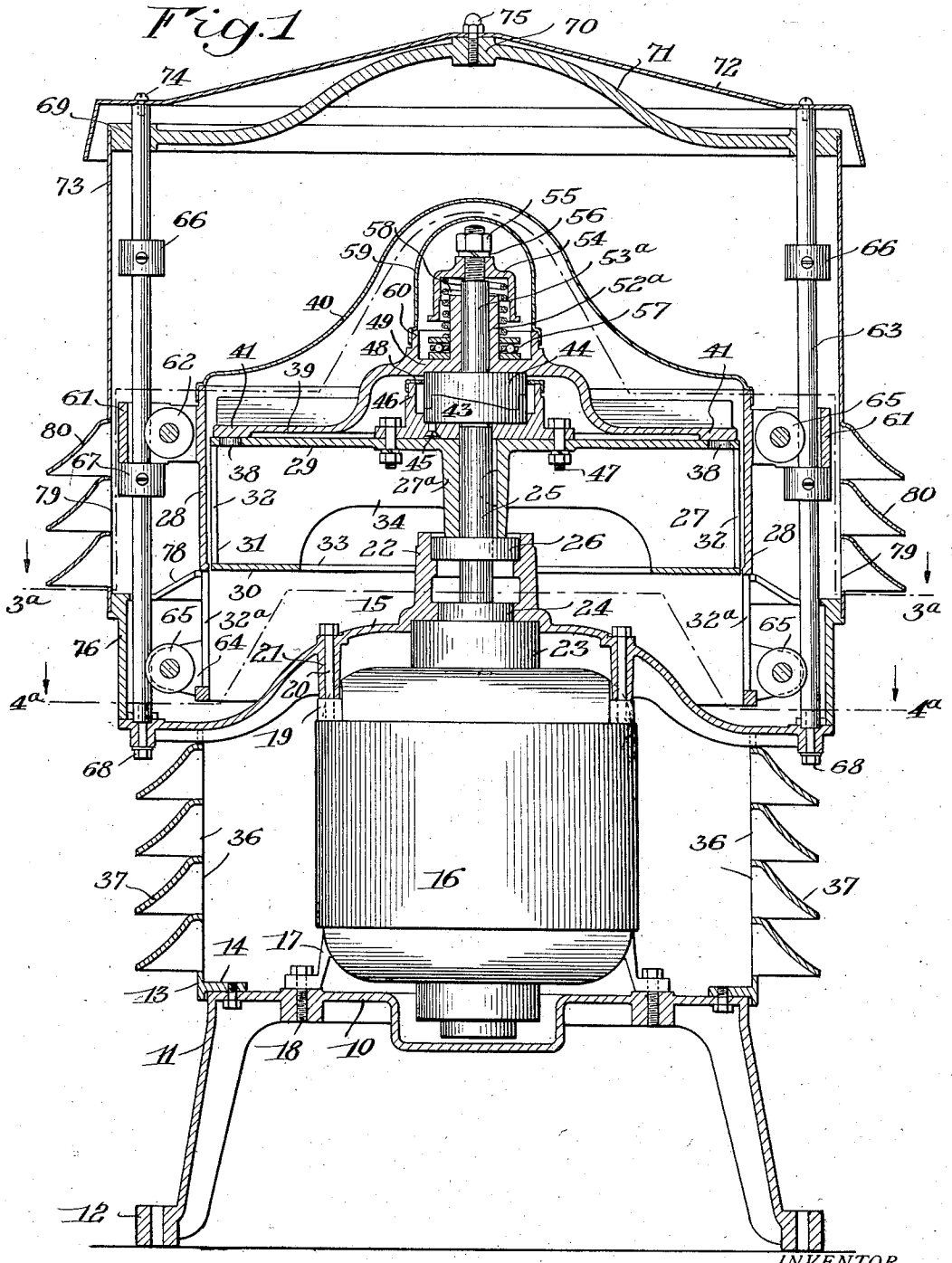
Feb. 11, 1936. M. C. ARMSTRONG 2,030,733

SIGNALING DEVICE

Filed Feb. 20, 1931 6 Sheets-Sheet 1

Fig. 1



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Feb. 11, 1936. M. C. ARMSTRONG 2,030,733

SIGNALING DEVICE

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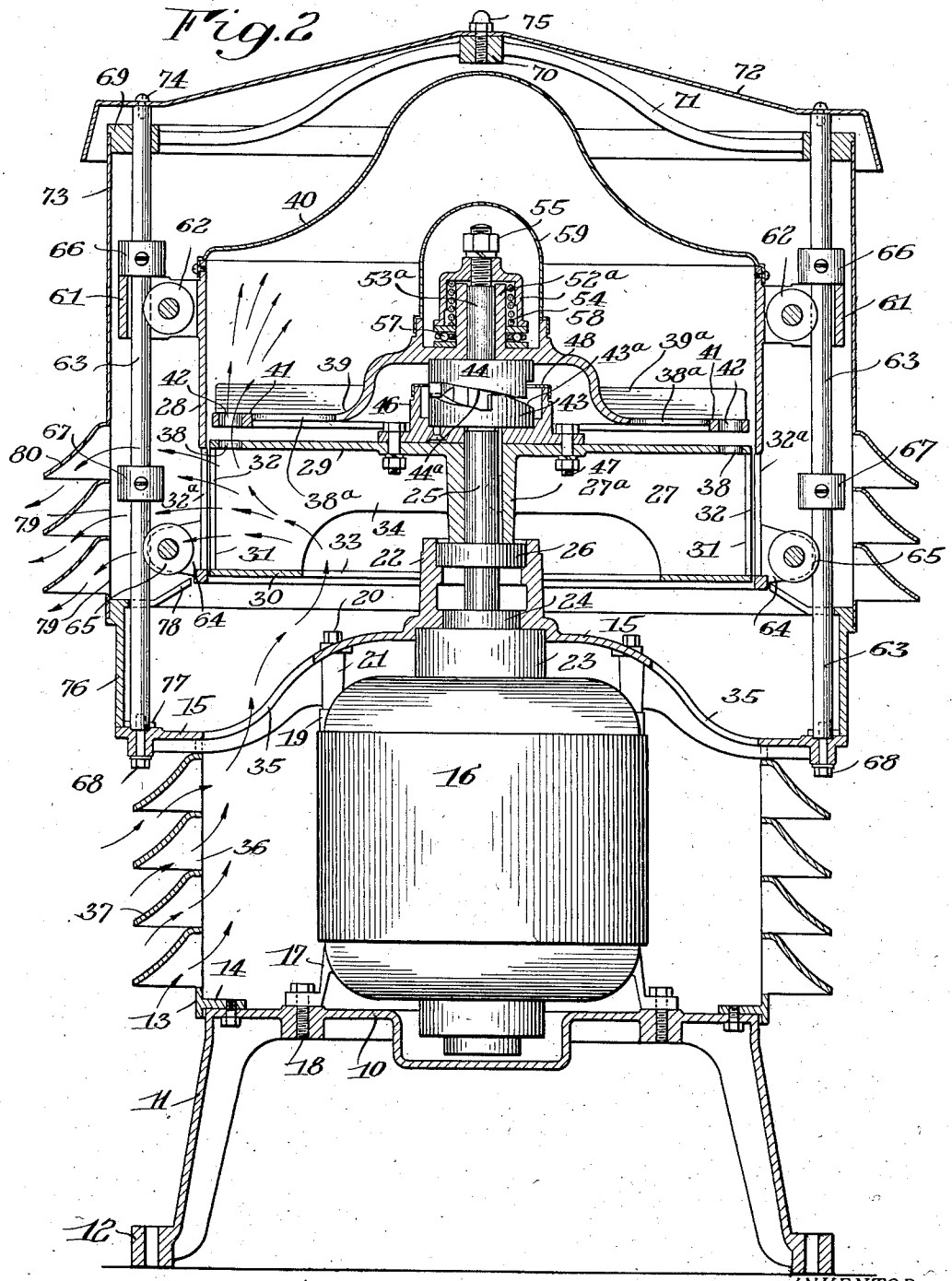
Fig. 2



