Jan. 9, 1951

V. S. LOVETT

2,537,771

SPRINKLER ALARM SWITCH

Filed Dec. 11, 1946

3 Sheets-Sheet 1

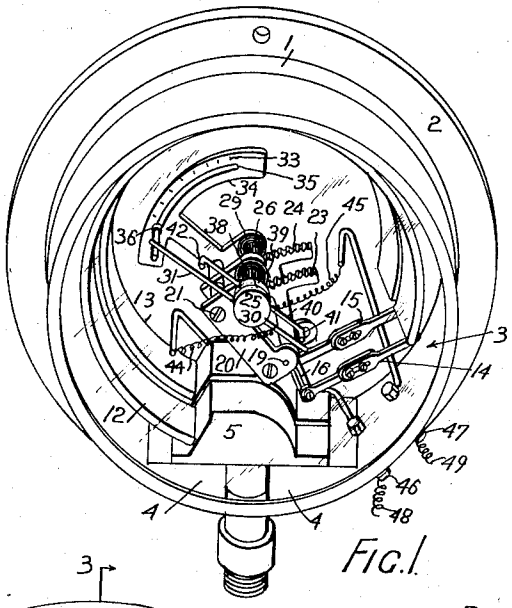


FIG. 1.

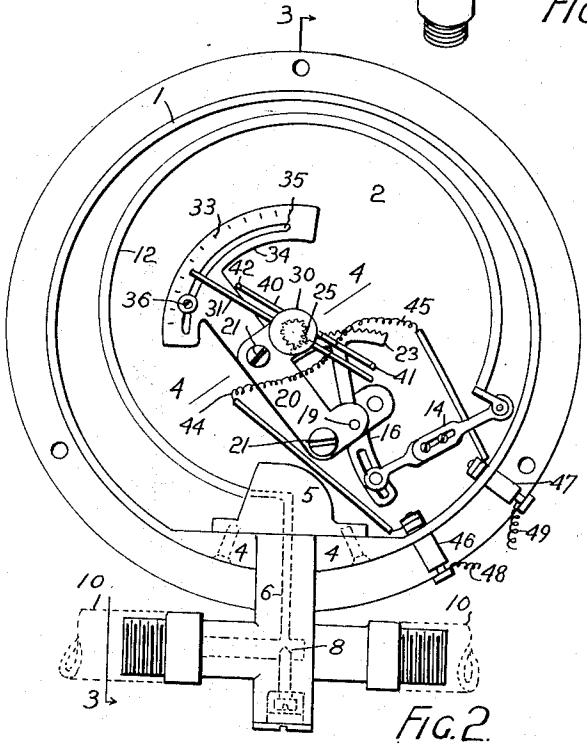


FIG. 2.

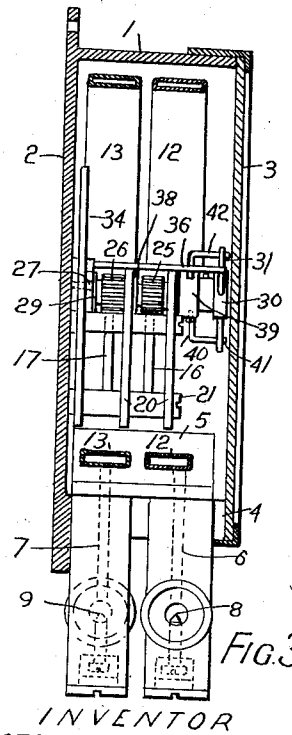


FIG. 3.

INVENTOR
VICTOR SYDNEY LOVETT
BY Otto Munk
HIS ATTY

Jan. 9, 1951 V. S. LOVETT 2,537,771

SPRINKLER ALARM SWITCH

Filed Dec. 11, 1946 3 Sheets-Sheet 2

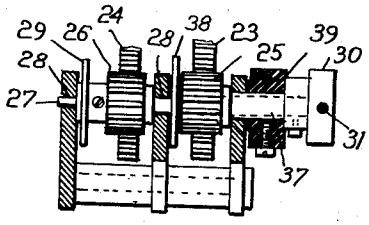


FIG. 4.

