

Feb. 19, 1935.

M. C. ARMSTRONG

1,991,718

ELECTRIC SIREN

Filed April 7, 1928

5 Sheets-Sheet 1

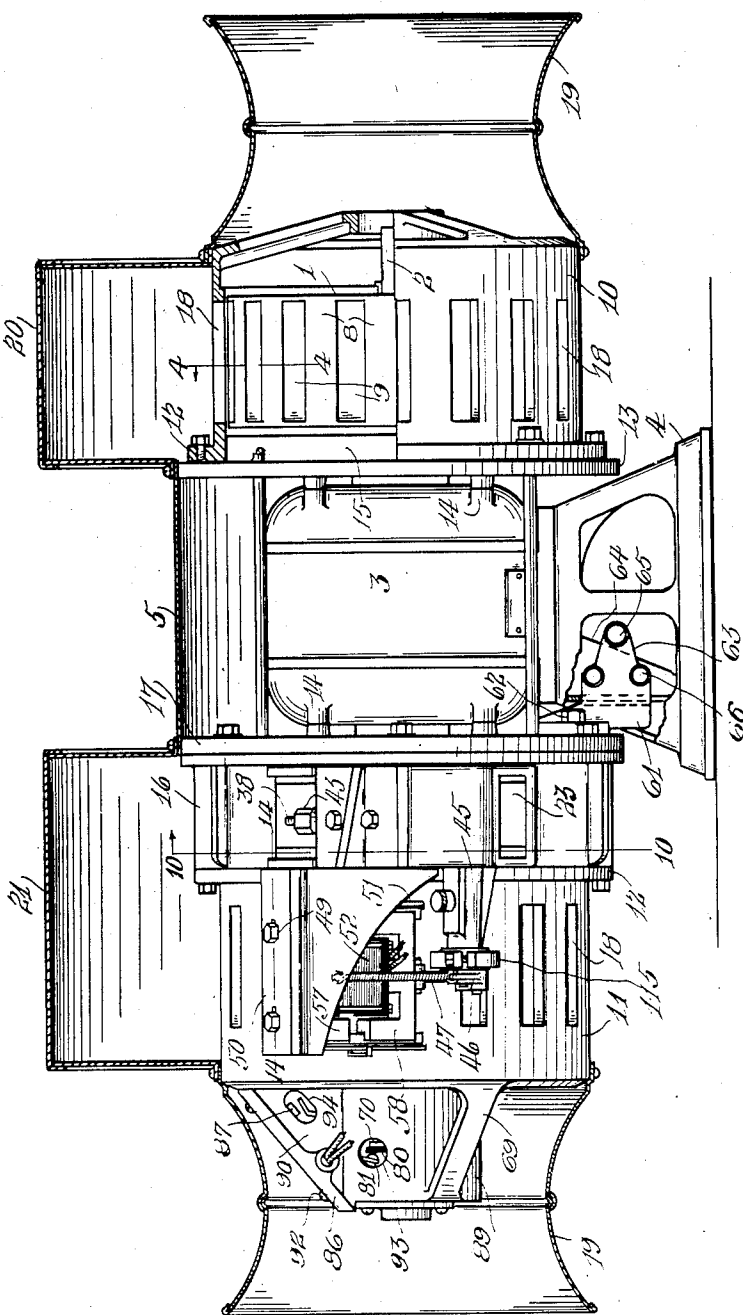


FIG. 1

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5 Sheets-Sheet 2