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SIGNALING DEVICE

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Fig. 3

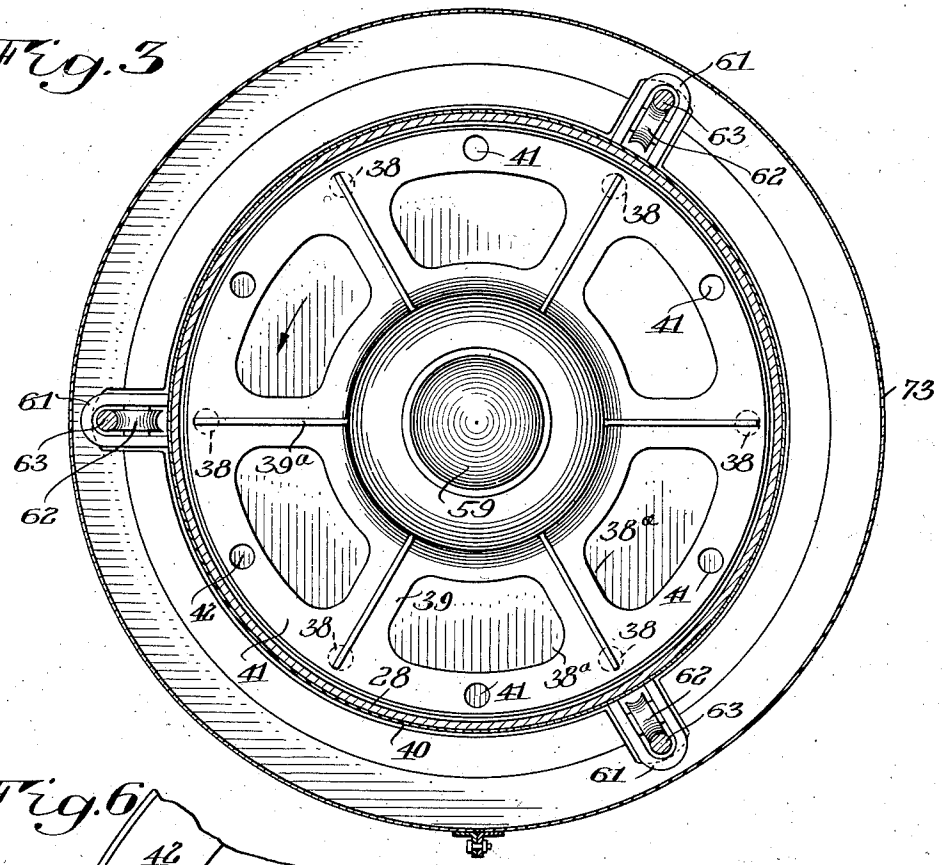
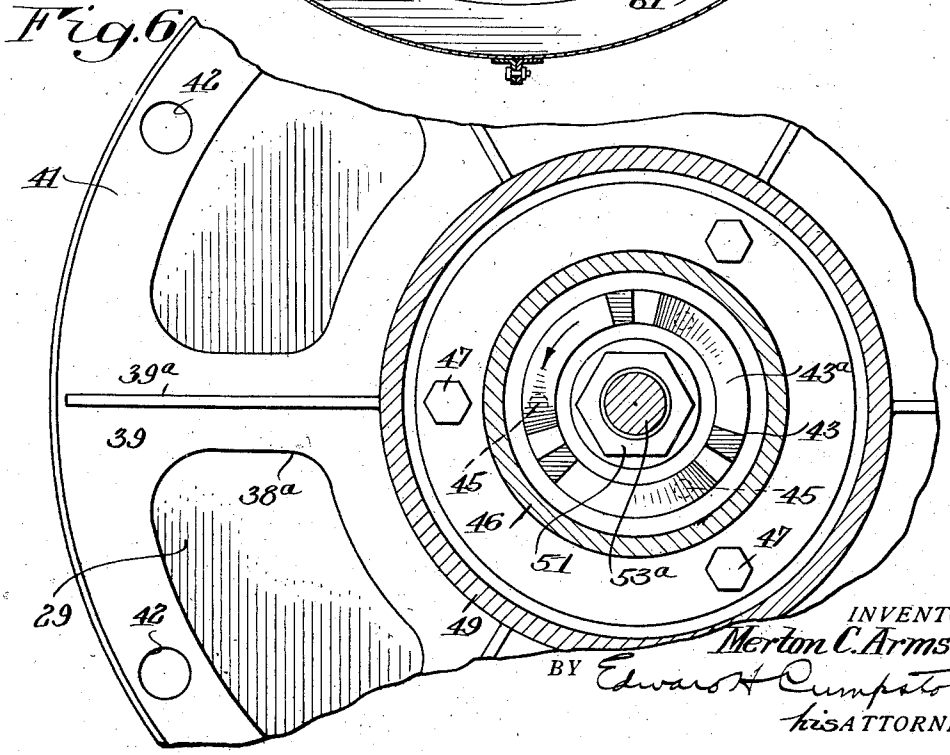


Fig. 6



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SIGNALING DEVICE

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Fig. 4

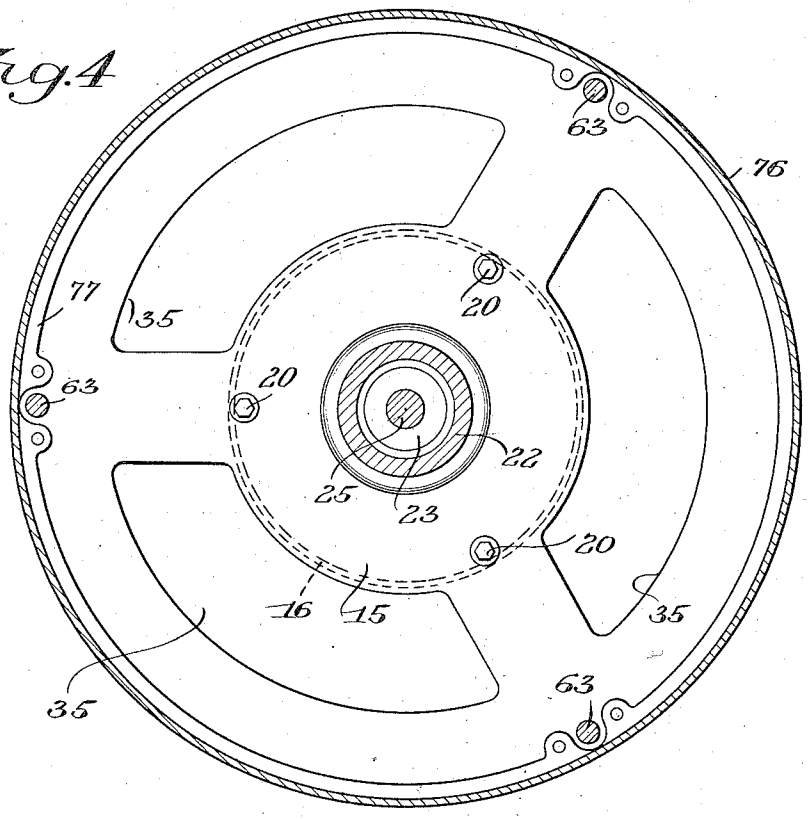
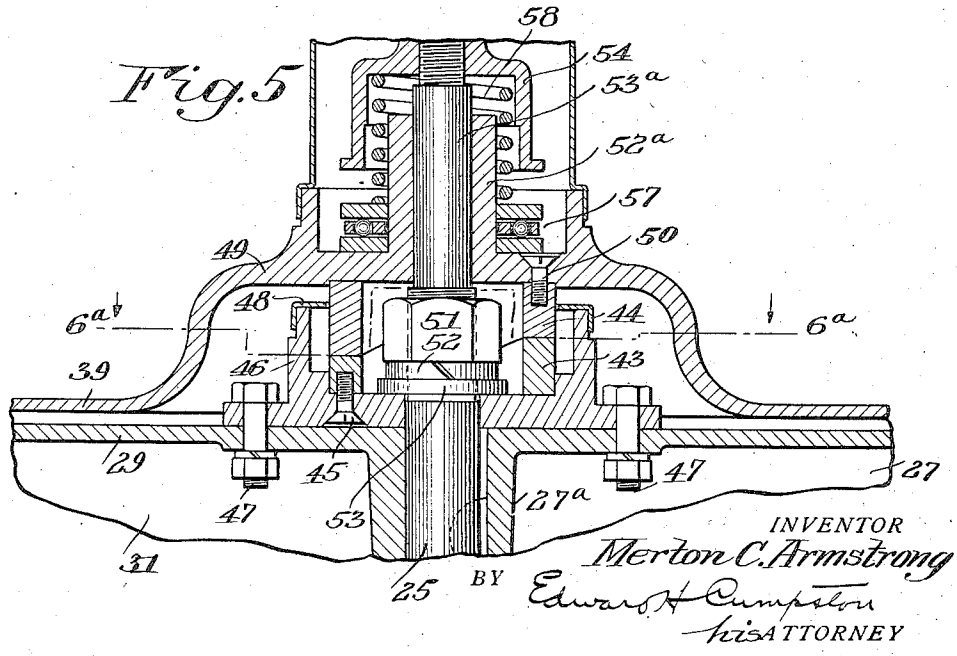