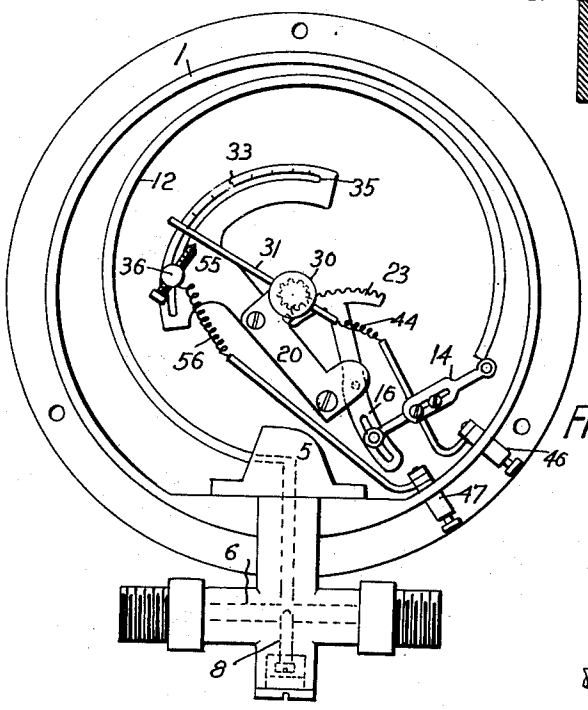


FIG. 5.

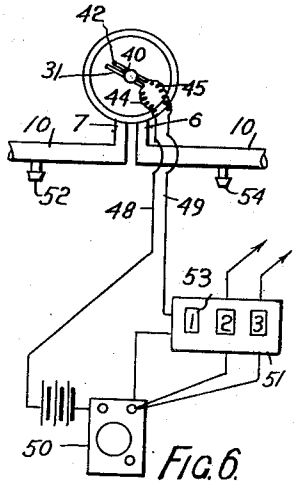


FIG. 6.

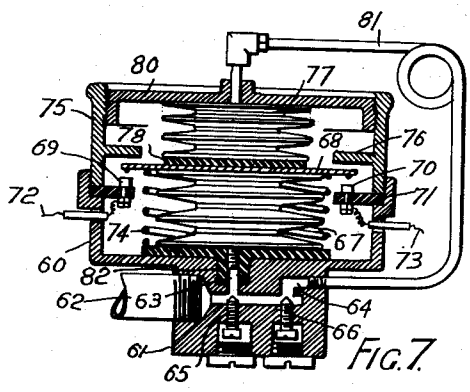


FIG. 7.

INVENTOR
VICTOR SYDNEY LOVETT

BY Otto Munk

HIS ATT'Y

Jan. 9, 1951 V. S. LOVETT 2,537,771

SPRINKLER ALARM SWITCH

Filed Dec. 11, 1946 3 Sheets-Sheet 3

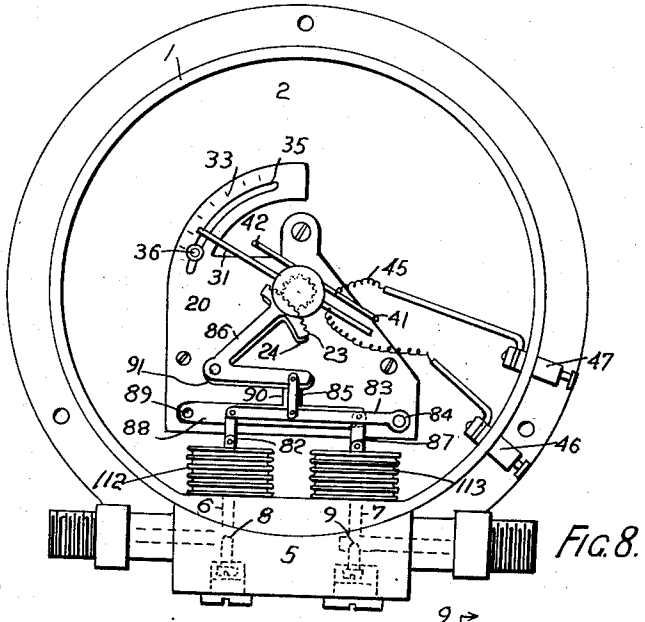


FIG. 8.