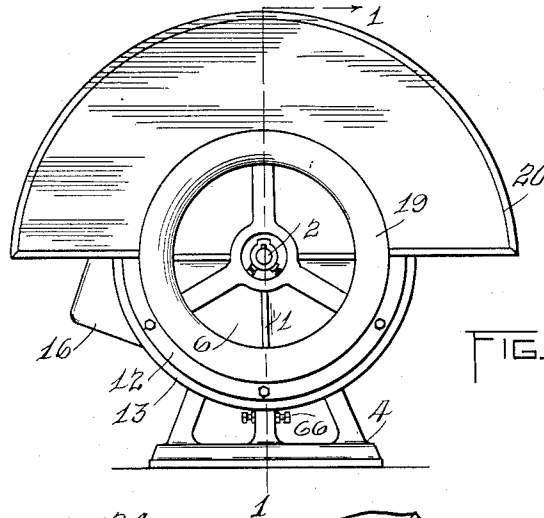


FIG. 2

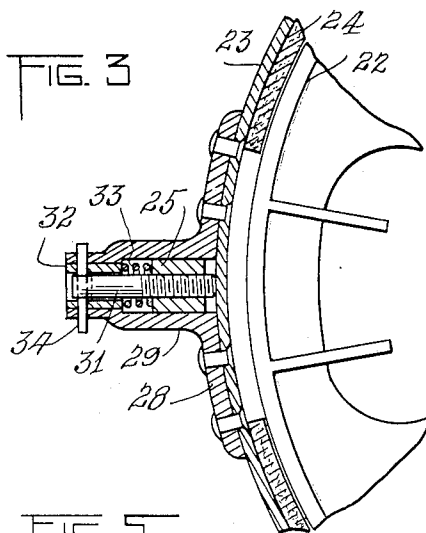


FIG. 3

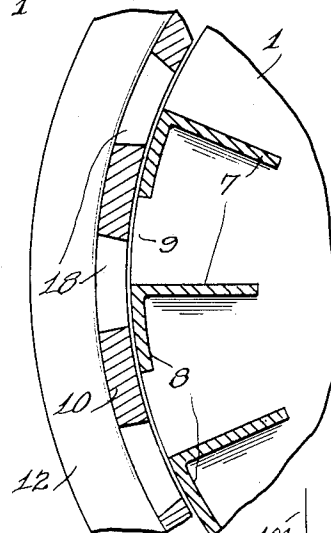


FIG. 4

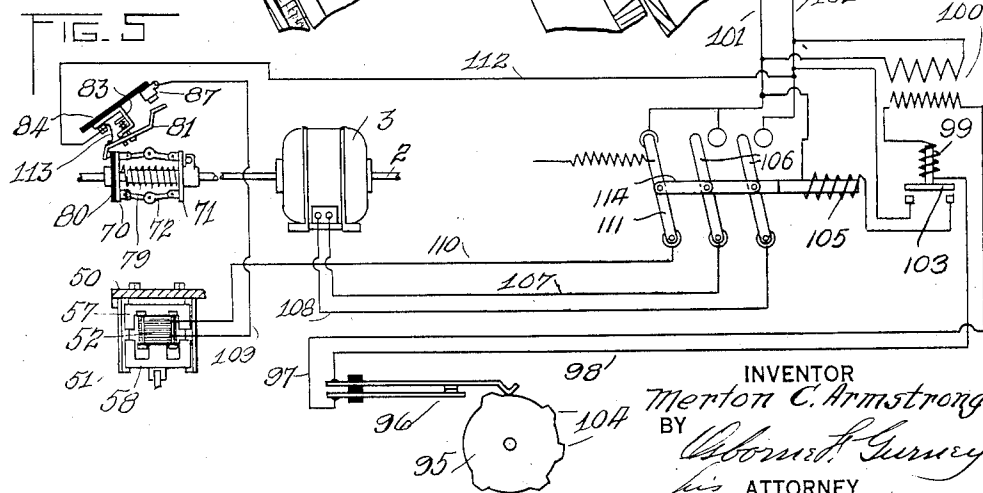


FIG. 5

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