Fig. 5



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SIGNALING DEVICE

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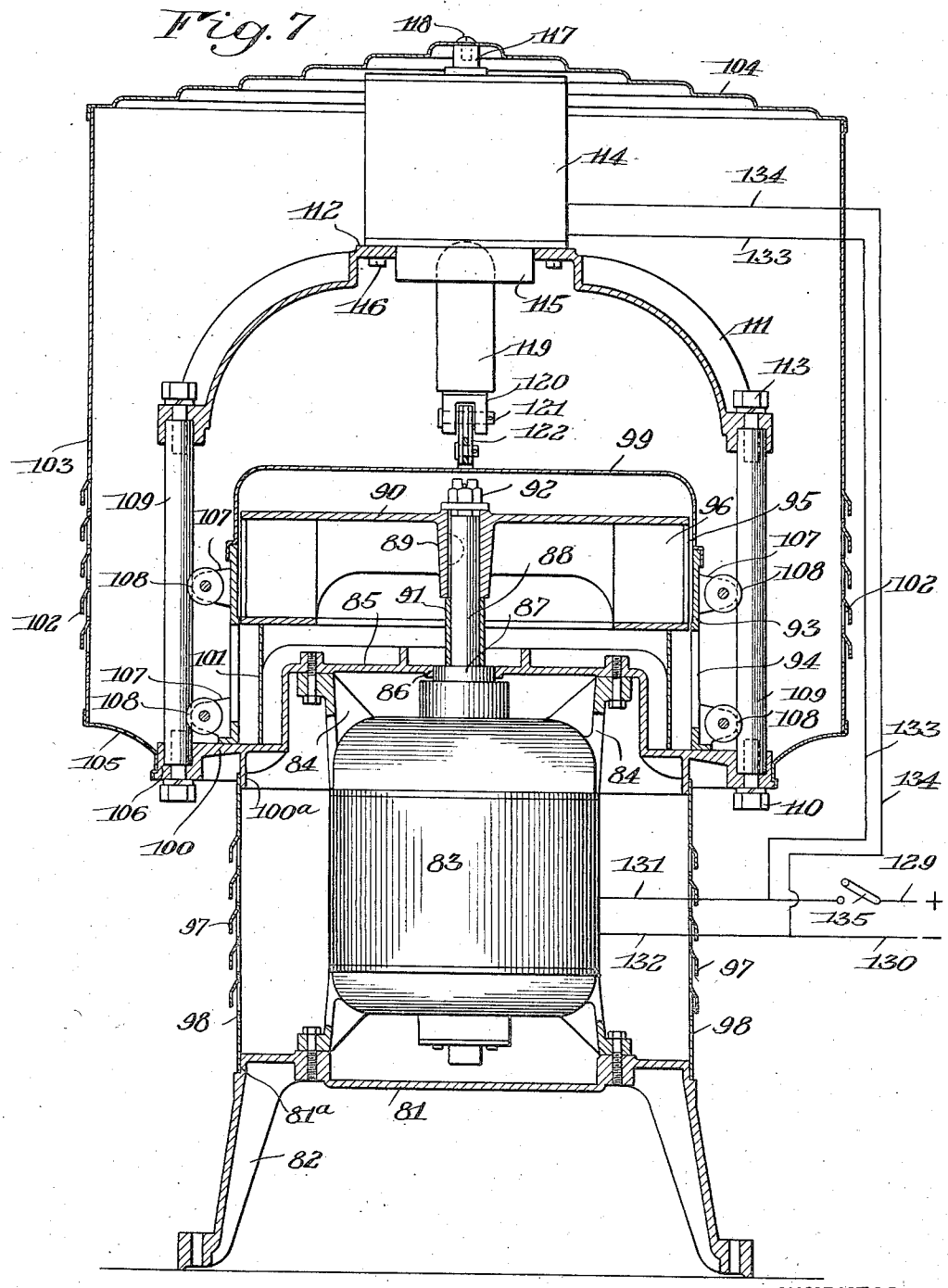
Fig. 7



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SIGNALING DEVICE

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Fig. 8

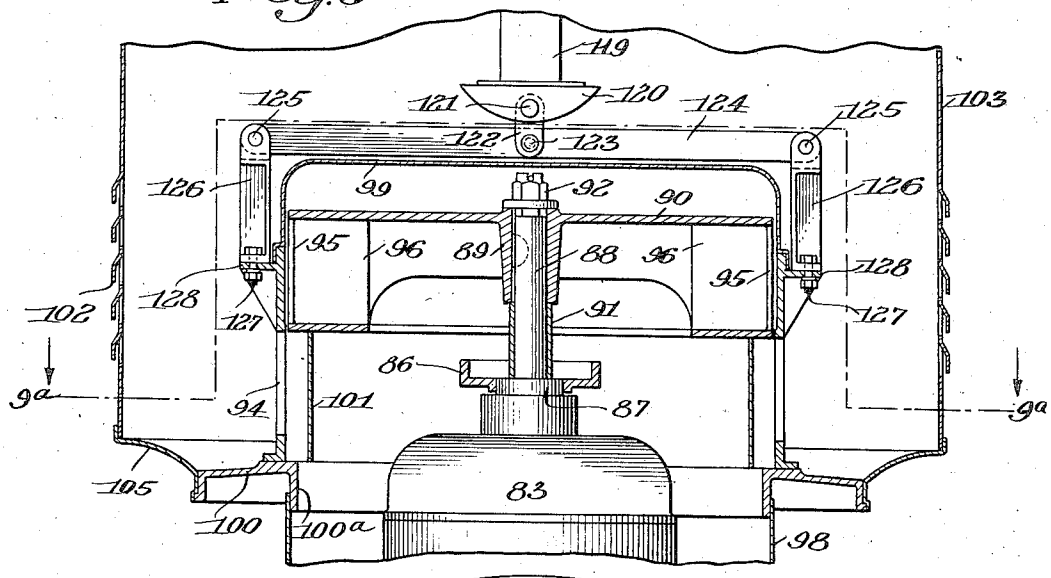
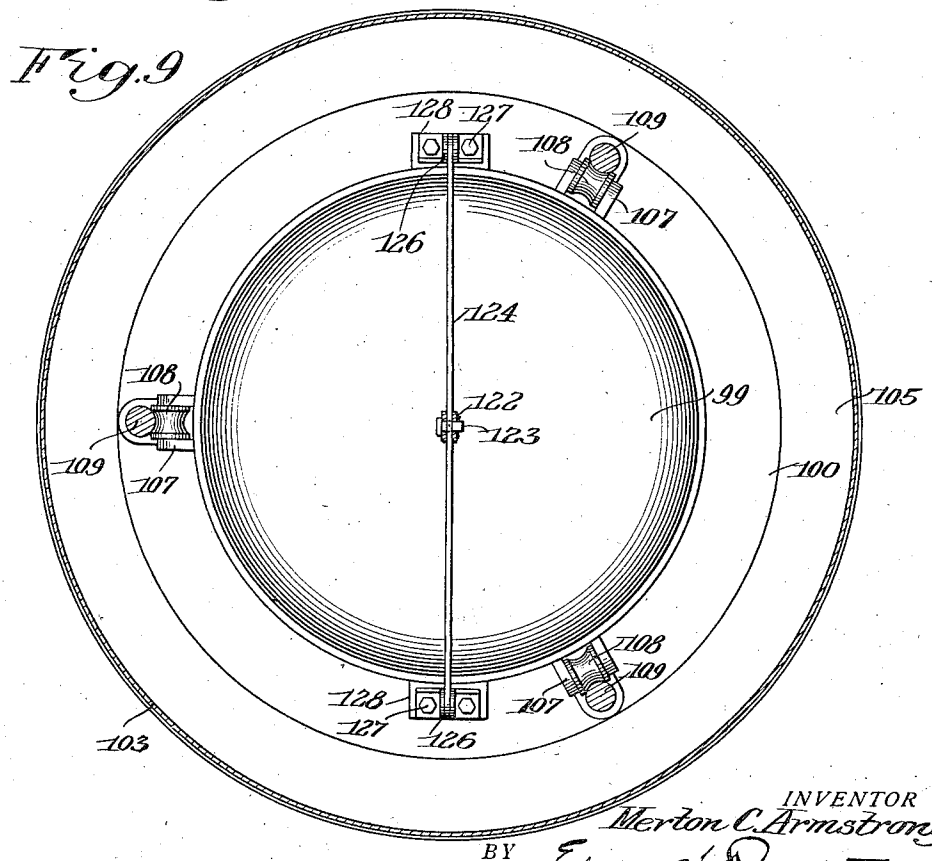