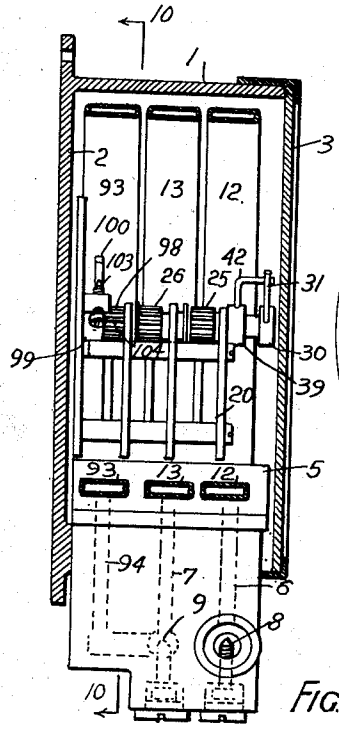


FIG. 9.

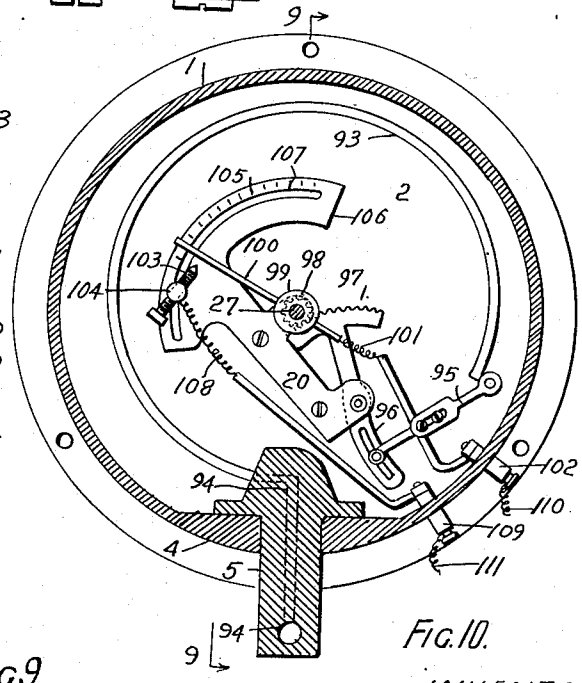


FIG. 10.

INVENTOR
VICTOR SYDNEY LOVETT
BY Otto Munk
HIS ATTY

Patented Jan. 9, 1951

2,537,771

UNITED STATES PATENT OFFICE

2,537,771

SPRINKLER ALARM SWITCH

Victor Sydney Lovett, Randwick, near Sydney, New South Wales, Australia

Application December 11, 1946, Serial No. 715,388
In Australia January 8, 1946

4 Claims. (Cl. 200—81.8)

1

This invention relates to improvements to sprinkler fire alarm systems capable of giving local and distant signals on the outbreak of fire in a building or other enclosed space in which water sprinkler systems for fire extinction are installed. Said improved fire alarm systems are adapted to be operated in connection with sprinkler systems whether these are worked on overloaded water pressure or on the water pressure from a town's water main only.

According to the invention, sprinkler fire alarm systems in which pressure water from a town's water main is used is supplied under control to means associated with a fire sprinkler installation. The said systems according to the invention are characterized that on release of a sprinkler head of the sprinkler installation, due to fire or other conditions arising, electrical fire alarm and indicator means will be immediately operated, owing to impulse conditions created by drop in water pressure in the said installation, to give indication of the exact location of a fire, or the release of said sprinkler head, in a building or other enclosed space carrying said installation.