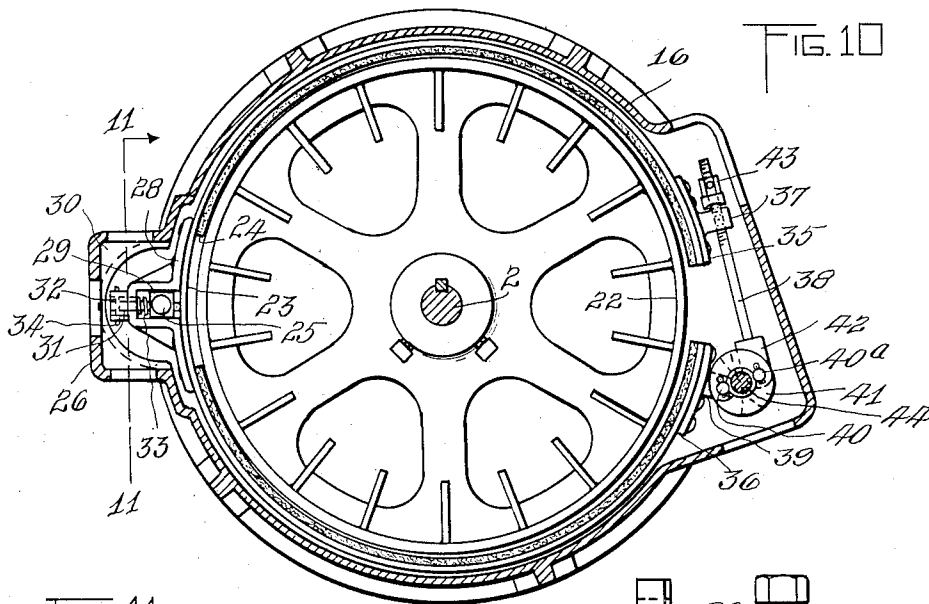
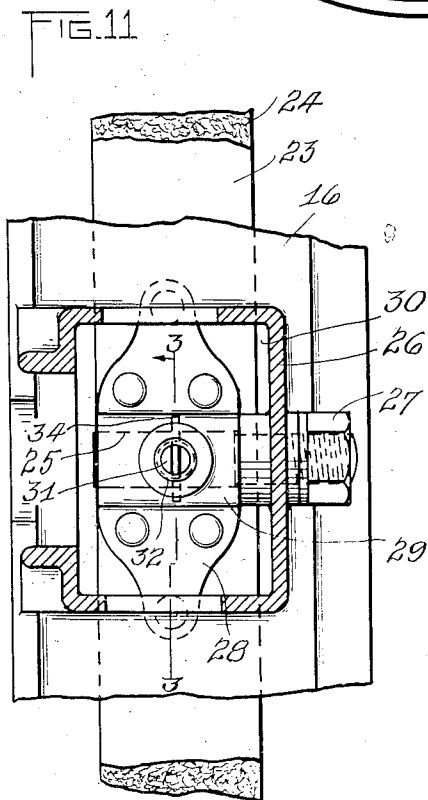
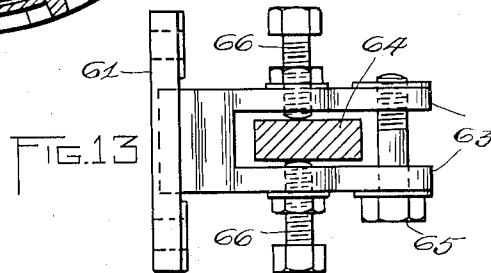
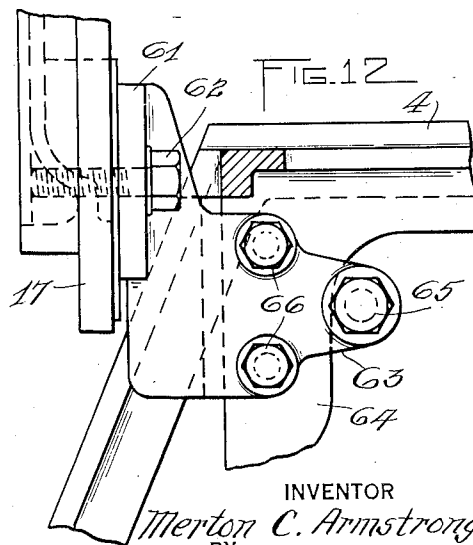
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5 Sheets-Sheet 5