Fig. 9



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Patented Feb. 11, 1936 2,030,733

UNITED STATES PATENT OFFICE

2,030,733

SIGNALING DEVICE

Merton C. Armstrong, Rochester, N. Y., assignor to The Sterling Siren Fire Alarm Company Inc., Rochester, N. Y., a corporation of New York

Application February 20, 1931, Serial No. 517,177

28 Claims. (Cl. 177—7)

The present invention relates to a sound producing signaling device, and more particularly to one of the siren type, the object being to provide an improved device of this class embodying a practical and efficient siren of simplified construction designed to be operated at a relatively low cost.

A further object of the invention is to provide in apparatus of this class an improved arrangement of sound producing elements, one of which is conditioned for cooperation with another by the creation of pressure built up by rotation of the latter and controlled by automatic means associated with said elements.

A further object of the invention is to provide in a signal of the siren type improvements in the construction and arrangement of the sound producing elements, together with improved means for controlling the operation of the same whereby to produce a rapid succession of blasts in order to afford an effective and reliable device for quickly and accurately producing the desired signals.

A further object of the invention is to provide an improved stator and rotor construction in which the rotor is preferably motor driven and the stator is axially movable and shifted by suitable means into position to cooperate with the rotor in producing the desired signals.

A further object of the invention is to provide an improved arrangement of associated stator and rotor elements in which the latter is electrically driven and in which one of said elements is electrically shifted with respect to the other from a normally inoperative to a cooperating signaling position.

A further object of the invention is to provide a compact unitary motor operated signal of the siren type in which the air taken in by the rotor is utilized to both cool the motor and to vary the position of the stator for the purpose of controlling the emission of the sound producing blasts of air discharged by the rotor in a manner to avoid ascending and descending notes in the sounding of the signal.

A further object of the invention is to provide in a siren of the present type a stator having a pressure chamber in which a motor driven rotor operates to build up pressure to effect movement of the stator axially of the motor shaft from a nonoperative to an operative position, and in which the stator is returned to normal inoperative position, as for example, by the action of gravity, upon reducing the speed of or stopping the motor, the motor also serving to operate valve means for controlling the passage of the air to the pressure chamber of the stator.

A further object of the invention is to provide a siren enclosed in a protecting casing embodying an improved construction designed to both efficiently control the currents of air entering and leaving the same when operating the rotor, and to exclude or prevent the entrance of foreign substances or materials which would tend to clog or otherwise interfere with the operation of the apparatus.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a sectional elevation of a signaling device constructed in accordance with the invention and showing the pressure controlled stator in its normal lowered position;

Fig. 2 is a similar view with the stator shown elevated by the pressure produced by operation of the rotor and with the air valve moved to open position;

Fig. 3 is a sectional plan taken on line 3*a*—3*a* of Fig. 1;

Fig. 4 is a sectional plan taken on line 4*a*—4*a* of Fig. 1;

Fig. 5 is a fragmentary sectional elevation drawn to an enlarged scale showing the construction of the air valve and power driven cam means for lifting the same;

Fig. 6 is a fragmentary sectional plan taken on line 6*a*—6*a* of Fig. 5;

Fig. 7 is a sectional elevation of a modified form of siren;

Fig. 8 is a fragmentary sectional elevation taken substantially at right angles to the section shown in Fig. 7, and

Fig. 9 is a sectional plan taken substantially on line 9*a*—9*a* of Fig. 8.

Similar reference numerals throughout the several views indicate the same parts.

The present signaling device is one of the siren or sound producing type adapted for various uses in the field of signaling as, for example, in code signaling through the rapid production of sounds of relatively long and short duration and in such a manner as to be clearly distinguished at considerable distances from the point of operation of the signal. The apparatus, for example, may be used as a fire signal in different outlying or suburban districts, relying for protection on the fire apparatus of a nearby city, or whenever and

under whatever conditions a signal of this type may be advantageously employed.

Referring to Figs. 1 to 6 inclusive of the drawings, a base for supporting the apparatus is shown in Figs. 1 and 2 embodying a horizontally disposed plate 10 having supporting legs 11 provided with feet 12 arranged for attachment to a floor or to the roof of a building or other suitable supporting means by the use of bolts, not shown. The base carries an upstanding motor housing 13 provided with an inwardly extending flange 14 suitably connected with the base plate 10 as shown. The housing is provided at its upper end with a horizontally disposed frame 15 between which and the base plate is disposed an electric motor 16. The motor is provided at its lower end with supporting members 17 detachably connected with the base plate, as by means of the bolts 18. The motor is provided adjacent its upper end with lugs 19 into which are threaded bolts 20 extending downwardly through boss like members 21 on the frame which are clamped upon the lugs by said bolts. The frame has a centrally disposed extension 22 bored to receive the upper cylindrical portion 23 of the motor and a bearing portion 24 through which the motor shaft 25 extends. The frame extension 22 is also arranged to receive a ball bearing unit 26 in which the extended portion of the motor shaft is journaled and by which it is more effectively maintained in proper alinement, said extended shaft portion being keyed within a hub 27*a* depending from the upper wall of the motor driven fan or rotor 27 which is mounted within the stator 28, the hub being preferably arranged to rest on the bearing unit 26 as shown. The fan or rotor is of the hollow type, having upper and lower horizontally disposed end walls 29 and 30 connected by a side wall 31 having a series of vertically disposed ports 32 therein for the escape of the air drawn in through the opening 33 in the bottom wall 30 by the radially extending fan blades 34 upon rotation of the fan by the rotor. The air is sucked up by the fan through the side wall 13 of the motor housing, as indicated by the arrows in Fig. 2, and serves to effectively cool the motor on its way upwardly through the housing from which it discharges through openings 35 in the frame 15 overlying the motor, the side wall of the housing having a plurality of sets of openings 36 suitably formed therein and protected by the outwardly and downwardly extending shield-like members 37 constituting louvers for preventing the entrance of foreign materials to the motor chamber. It will be noted that the bottom wall of the motor chamber is closed and all of the air drawn in through the side wall since where openings are provided in the bottom there is a greater tendency for the fan to suck up foreign substances such as paper, leaves and other materials.