Said sprinkler fire alarm systems according to the invention may have in combination with the means associated with the fire sprinkler installation to receive pressure water from a town's water main, means enabling the said sprinkler installation of the systems to work on overload water pressure which is above the water pressure of an associated town's water service main.

Other features of the invention are hereinafter referred to.

But in order that the invention may be better understood and carried into effect, the same by way of certain examples will now be more particularly described with reference to the accompanying drawings, in which—

Fig. 1 is a perspective view of one construction of apparatus usable in connection with the invention;

Fig. 2 is an elevation view with transparent cover of the casing removed;

Fig. 3 is a sectional view approximately on line 3—3, Fig. 2;

Fig. 4 is a sectional view on line 4—4, Fig. 2;

Fig. 5 is an elevation view of another construction of the apparatus with the transparent cover of the casing removed;

Fig. 6 is a diagrammatic view of an electrical circuit associated with certain constructions of the apparatus;

2

Fig. 7 is a sectional detail view of another construction of the apparatus;

Fig. 8 is an elevation view of another construction of the apparatus with the transparent cover of the casing removed;

Fig. 9 is a sectional elevation on line 9—9, Fig. 10, of a further construction of the apparatus; and

Fig. 10 is a section on line 10—10, Fig. 9.

Referring to the apparatus shown in Figs. 1 to 4. In such apparatus there is a cylindrical casing 1 which has a back wall 2, a window 3, and a base 4 upon which is mounted a pressure water inlet fitting 5. The latter has therein a pair of passages 6 and 7; the passage 6 has an adjustable screw 8 and the passage 7 an adjustable screw 9. The screws 8 and 9 are adapted to control admission of water through their respective passages 6 and 7 (Fig. 3). Said passages 6 and 7 are connected at one end to the pressure water service pipes 10 of a town's pressure water service main, and they are also respectively connected to their co-operative Bourdon tubes 12 and 13. The latter are rigidly affixed at one end to the inlet fitting 5 and both said tubes are disposed within the casing 1. At their other ends the respective Bourdon tubes 12 and 13 are pivotally connected to one end of adjustable links 14 and 15.

Said links 14 and 15 at their other end are respectively adjustably connected to one end of rocker arms 16 and 17 which are fulcrumed at 19 (Figs. 1 and 2) in a bracket 20 rigidly secured to the back wall 2 by screw bolts 21. Each of the said rocker arms 16 and 17 has a toothed sector, one 23 and the other 24, these meshing respectively with gear wheels 25 and 26. The gear wheel 26 is rigidly secured to a spindle 27 which has bearings 28 in the bracket 20 and is spring-loaded by the spiral spring 29. There is affixed to the outer end of the spindle 27 a hub 30 of electric insulated material. A metal spoke 31 passes through the hub 30 and is adapted at one end to register with a calibrated scale having markings 33 on a quadrant sector 34 which is associated with the bracket 20. The sector 34 has an arcuate slot 35 to receive an adjustable stop pin 36 for regulation of the backward movement of the spoke 31.

Gear wheel 25 is mounted on a hollow spindle 37 through which passes the spindle 27. Spindle 37 is spring-loaded by the spiral spring 38 and has affixed at its outer end an electric insulated hub 39 through which passes a metal spoke 40 which is approximately disposed in parallelism

with the spoke 31. The ends of the spoke 40 are returned as at 41 and 42 (Fig. 1) to adapt them to make contact with the spoke 31. Affixed respectively to the spokes 31 and 40 are the electrical leads 44 and 45, these in turn being secured to the binding posts 46 and 47. From the respective posts 46 and 47 are lead wires 48 and 49 which are respectively connected to the electrical alarm 50 and indicator 51 (Fig. 6). The said indicator is adapted to be connected to different sections or floors of a building or other enclosed space which is fitted with a fire sprinkler system.

In operation, pressure water from a town's water main can be supplied to the water inlet pipes 10 associated with the casing 1 of the apparatus. The latter may be fitted to any section or floor of a building or other enclosed space in relation to the fire sprinkler installation thereof if one is already existing or to any such new installation. The pressure water supplied to said installations will fluctuate according to the rise or fall of the water pressure in the town's water main with which the system is connected.