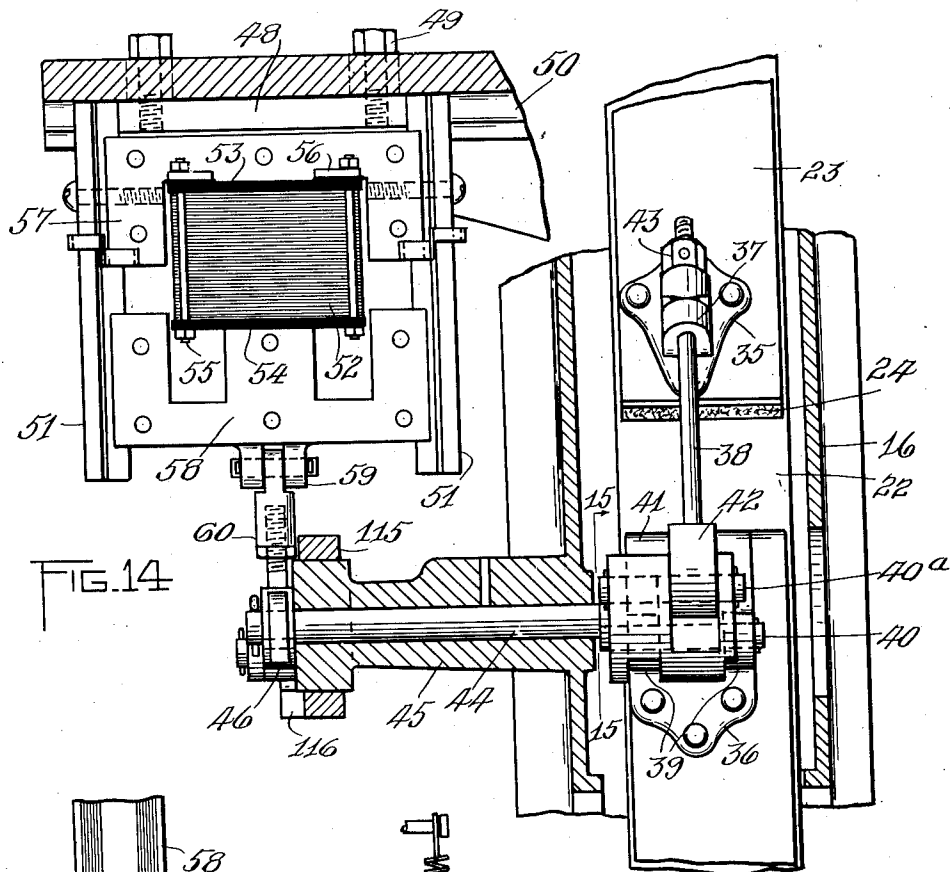


FIG. 14

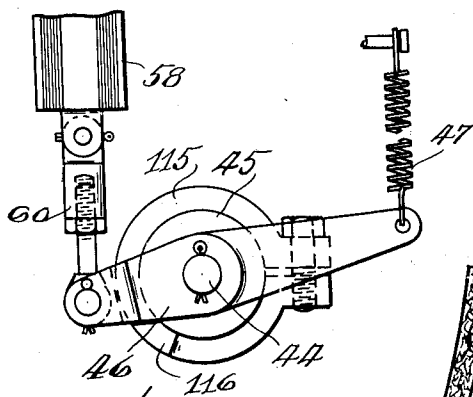


FIG. 16

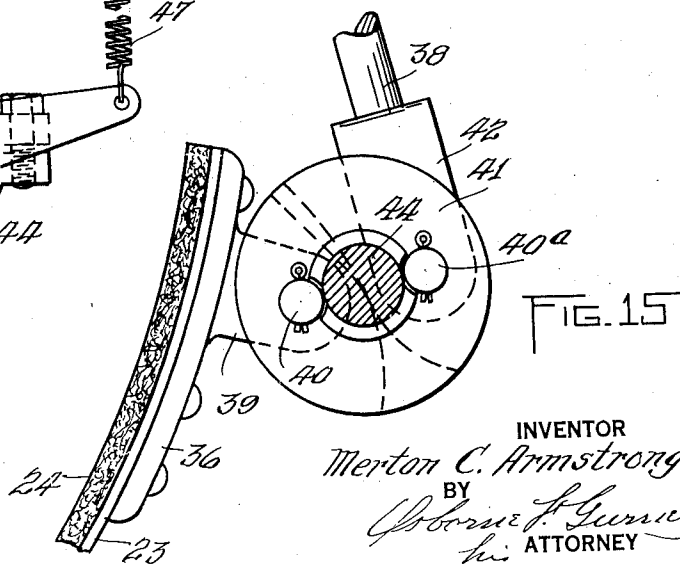


FIG. 15

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UNITED STATES PATENT OFFICE

1,991,718

ELECTRIC SIREN

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Application April 7, 1928, Serial No. 268,359

6 Claims. (Cl. 177-7)

The present invention relates to code blowing electric sirens, an object of the invention being to meet the requirements of such fire departments as desire a siren that will localize a fire by blowing district or box numbers and give a predetermined number of complete blasts in the shortest possible time.

In order to be really effective, a code siren must have rapid acceleration and must stop the sound abruptly. In other words, the blast should not gradually diminish but should be cut off instantly as is done with a steam whistle; and, it is a further object of the invention to provide a siren that goes up to speed quickly and then stops abruptly, that is,—the siren sound quickly rises in pitch from a low heavy tone to a piercing shriek, as the motor gains in speed, and then is cut off as if with an abrupt exhalation.

It has heretofore been suggested, in blowing code numbers with an electric siren, to stop the motor suddenly through phase changing or reversing the flow of the electric current, which method sets up a tremendous overload on the motor and causes excessive heat with the usual disastrous results, and in overcoming this objectionable method it is a further object of the invention to entirely cut off the current to the motor and to bring the siren to an instant stop by means of a powerful electrically controlled mechanical brake.