The stator which is in the form of a cylindrical casing surrounds the rotor and is arranged to be moved axially of the latter from the normal lowered position shown in Fig. 1 to the raised position shown in Fig. 2. This is done by the pressure of air built up within the stator through operation of the motor to drive the fan or rotor which forces the air through the series of openings 38 in its upper wall 29 as soon as said openings are uncovered by a valve element 39 arranged to be elevated from the normal position shown in Fig. 1 to that shown in Fig. 2 by means operated by the motor shaft and described hereinafter. At this point it may be stated that the peripheral wall portion of the rotor has a relatively close fit with the surrounding wall of the stator so that only a relatively small amount of air can escape from the interior of the upper portion of the stator during the period of building up pressure therein by employing the fan or rotor to force the air thereto, such an amount not being sufficient to prevent the stator from being raised by the pressure built up therein. Consequently the stator will be quickly elevated from the position shown in Fig. 1 to that shown in Fig. 2 when the air valve 39 is elevated upon starting the motor to drive the fan, the valve operating means being described hereinafter. The stator comprises a cylindrical body portion of a depth somewhat greater than twice that of the rotor, the body portion having a dome shaped closure 40, which is suitably secured thereto. The upper half of the body portion is preferably made imperforate while the lower half is provided with the vertically extending ports 32*a* through which the air is discharged by the rotor to produce the signal blasts when the stator is elevated to the position shown in Fig. 2 by the pressure of the air therein.

The means for controlling the passage of the air from the rotor to the upper half of the stator comprises a horizontally disposed valve plate or disk 39 having an annular or outer portion 41 arranged to normally close the air discharge ports 38 in the upper wall 29 of the stator as shown in Fig. 1. However, the outer valve portion 41 is provided with a series of ports 42 adapted during operation of the fan after the motor is started to momentarily register with the ports 38 thereof to permit of the escape of the air into the upper half of the stator in advance of or during the lifting movement of the valve which takes place when the rotor has attained a given speed sufficient to overcome the tendency of the valve to lag, the valve being frictionally driven by means operated by the motor which preferably comprises cam means on the motor shaft. This means is in the form of a plurality of cam elements 43 and 44 normally having their respective cam faces 43*a* and 44*a* in the relationship shown in Fig. 1. The cam element 43 may be connected with the motor shaft in any suitable or prefered manner, but as shown it is positioned within and rigidly secured by screws 45 with a protecting element 46 secured to the rotor by means of a plurality of bolts 47. The cam receiving member 46 is provided at its upper end with a cover plate 48 having a central opening in which the upper cam element 44 is free to move vertically during operation of the signal. The upper cam element 44 is rigidly secured upon a central offset portion 49 of the valve plate 39 by means of screws 50 as best shown in Fig. 5. The fan or rotor is held clamped against displacement upon the motor shaft by a nut 51 thereon which is prevented from working loose by a locking element 52 of the spring washer type which engages a disk 53 resting upon the horizontally disposed wall of the cup-shaped member 46 as shown in Fig. 5. The offset portion 49 of the valve 39 which overlies both cam elements has an upstanding sleeve like portion 52*a* slidably positioned upon an extended portion 53*a* of the motor shaft which is threaded at its upper end to adjustably receive a bearing stop in the form of an inverted cup-shaped element 54 held by a nut 55 having a locking element 56 in the form of a spring washer. A ball bearing unit 57 normally rests upon the upper face of the offset portion 49 of the valve and is slidably received

by the upstanding sleeve 52a thereon, the bearing being moved up to engage the bottom portion of the inverted cup-shaped element 54, as shown in Fig. 2, when the valve is elevated by the motor driven cam means associated therewith under operating conditions described hereinafter. A spring 58 is interposed between the bearing and the stop 54, the latter being adjustable to regulate the tension of the spring whereby to vary the pressure exerted by it as may be required under different operating conditions.

The valve plate is also provided with a series of openings 38a serving to both lighten the valve and to permit the air discharging through the ports 38 of the rotor to more freely pass into the compression chamber of the stator. The valve is shown provided with a series of vertically disposed plates or vanes 39a on its upper face which may be employed if it is found desirable to utilize the same in the control of the passage of the air to the stator. The bearing 57 and other parts superimposed upon the valve 39 are protected by a cover 59 having its lower end surrounding and suitably secured upon an annular portion 60 of the valve.

The stator is provided with a plurality of laterally extending yoke like members 61 each having a roller 62 arranged to travel upon the vertically disposed frame members 63 suitably connected with and supported by the horizontally disposed frame 15. The stator is also provided adjacent its lower end with a plurality of sets of laterally projecting lugs 64, each set having therebetween a roller 65 also arranged to travel on one of the vertical frame members 63 which form guides for the rollers. The frame members 63 are provided with upper and lower adjustable stops 66 and 67 respectively adapted for engagement by the yokes 61 whereby to regulate the extent of the up and down movement of the stator, the extreme positions of which are shown in Figs. 1 and 2.

The lower ends of the vertically disposed roller guides 63 are detachably secured to the horizontally disposed frame 15 preferably by means of bolts 68. The upper ends of the guides are extended through the annular portion 69 of a horizontally disposed open frame having a central portion 70 above the annular portion and connected therewith by a plurality of radially extending members 71. The upper ends of the roller guides are connected with and serve to support a detachable cover plate 72 for the casing 73 which encloses the rotor and stator as shown in Figs. 1 and 2. The cover which forms a roof over the casing is spaced from the latter to permit of the circulation of air upwardly through the casing. The cover is detachably secured upon the upper extremities of the roller guides by means of screws 74 and to the central portion 70 of the horizontal frame by means of a screw 75. The lower end of the casing 73 is fitted within a groove formed in the upper peripheral portion of an annular support 76, the lower end of which is provided with an inwardly extending flange 77 resting upon and suitably connected with the lower frame member 15.

The annular supporting member 76 is provided with an inwardly projecting and upwardly inclined baffle plate 78 terminating in proximity to the vertical side wall of the stator in all positions of the latter whereby to insure the passage of the sound producing blasts of air outwardly through the openings 79 of the casing rather than downwardly within the casing where they would be rendered ineffective by the inflowing currents of air drawn up by the rotor. The openings 79 in the side wall of the casing are made relatively small to prevent the passing of foreign matter to the interior of the casing, said openings being protected by suitable shields or louvers 80 as shown in Figs. 1 and 2.

In the operation of the signaling device shown in Figs. 1 to 6 inclusive, the motor circuit is periodically closed and opened by any form of control means suitable for the purpose such, for example, as a clock driven mechanism not shown, the periods between closing and opening being varied as previously determined upon in accordance with the code selected and under which the signals are produced. Assuming that the parts are in the normal position shown in Fig. 1 with the valve 39 in lowered position, then upon closing the motor circuit operation of the rotor will begin and, due to the tendency of the spring pressed valve to lag, the lower cam 43 will run ahead of the upper cam, thereby lifting the latter to elevate the valve to the position shown in Fig. 2, in which position the bearing 57 will engage the stop member 54 before the upper cam is permitted to pass the high point of the lower cam. At this stage of the operation the valve will rotate at the same speed as the rotor and being in extreme open position will permit the latter to quickly build up sufficient pressure within the stator to effect elevation of the same to the position shown in Fig. 2 in which the sound blasts are produced by the expulsion of the air through the ports 32 in the side wall of the stator. As long, therefore, as the motor circuit is closed the parts will remain in the position shown in Fig. 2 and the fan which is drawing the air upwardly through the motor housing will maintain sufficient pressure in the stator to support it in elevated position while at the same time the discharge of air by the rotor through the ports 32a of the stator will produce sound blasts of even or uniform pitch regardless of whether or not the blasts are of relatively long or short duration. The air which is expelled by the rotor is prevented from passing downwardly within the casing 73 by the baffle plate 78 and is thus forced outwardly through the discharge ports 79 of the casing 73. As soon, however, as the motor circuit is broken the speed of the rotor begins to diminish at which time the speed of the valve due to its momentum will cause it to momentarily run ahead of the rotor, the result being that the relative positions of the cam elements will be changed and a consequent lowering of the valve effected under the action of the spring 58 as the inclined faces of the upper cam element 44 ride downwardly upon those of the lower element 43 and permit the valve to return to normal closing position. When the speed of the rotor is decreased to a certain minimum the pressure built up in the stator chamber will be reduced to an extent insufficient to support the stator in extreme elevated position and as soon as the valve 39 moves to closing position with respect to the ports 38 of the rotor the stator will quickly drop by its own weight. However, if the ports 38 are left open after the speed of the rotor has been reduced to said minimum a certain amount of pressure will still be maintained in the stator by the continued forcing of air therein sufficient to interfere with the rapid descent of the stator to normal inoperative position, thus preventing the quick closing of the ports 32 in the rotor. By thus prolonging the closing period of the ports 32,

there would be a gradual dying out of the sound blast causing a noticeable descent in the scale of the notes, a decided disadvantage which the present siren is designed to overcome and which, as above stated, is avoided by the use of the valve 39. It will also be understood that if desired the pressure within the stator may be somewhat relieved after closing the valve 39 by permitting a small quantity of the air to escape between the rotor and the wall of the stator but this, of course, will be insufficient to interfere with the rapid building up of the pressure within the stator by the rotor at the maximum speed of the latter when the valve is open.