On release of a sprinkler head or valve 52 (Fig. 6) in the sprinkler installation, due to fire or other conditions arising, the valve control means of the improved fire alarm installation will operate to close electrical circuit to the local indicator panel 51 due to the fact of sudden drop of water pressure at the point mentioned. As one of the arcuately movable spokes (say 40) with its contact point 42, due to the movement of its faster Bourdon tube 13, is adapted to travel faster than the other said arcuately movable spoke 31, due to the movement of its slower Bourdon tube 12, electrical contact is made faster by the spoke 40 to close the electrical circuit to the local indicator panel 51.

Immediately the nearest control valve or sprinkler head 52 of the improved fire alarm system operates, the indicator shutter 53 on the panel 51 is allowed to fall which gives a visual indication of the exact location of the fire. On such operation, the electrical circuit to the indicator panel is opened, whereby the fall of other shutters on the panel 51 is prevented, if any of the other valves or sprinkler heads 52 should operate on a further drop of water pressure in the installed sprinkler system with which means relative to this invention are combined. Upon the fall of the shutter 53 electrical connection is made immediately with the local indicator panel 51 operating the associated fire alarm bell 59 and through suitable known means associated with the panel 51 to the distant signalling means, say at a fire station or stations. Should the sprinkler head 54 (Fig. 6) explode, then the impulse created by the drop in water pressure will affect the slow moving Bourdon tube 12 whereby the spoke 31 will close with contact 41 and the alarm 50 and indicator 51 will be operated as before described.

As an alternative (see Fig. 5), the said improved fire alarm systems may only be provided with one Bourdon tube 12, with one control screw 8 in the water restricted passage 6. In Fig. 5 similar parts shown therein to those shown in Figs. 1 to 4 are marked with like reference numerals. The adjustable stop pin 36 is, however, furnished, and it has an electrical adjustable contact 55 with which is adapted to engage the spoke 31. The latter has a lead 44 connected to the binding post 46. The adjustable contact 55 is connected by a lead 56 to the binding post 47. From the binding posts 46 and 47 electrical connections are made to the alarm 50 and indicator 51 as before described. Said alternative means are usable in association with existing fire sprinkler installations which work on an overloaded water pressure therein, say up to 40 lbs., over the water pressure of an associated town's water service main.

By the said alternative means, the water pressure in the sprinkler system being static, it does not fluctuate owing to the alarm principle which is used in the said overloaded pressure system. The stop pin 36 with its contact point 55 will be set to suit the overloaded pressure of the system in relation to the calibrated pressure marking on the scale 33 of the said alternative means. The said manually adjustable contact point 55 is then set at say 5 to 10 lbs. below the setting of the contact point of the spoke 31 in relation to the scale 33.

Upon say the release of a springler head or valve 52, the apparatus (Fig. 5) will operate in similar manner to the operation of the apparatus before described, and the contact spoke 31 will drop back, and allow contact to be made with the manually adjustable contact 55, and electrical circuit as before described will be made to the alarm 50, indicator panel 51 and distant signalling means to give alarm indications as before mentioned.

Referring to Fig. 7, in this is shown a modification of the apparatus in which Sylphon tubes are used and in which static pressure is maintained in the pressure water sprinkler service pipes of the system. The casing 60 has a pressure water inlet fitting 61 connected to the pressure water service pipe 62. Fitting 61 has therein a pair of passages 63 and 64 with which respectively cooperate adjustable restriction screws 65 and 66. There is shown mounted on the fitting 61 and electrically insulated therefrom a Sylphon tube 67 having on its upper end an electrical contact plate 68 which is adapted to bridge the electrical contacts 69 and 70 mounted in a disc 71 of electric insulated material and disposed and secured within the casing 60. The contacts 69 and 70 have lead wires 72 and 73 connected to the alarm 50 and indicator 51 before described.

