member being connected with the binding post 10 on the casing 4. One end of the contact 7 is provided with a narrow head or index 11 for adjusting the contact with respect to the dial so as to set the switch to open at a certain maximum pressure. On the end having the pointer 11 is a block of insulation 12 that serves to mechanically connect a permanent bar magnet 13 to the stationary contact so as to be adjustable therewith. On the casing 4 is a second binding post 14 connected with the conductor 15 of the electric circuit and between the binding post and the wiping contact 16 is a connection 17, the wiping contact 16 being arranged to engage the movable contact 18 of the switch. The movable contact is mounted to swing on the arbor 8 of the gage and is of such a length as to bear against the stationary contact 7 for completing the circuit. On the movable contact 18 is an arcuate arm 19 that has

its end turned forwardly to form a stop 20, and on the contact 18 is a stop 21 and between the stops or abutments, the hand or index 22 is adapted to oscillate independently of the
 5 movable contact. This construction constitutes a lost motion connection between the movable contact and hand 2 so that the pressure can vary between a certain maximum and minimum before the switch is
 10 opened or closed. As shown in Fig. 3, the extremity of the movable contact 18 is increased in size, as indicated at 23, so as to present a considerable mass on which the magnet 13 can act to draw the switch open.

15 In order to start the system into operation, the cut out switch of the motor circuit is closed and the circuit is completed through the automatic switch and the gage. In its initial position, the hand or index 2 is at zero
 20 and the movable contact will be in the dotted line position shown in Fig. 1, thus making contact with the stationary member 7. As the pressure in the system rises, the needle moves in a clockwise direction and inde-
 25 pendently of the movable contact until the stop 21 is reached, and from this point onward, the movable contact is carried by the index until the maximum pressure is reached, which will be indicated by the pointer 11.
 30 Since the movable contact is thus brought close to the magnet at the maximum pressure, the magnet will immediately attract the movable contact and draw it to the full line position, Fig. 1. The circuit is thus auto-
 35 matically opened, since the movable contact is no longer in engagement with the fixed contact, consequently the motor of the system is stopped, and as the compressed air is used, the pressure falls, as will be indicated
 40 by the hand 2. The hand moves independently of the contact 18 until the other stop 20 is reached, whereupon the hand will carry the contact with it and cause the circuit to be closed when the contact 18 engages the
 45 stationary contact 7. This means that the motor is again started and the pressure restored until finally the needle will move the contact 18 in the opposite direction and permit the magnet to open the switch and posi-
 50 tively hold it open until the needle again closes the switch by the fall of the pressure. By adjusting the stationary contact 7 back and forth, the switch can be caused to open at any desired pressure, and furthermore the
 55 arm 19 may be of any desired length or adjustable to vary the margin through which the needle can fluctuate before opening or closing the switch.

60 In Figs. 4 and 5, a modification is shown in which the gage itself is adapted to be adjusted instead of the stationary contact. In this case the gage is rotatably mounted on a head 25 on the compressed air pipe 26 and the stationary contact is secured to the head
 65 by means of a supporting member 27 which

extends upwardly and forwardly and has a downwardly projecting extremity 28 passing through a slot 29 in the casing 4 to connect with the stationary contact 7. By turning the gage A as a unit, the pointer 11 can be
 70 brought opposite any division on the scale of the dial 1 so that the switch will automatically open when the pressure causes the index hand 2 to reach the pointer 11. The
 75 operation of the modified form of the device is practically the same as that already described, except as to the manner of adjusting the parts to cause the switch to open or close at any desired pressure.

80 From the foregoing description, taken in connection with the accompanying drawing, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have de-
 85 scribed the principle of operation of the invention, together with the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative
 90 and that such changes may be made when desired, as are within the scope of the claims. Having thus described the invention, what I claim is:—

1. The combination of a gage comprising 95 a dial and a hand relatively movable, with an automatic switch controlled by the movable element of the gage, said switch comprising an adjustable contact, a magnet carried thereby, and a swinging contact slidably
 100 engaging the first and adapted to be attracted by the magnet for opening the switch.

2. In an apparatus of the class described, the combination of a gage including a dial 105 and a hand, with an automatic switch comprising a relatively stationary contact, a movable contact, a lost motion connection between the movable contact and hand whereby the latter actuates the said contact, 110 and a device arranged to cause the switch to suddenly open and remain in such position.

3. In an apparatus of the class described, the combination of a gage including a dial and a hand, with an automatic switch, said 115 switch comprising a relatively stationary segmental contact disposed over the dial, a movable contact adapted to bear on the first and actuated by the hand, and a magnet arranged to operate on the movable contact to
 120 open the switch.

4. In an apparatus of the class described, the combination of a dial and a hand, with an automatic switch comprising a relatively 125 stationary contact means for mounting the contact to permit of relative adjustment between the contact and dial, a movable contact mounted to slide on the first contact, means for moving the second contact over the first by the hand, and means for quickly 130

disengaging the movable from the stationary contact independently of the hand when a certain predetermined pressure is reached.

5 5. In an apparatus of the class described, the combination of a gage including a dial and a hand, with an automatic switch comprising an arcuate relatively stationary contact and mounted to be adjustable relatively to the dial, a magnet mechanically connected
10 and adjustable therewith and insulated therefrom, a movable contact having a sliding engagement with the first contact and adapted to be disengaged therefrom by the magnet, and means for actuating the movable
15 contact by said hand.

6. In an apparatus of the class described, the combination of a gage, with an automatic switch comprising a stationary contact
20 mounted to permit relative movement between the same and gage for opening the switch at any predetermined pressure, a movable contact actuated by the hand of the

gage to a certain position, and a magnet arranged to open the switch and secured to the first contact and movable therewith. 25

7. The combination of a gage including a hand and a dial, with a switch device comprising a segmental contact, a magnet carried thereby and insulated therefrom, a
30 movable contact arranged to swing around the center of movement of the hand, and spaced stops on the movable contact between which the hand is adapted to move independently of the contact and by which the hand actuates the latter, and means for
35 connecting the contacts in circuit with the apparatus to be controlled.

In testimony whereof, I affix my signature in presence of two witnesses.

JOSEPH FRANCIS RAYNES.

Witnesses:

JOHN C. RAYNES,

WILLIAM A. RAYNES.