It is evident therefore that the comparatively rapid descent of the stator upon relieving the pressure therein serves to quickly close the discharge ports 32 of the rotor whereby to avoid any appreciable variation in the pitch of the sound blasts regardless of whether they are of relatively long or short duration. It will be seen, therefore, that with the present apparatus the signals can be delivered in rapid succession and in clear and distinct tones free from any appreciable variation in the pitch of the notes so that they can be readily distinguished at comparatively long distances from the point of operation of the signal. This is made possible by the relatively quick up and down movements of the stator, effected on the one hand by pressure built up therein by the rotor and on the other by the action of gravity in lowering the stator to close the ports of the rotor. The sounding of the signals in this manner without causing the notes to ascend or descend in scale is decidedly advantageous in code signaling where a rapid delivery of the sound blasts and a clear distinction between the relatively long and short notes is highly important to a proper interpretation of the signals, this being true with respect to both arrangements shown in the drawings.

In the siren shown in Figs. 7 to 9 inclusive, the general arrangement is the same as that shown in the previously described figures except for the means for lifting the stator from the lowered inoperative position to the elevated signaling position. This is done in the modification by electrical means, such for example, as a solenoid which is preferably included in the motor circuit so that upon closing the latter to start the motor the solenoid will be energized and the stator elevated to cooperative signaling relationship with respect to the rotor.

Referring to the construction shown in Figs. 7 to 9, the supporting base for the siren comprises a horizontally disposed plate 81 and legs 82 arranged for attachement to a floor or other supporting means. The motor 83 is superimposed upon the base plate 81 and has extending from its upper end suitably constructed arms 84 which serve to support a detachable spider-like frame 85 having a central portion 86 in which is seated a sleeve-like bearing 87 on the motor in which is journaled the motor shaft 88, the motor shaft being keyed to the hub-like portion 89 of the rotor indicated generally at 90. The lower end of the hub engages a sleeve 91 on the motor shaft, which in turn rests upon the bearing 87, the rotor being clamped in the position shown by a nut 92 on the upper end of the motor shaft.

The stator is indicated generally at 93 and provided with a suitable number of air passages or ports 94 which, when the stator is elevated to a predetermined position, lie opposite the discharge ports 95 of the rotor or fan 90. With the stator in elevated position the rotary fan blades 96 serve to suck up the air and expel it through the ports 94 of the stator to produce the sound blast in the usual way. The air is first drawn through the louvers 97 of the motor casing 98 and serves to cool the motor as it passes upwardly around the same to the rotor for discharge through the ports of the stator.

The stator has a closure 99 for protecting the rotor, and for preventing the escape of air therefrom except through the passages 94 when they are in registry with the passages 95 of the rotor, the lower end of the stator normally resting upon the horizontally disposed annular portion 100 of the frame 85 which carries a downwardly extending flange 100a for receiving the upper end of the motor casing 98, to which the casing is attached by any suitable means, not shown. The lower end of the casing rests upon and is supported by an annular shoulder 81a on the base plate 81. An upstanding annular baffle plate 101 is suitably secured between the lower portion 100 of the frame and the bottom of the rotor to prevent the downward discharge into the motor casing of the blasts of air delivered through the ports 94 of the stator by the rotor during operation of the latter. In other words, short circuiting or return of the air to the motor casing is prevented by the baffle plate and proper discharge through the louvers 102 of the housing 103 is thereby assured. The housing is provided with a closure 104 which is preferably of the stepped formation shown in Fig. 7. The housng is supported at its lower end by an annular or ring-shaped member 105 having a downwardly extending part resting upon the peripheral wall portion 106 of the horizontal wall 100, the latter being shouldered to receive the offset lower edge of the ring, as shown in Fig. 7.

The stator is provided with three sets of upper and lower lugs 107 carrying suitable rollers 108 which are arranged to travel on upright guides 109 when the stator is moved between its upper and lower positions, as hereinafter explained. The guides 109 are preferably in the form of rods, the lower ends of which are seated in sockets formed in the annular horizontal wall portion 100 of the spider-like frame 85, the rods being held within the sockets preferably by stud bolts 110, as shown in Fig. 7. The upper ends of the guide rods are received in similar sockets formed in the downwardly extending arms 111 of a centrally disposed plate or shelf-like member 112, the arms being rigidly connected with the rods by stud bolts 113. The plate 112 forms a support for an electrically operated lifting unit such for example as a solenoid 114 having a reduced portion 115 fitted within an opening formed in the plate, the solenoid being secured to the plate by screws or bolts 116. The upper end of the solenoid carries a projecting lug 117 which engages the underside of and forms a support for the housing closure 104, as shown in Fig. 7. The closure is held against lateral displacement upon the lug by one or more screws 118 and is spaced from the solenoid to permit of the free circulation of air between it and the solenoid. The core of the solenoid is shown at 119 and has on its lower end a forked head 120 carrying a pivot pin 121 from which depends a pair of links 122. The links are connected by a pin 123 with a lifting bar 124 the opposite ends of which are pivotally connected at 125 with a pair of upstanding arms 126 at opposite sides of the stator. The lower ends of the arms are secured by bolts 127

to horizontally disposed lugs 128 projecting laterally from the wall of the stator and which may be cast integral therewith, or otherwise secured thereon. The solenoid with its core and the connections between it and the stator constitute the lifting means for the latter which is immediately raised to operating position upon closing the motor circuit.

The wiring for the motor and solenoid circuits is illustrated diagrammatically in Fig. 7, in which the current supply lines 129 and 130 are connected both with the motor circuit wires 131 and 132 and the solenoid connections 133 and 134, a switch 135 being employed to close the circuit when it is desired to operate the motor and solenoid, the latter serving to lift the stator so that the discharge ports 94 in the wall of the stator will lie opposite the outlet ports 95 of the rotor.

It will be noted that the frame 85 carried by the motor and motor casing forms a bearing for the sleeve-like portion 87 of the motor. The frame also supports the annular baffle plate 101 for preventing short circuiting or return to the motor casing of the air expelled by the rotor through the discharge ports of the stator. The frame further serves as a support for the stator guide means and solenoid carried by the latter, while it also forms supporting means for the casing 103, the upper end wall of which is preferably connected with the solenoid. These several parts form a compact and simple arrangement which can be easily assembled and which is practical and efficient in service and comparatively inexpensive to manufacture.

The motor and all of the parts above the same, in each of the arrangements shown, are protected from rain, snow, dirt, and other foreign matter by the surrounding casings so that the operation of the driving and driven parts cannot be interfered with by adverse weather conditions or external means of any kind.

In the operation of the siren shown in Figs. 7 to 9 inclusive, the motor switch may either be manually operated or periodically closed and opened by any desired control means suitable for the purpose, such as a well known form of clock mechanism, not shown, the periods between closing and opening being varied as desired. When the motor circuit is closed to start the motor the current will pass through the solenoid to energize the same which will cause the core 119 to be elevated for the purpose of raising the stator to bring it into cooperative signaling position with respect to the rotor. In this position of the stator the sound blasts are delivered by the rapidly moving blades of the rotor through the discharge ports 94 of the stator, the stator being held in elevated operating position by the core of the solenoid as long as the circuit remains closed. As soon, however, as the circuit is broken, the stator will descend by gravity to the normal inoperative position shown in Fig. 7, where it rests upon the horizontal portion 100 of the frame 85 carried by the motor.