The Sylphon tube 67 may be spring-loaded by the coil spring 74 surrounding same. Disc 71 is secured within the casing 60 by a hollow cylindrical spigot 75 which has therein an annular flange 76 whereby the upward movement of the Sylphon tube 67 is limited. Mounted on the contact plate 68 is a second Sylphon tube 77 but electrically insulated from the tube 67 by the disc 78 of electric insulated material. Tube 77 is adjustably secured in the spigot 75 by the screw-cap 80 fitting the head of the spigot 75. Sylphon tube 77 is connected by pipe 81 to the passage 64 and Sylphon tube 67 is similarly connected to the passage 63 by pipe 82.

In operation, as the water pressure in the service pipe 62 of said Sylphon tube apparatus shown in Fig. 7, suddenly falls, the water pressure in the Sylphon tube 77 will force the plate 68 so that an electric circuit will be completed between the contact points 69 and 70, whereby the electric circuit to the alarm 50 and indicator 51 is established. Such alarm is audibly given. Said apparatus is re-set when the water pressure in both Sylphon tubes 67 and 77 is in equilibrium, when the coil spring 74 will actuate the tube 67 so that the contact plate 68 will be raised and

the electrical circuit between the contacts 69 and 70 will be broken.

As regards the apparatus which is shown in Fig. 8, its construction is similar to the apparatus shown in Figs. 1 to 3, but in Fig. 8 there are shown for the two Bourdon tubes shown in Figs. 1 to 3, a pair of Sylphon tubes 112 and 113. Similar parts in Fig. 8 to those shown in Figs. 1 to 3 are indicated by like reference numerals. The Sylphon tubes 112 and 113 are mounted upon the water inlet fitting 5 and are connected to the passages 6 and 7 respectively. Tube 112 is connected by a link 82 to a radius arm 83 which is fulcrumed at 84 to the bracket 20. These is pivotally connected to the radius arm 83 a link 85, which is also pivotally connected to a bell-crank arm 86 of the toothed sector 23. Similarly, tube 113 has a link 87 pivotally connected to a radius arm 88 which is also fulcrumed at 89 to bracket 20. A link 90 is also pivoted at one end to the radius arm 88 and is also pivoted to the bell-crank arm 91 of the toothed sector 24.

In operation, the apparatus shown in Fig. 8 is actuated in similar manner to that above described with reference to the apparatus shown in Figs. 1 to 3.

With reference to the apparatus shown in Figs. 9 and 10, the construction thereof is identical with the apparatus shown in Figs. 1 to 3, with the exception of features hereinafter mentioned. Apparatus as shown in Figs. 9 and 10 has, an additional Bourdon tube 93. Such Bourdon tube is adapted to control an electric circuit situate in close proximity to the apparatus. An audible alarm is given as soon as the water pressure in the water pressure service pipes of the apparatus falls to a predetermined point. The reference numerals used in Figs. 9 and 10 to indicate parts shown therein which are similar to the parts shown in Figs. 1 to 3 are identical with one another.

Said Bourdon tube 93 communicates with the passage 94 in the fitting 5 which branches from the passage 7. On the free end of the tube 93 is pivotally connected one end of an adjustable link 95 whose other end is pivotally connected to a rocker arm 96 which has a toothed sector 97. The latter meshes with a gear wheel 98 which is loosely mounted on the spindle 27. The gear wheel 98 is associated with a hub 99 of electric insulated material through which passes a metal spoke 100. Spoke 100 has an electric lead 101 connected to a binding post 102. Said spoke 100 is adapted to make contact with the adjustable contact 103.

Contact 103 is mounted in a bracket 104 which is adjustable in the arcuate groove 105 in the quadrant 106 of the bracket 20. Quadrant 106 has a calibrated scale 107. An electric lead 108 from the bracket 104 passes to the binding post 109. From the binding posts 102 and 109 lead wires 110 and 111 are connected to an electrically operated alarm (not shown) which alarm can be located in close proximity to the apparatus.