I claim:

1. In a sound producing signal, the combination of a stator including side and end walls forming a chamber and a rotor operable within the stator and forming a partial closure for said chamber, guide means, said stator being movable upon the guide means axially of the rotor from a normal inoperative position to signaling position by pressure built up within said chamber through the delivery of air thereto by operation of the rotor and movable to normal position upon the guide means by the action of gravity, said rotor having one or more passages in its wall through which air is delivered to the chamber, a motor for operating the rotor, valve means for controlling said air passages, and relatively movable cam elements responsive to operation of the rotor and adapted to open the valve means upon operation of the motor.

2. In a sound producing signal, the combination of a stator including side and end walls forming a chamber and a rotor operable within the stator and forming a partial closure for said chamber, guide means, said stator being movable upon the guide means axially of the rotor from a normal inoperative position to a signaling position by pressure built up within said chamber through the delivery of air thereto by operation of the rotor, said rotor having one or more passages in its wall through which air is delivered to the chamber, a motor for operating the rotor, valve means for controlling said passages mounted upon the motor shaft for movement to and from closing position, and cooperating devices for operating the valve means upon initial operation of the rotor, one of said devices being fixed on the motor shaft and the other on the valve means.

3. In a sound producing signal, the combination of a stator including side and end walls forming a chamber and a rotor operable within the stator and forming a partial closure for said chamber, guide means, said stator being movable upon the guide means axially of the rotor from a normal inoperative position to signaling position by pressure built up within said chamber through the delivery of air thereto by operation of the rotor, said rotor having one or more passages in its wall through which air is delivered to the chamber, a motor for operating the rotor having its shaft connected therewith, valve means for controlling said passages slidably and rotatably mounted on the motor shaft for movement to and from closing position, stop means on said shaft for limiting the sliding movement of the valve means in one direction, cooperating cam elements for sliding and rotating the valve means, one of which is fixed on and driven by the motor shaft and the other on the valve means, and spring means interposed between said stop means and said valve means for returning the latter to normal position upon discontinuing operation of the motor.

4. In a sound producing signal, the combination of a stator including side and end walls forming a chamber and a rotor operable within the stator and forming a partial closure for said chamber, guide means, said stator being movable upon the guide means axially of the rotor from a normally inoperative position to an operative signaling position by pressure built up within said chamber through delivery of air thereto by operation of the rotor, said rotor having one or more passages in its wall through which air is delivered to the chamber, a motor located at one side of the rotor and having its shaft operatively connected with the rotor, said shaft including a portion projecting from the side of the rotor opposite that nearest to the motor, valve means for controlling said passages rotatable and slidably mounted on said projecting shaft portion for movement to and from closing position, stop means on said shaft portion, a bearing element carried by said valve means arranged to be engaged by said stop means to limit axial movement of the valve means while permitting it to

rotate upon said shaft portion, spring means interposed between the stop means and said bearing element for returning the valve means to normal position, and cooperating cam elements one of which is fixed upon the valve means for rotation therewith and the other fixed upon said projecting shaft portion, said cam elements operating upon rotation of the shaft to both rotate and move the valve means axially of the shaft.

5. A sound producing signal comprising a base, a motor on the base having a vertically extending shaft, a rotor fixed on the shaft against axial movement having end and side walls and radially extending blades, said end wall having air discharge passages and the side walls having air outlet ports therein, a stator movable axially of the rotor and comprising a dome-like portion forming an air pressure chamber surrounding the rotor and adapted to receive air under pressure discharging from the passages of the rotor whereby to effect axial movement of the stator to a predetermined operating position, through the pressure of the air in said chamber, said stator having an extension provided with air discharge ports adapted to register with the air outlet ports of the rotor when the stator is moved axially of the rotor to said predetermined operating position, and upstanding guide means carried by the base for guiding the stator in its up and down movement.

6. A sound producing signal comprising a base, a motor on the base having a vertically extending shaft, a rotor fixed on the shaft against axial movement having end and side walls and radially extending blades, the end wall having air discharge passages therein and the side walls having air outlet ports, a stator movable axially of the rotor and comprising a dome-like portion forming an air pressure chamber surrounding the rotor and adapted to receive air under pressure discharging from the passages of the rotor whereby to effect axial movement of the stator to a predetermined operating position, through the pressure of the air in said chamber, said stator having an extension provided with air discharge ports adapted to register with the air outlet ports of the rotor when the stator is moved axially of the rotor to said predetermined operating position, a plurality of track members extending upwardly in spaced relation to the stator, rollers interposed between the stator and the track members arranged to travel upon the latter upon axial movement of the stator, and a casing surrounding the stator and having outlet passages for the air discharged by the rotor.

7. A sound producing signal comprising a base, a motor on the base having a vertically extending shaft, a rotor fixed on the shaft against axial movement having end and side walls and radially extending blades, said end wall having air discharge passages therein and the side walls having air outlet ports, a stator movable axially of the rotor and comprising a dome-like portion forming an air pressure chamber surrounding the rotor and adapted to receive air under pressure discharging from the passages of the rotor whereby to effect axial movement of the stator to a predetermined operating position through the pressure of the air in said chamber, the stator having an extension provided with air outlet ports adapted to register with the air outlet ports of the rotor when the stator is moved axially to said predetermined operating position, a frame connected with the motor and having a bearing in which the motor shaft is journaled, and a casing surrounding the stator and supported by said frame.

8. A sound producing signal comprising a base, a motor on the base having a vertically extending shaft, a rotor fixed on the shaft against axial movement having end and side walls and radially extending blades, said end wall having air discharge passages therein and the side walls having air outlet ports, a stator movable axially of the rotor and comprising a dome-like portion forming an air pressure chamber surrounding the rotor and adapted to receive air under pressure discharging from the passages of the rotor whereby to effect axial movement of the stator to a predetermined operating position through the pressure of air in said chamber, the stator having an extension provided with air outlet ports adapted to register with the air outlet ports of the rotor when the stator is moved axially to said predetermined operating position, a frame overlying the motor and connected therewith, track members extending upwardly from the frame and forming means for guiding the stator in its up and down movements, and a casing surrounding the stator and rotor and having outlet passages for the air discharged by the rotor through the outlet ports of the stator.

9. In signaling apparatus, the combination of relatively movable rotor and stator elements, one of said elements having walls forming a fluid pressure chamber and the rotor element having a fluid discharge passage and operating when rotated to deliver fluid through said passage to said chamber under pressure sufficient to move one of the elements from a non-operating to a signaling position relative to the other, guide means for the movable element, driving means for the rotor element, and valve means associated with the rotor element for controlling said passage and automatically moving to open position upon operation of the rotor.

10. In signaling apparatus, the combination of a rotor having an outlet passage, a stator surrounding the rotor and movable axially thereof, the stator having walls forming a fluid pressure chamber for receiving the fluid discharged by the rotor through said outlet passage whereby pressure is built up in said chamber to effect axial movement of the stator from non-operating to signaling position relative to the rotor, means for guiding the stator when moving to and from signaling position, and means for driving the rotor.

11. In signaling apparatus, the combination of a rotor having a fluid outlet passage, a stator having walls forming a fluid pressure chamber for receiving the fluid discharged by the rotor through said outlet passage whereby pressure is built up in said chamber to effect movement of the stator from non-operating to signaling position relative to the rotor, means for guiding the stator when moving to and from signaling position, valve means for regulating the flow of the fluid from the rotor through said outlet passage to the pressure chamber of the stator, operating means for the valve means actuated by the rotor upon operation of the latter, and driving means for the rotor.

12. In signaling apparatus, the combination of a rotor and a stator having walls forming a chamber, the rotor having a fluid outlet passage and being mounted within the stator and the latter being movable in a vertical direction axially of the rotor, the rotor operating to deliver air through said outlet passage to said chamber

under pressure to move the stator from nonoperating to cooperative signaling position relative to the rotor, said stator being returned to nonoperating position by the action of gravity, means for guiding the stator in its movement axially of the rotor, and driving means for the rotor.