The calibrated scales used in connection with the improved apparatus shown in the drawings and described herein are similar to and usable for ordinary pressure readings and these when used with means such as the arcuately movable spoke 31 facilitate adjustment of said spoke for proper operation. The adjustable restriction screws used for the pressure water service passages to the apparatus may be sealed for such adjustment. Adjustment may thus be made as to movement of the Bourdon tubes and to prevent effect of water hammer in undue vibration of the said arcuately movable spoke.

Where reference is made in the text of the specification or in the claims herein to Sylphon tubes it is to be understood that such references are intended to include reference to diaphragms which are usable in substitution for Sylphon tubes.

Through the said invention means are provided for combining with existing or proposed new fire sprinkler installations of an indicator panel capable of giving visual and/or audible indication of the exact location of a fire for immediate inspection either by brigade officials or otherwise. Time and unnecessary damage to stock and property are thus saved. By certain construction of the improved fire alarm system as above described, pumping and loading of the sprinkler installations to a higher pressure than a town's main water supply is also avoided, and also false alarms of fire are obviated due to water hammer, rise in pressure, and foreign matter in the installations. Again, installations carrying the improved alarm means are simple in operation, are dependable and are not affected by any rise in temperature due to extreme climatic conditions arising, as is the case with indicator panels used today which work on thermostatic principles.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a circuit closer for use in sprinkler fire alarm systems, said circuit closer including elements normally acted upon by water under pressure from a source thereof which elements, when a drop in the water pressure occurs as the result of the release of water through a sprinkler head of the sprinkler system, operate to close an electrical circuit, the combination which comprises a casing, a pair of Bourdon tubes which are respectively fast and slow moving carried in said casing, said casing having a fitting with adjustable control means for admitting water under pressure from said source thereof to said Bourdon tubes, electrical contact means in said casing associated with said Bourdon tubes and adapted to close an electrical circuit, a calibrated scale in said casing, and arcuately movable means associated with said scale, the said contact means for closing said electrical circuit being associated with said arcuately movable means.

2. Control means according to claim 1, including a pair of links, a pair of rocker arms fulcrumed in a bracket secured to the back wall of the casing, one end of said pair of links being pivoted to one end of said Bourdon tubes and the other end of said links being adjustably connected to the pair of rocker arms fulcrumed in the bracket secured to the back wall of the casing, cooperative gear wheels, toothed sectors on said rocker arms meshing with the cooperative gear wheels, a spring loaded spindle in a bracket in the casing secured to one of said wheels, the said spindle at its outer end having an electrical insulated hub, an arcuately movable metal spoke passing through the hub and having one end thereof registering with the calibrated scale having markings on the quadrant sector, and an arcuate slot in the sector for receiving an adjustable stop pin for regulation of backward movement of the said spoke.

3. Control means according to claim 2 having combined therewith a hollow spindle through which passes the spring-loaded spindle in the bracket in the casing, the hollow spindle also

being spring-loaded and having affixed to its outer end an electric insulated hub, a second arcuately movable metal spoke passing through the latter hub and which is disposed approximately in parallelism with the spoke passing through the other said spring loaded spindle, the said second spoke having its ends returned to adapt it to make contact with the other said spoke.

4. Control means according to claim 3, in which one of the arcuately movable spokes due to the movement of its faster Bourdon tube is adapted to travel faster than the other said arcuately movable spoke due to the movement of its slower Bourdon tube, so that electrical contact is made faster by said faster mentioned spoke to close the electrical circuit.

VICTOR SYDNEY LOVETT.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
801,922	Shaffer	Oct. 17, 1905
983,396	Oliver	Feb. 7, 1911
1,172,199	Dana, et al.	Feb. 15, 1916
1,185,544	Rockood	May 30, 1916
1,204,327	Suren	Nov. 7, 1916
1,240,049	Jenne	Sept. 11, 1917
1,250,209	Norwood	Dec. 18, 1917
2,058,082	Jameson	Oct. 20, 1936
2,092,560	Runaldue	Sept. 7, 1937
2,373,042	Martindell	Nov. 7, 1942