13. In signaling apparatus, the combination of rotor and stator elements, said rotor element having a fluid outlet passage and said stator element having walls forming a chamber, one of said elements being movable from normally inoperative to cooperative signaling position relative to another by fluid pressure built up within the chamber of the stator element by the discharge thereto of fluid through the outlet passage of the rotor element upon operation of the latter, guide means for said movable element, driving means for the rotor element, valve means adapted to control said outlet passage to establish communication between said elements, and means responsive to the operation of the driving means for operating said valve means upon operation of the rotor element.

14. In signaling apparatus, the combination of a base, a motor mounted upon the base and having a vertically extending drive shaft, a rotor on said drive shaft having an air outlet passage, upstanding guide members upon the base, and a stator mounted for vertical movement upon said guide members from inoperative to a predetermined cooperative signaling position with respect to said rotor, said stator having walls forming a pressure chamber and said rotor when operated serving to discharge air through said outlet passage to said chamber to build up pressure therein whereby to effect vertical movement of the stator to said predetermined position.

15. In signaling apparatus, the combination of guide means, a stator mounted for vertical movement upon said guide means and having walls forming an air pressure chamber in its upper end and provided adjacent its lower end with air discharge ports in its side wall, a rotor within the stator having air outlet ports in its side wall adapted when the stator is raised from a normally inoperative position to a predetermined elevated position to register with said discharge ports during operation of the rotor, said rotor having one or more air passages in its wall through which it is adapted to discharge air to said chamber to build up pressure therein sufficient to raise the stator to said predetermined position, the stator when the pressure is relieved within said chamber being returned to normal position by the action of gravity, driving means for the rotor, and valve means responsive to the operation of the driving means adapted to open said passages upon operation of the rotor.

16. In signaling apparatus, the combination of a stator element having a pressure chamber therein formed by the walls thereof, a rotor element having a passage for the discharge of air to said chamber to build up pressure therein whereby to shift one of said elements from a normally inoperative to an operative signaling position with respect to the other, guide means for said shiftable element, valve means mounted upon the rotor element responsive to operation thereof and adapted to open said passage, and driving means for the rotor element.

17. In signaling apparatus, the combination of a stator having walls forming an air receiving chamber and a rotor within the stator having a discharge port for admitting air to said chamber to build up pressure therein upon operation of the rotor whereby to shift said stator from a normally inoperative to an operative signaling position with respect to the rotor, guide means for said stator, a valve normally closing said port, cam means connected with the rotor and operating automatically to open the valve upon operation of the rotor, and driving means for the rotor.

18. In signaling apparatus, the combination of a stator element having walls forming an air receiving chamber, a rotor element, valve means adapted to establish communication between said elements for the passage of air from the rotor element to said chamber under pressure produced by operation of the rotor element, said valve means having a combined rotary and axial movement relative to said rotor element, means actuated by the rotor element for effecting said movements, and driving means for said rotor element.

19. In a sound producing signal, the combination of a base, and a motor on the base having a vertically disposed shaft, a rotor fixed on the shaft for operation thereby and having an outlet passage, a stator enclosing the rotor and movable axially thereof, the stator walls forming a pressure chamber to which the rotor operates to deliver air under pressure through said passage to move the stator from a normally lowered inoperative position to an elevated signaling position with respect to the rotor, a frame carried by the base, upstanding guides on the frame, and rollers on the stator adapted to travel on the guides upon elevation of the stator.

20. In a sound producing signal, the combination of a stator having walls forming an air pressure chamber, guide means for the stator, a rotor, means for supporting the rotor for operation within the stator, the rotor having an air discharge passage adapted to communicate with said chamber in which pressure is built up by operation of the rotor to move the stator on the guide means from a normally inoperative position to an operative signaling position relative to the rotor, and a housing enclosing the stator and rotor and forming a chamber adapted to receive a motor for driving the rotor, the housing having inlet openings for admitting air to the motor chamber for passage therethrough to the rotor, and having separate openings for the discharge of the air expelled by the rotor.

21. In a sound producing signal, the combination of a stator having walls forming an air pressure chamber, guide means for the stator, a rotor, means for supporting the rotor for operation within the stator, the rotor having an air discharge passage adapted to communicate with said chamber in which pressure is built up by operation of the rotor to move the stator on the guide means from a normally inoperative position to an operative signaling position relative to the rotor, a housing enclosing the stator, and means dividing the housing into separate chambers one adapted to receive air for passage to the rotor, and the other receiving the air expelled by the rotor and having an opening for discharging the expelled air therefrom.

22. In a sound producing signal, the combination of a stator element having walls forming a receptacle, a rotor element, one of said elements having an air passage for establishing communication with the other, means for supporting one

of said elements for movement relative to another, said rotor element when operated discharging air through said passage to said receptacle under pressure sufficient to move one of said elements on the supporting means from normal inoperative position to signaling position relative to the other element, valve means normally closing said passage and having a combined rotary and axial movement relative to the axis of the rotor element when moving to open position, means operated by the rotor element upon initial movement thereof for opening said valve means, said rotor and stator elements having ports for the passage of air from the rotor element during operation thereof to sound the signal when said elements are in signaling position one relative to another, and driving means for said rotor element.

23. In a sound producing signal, the combination of guide means, a receptacle movable on the guide means, a rotor operable within the receptacle and having a passage through which to deliver air to the receptacle under pressure sufficient to move the receptacle on the guide means from normal inoperative position to a predetermined operating position upon operation of the rotor, valve means movable on the rotor and normally closing said passage, means operated by the rotor upon initial operation thereof for moving the valve means to open said passage, said receptacle having outlet passages through which air is discharged by the rotor to sound the signal when the receptacle is at said operating position.

24. In a sound producing signal, the combination of guide means, a receptacle movable on the guide means, a rotor operable within the receptacle and having a passage through which to deliver air to the receptacle under pressure sufficient to move the receptacle on the guide means from normal inoperative position to a predetermined operating position upon operation of the rotor, a motor having a shaft for operating the rotor, valve means normally closing said passage and movable upon operation axially of and guided by the motor shaft, and means on the motor shaft serving upon operation of the motor to open said valve means, said receptacle having outlet passages through which air is discharged by the rotor to sound the signal when the receptacle is at said predetermined position.

25. In a sound producing signal, the combination of a stator element having walls forming a receptacle, a rotor element, one of said elements having an air passage for establishing communication with the other, means for supporting one of said elements for movement relative to another, said rotor element when operated discharging air through said passage to said receptacle under pressure sufficient to move one of said elements on the supporting means from normal inoperative position to signaling position relative to the other element, valve means normally closing said passage, means operated by the rotor element upon initial movement thereof for opening said valve means, said stator element having ports for the passage of air from the rotor element during operation thereof to sound the signal when said elements are in signaling position one relative to another, and driving means for said rotor element.

26. In signaling apparatus, the combination of sound producing elements having parts for cooperation to sound a signal when one of said elements is moved from a normal inoperative position to signaling position relative to another, one of the elements having walls forming a chamber for the reception of fluid under pressure and another associated therewith comprising a rotary fluid impelling element having a discharge passage for delivering fluid under pressure to said chamber to effect movement of one of the elements from normal inoperative position to cooperating signaling position relative to another, and driving means for said rotary element.

27. In signaling apparatus, the combination of sound producing elements having parts for cooperation to sound a signal when one of the elements is moved from a normal inoperative position to signaling position relative to another, one of the elements having walls forming a chamber for the reception of fluid under pressure and another associated therewith comprising a rotary fluid impelling element having a discharge passage for delivering fluid under pressure to said chamber to effect movement of one of the elements from normal inoperative position to cooperating signaling position relative to another, valve means for closing said passage, means actuated by the operation of the rotary element for opening the valve means, guide means for the element moved by the pressure of the fluid in said chamber, and driving means for the rotary element.

28. In signaling apparatus, the combination of rotor and stator elements, means for supporting said elements for movement one relative to another from a normal inoperative position to cooperative signaling position, said stator element having walls forming a fluid pressure chamber, means for establishing communication between said chamber and the rotor element upon operation of the latter whereby the rotor element will serve to discharge fluid to said chamber under pressure sufficient to effect movement of one of said elements to cooperative signaling position relative to the other.

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