A further object of the invention is the provision of a brake of the character and for the purpose described that will be effective and positive in operation and to employ a governor on the motor shaft operating to close the circuit through the brake operating means at proper time intervals.

And, a still further object of the invention is the construction of an electric code siren of few parts, positive in its operation, not liable to derangement and operating in such manner as to relieve the motor from all undue strain when being brought to an abrupt stop.

To these and other ends the invention consists of certain parts and combinations of parts as will be fully set forth in the following description and particularly defined in the appended claims.

The accompanying drawings illustrating the invention are as follows:

Figure 1 is a view of the siren in side elevation with parts broken away to show details of construction and with the projectors, sounders and motor housing shown in vertical section as on the line 1—1, Fig. 2.

Fig. 2 is an end view of the siren from the right with respect to Fig. 1.

Fig. 3 is a sectional detail on the line 3—3, Fig. 11.

Fig. 4 is a sectional detail on the line 4—4, Fig. 1.

Fig. 5 is a diagram of the electric circuit connections.

Fig. 6 is an enlarged fragmentary sectional view as on the line 1—1, Fig. 2, but taken through the left hand end of the siren with respect to Fig. 1.

Figs. 7, 8 and 9 are sectional details taken, respectively, on the lines 7—7, 8—8 and 9—9, Fig. 6.

Fig. 10 is a vertical sectional view on the line 10—10, Fig. 1.

Fig. 11 is a fragmentary sectional view on the line 11—11, Fig. 10.

Fig. 12 is a side view of the bracket and a fragmentary view of parts associated therewith for sustaining the torsional strain when the brake is applied to the motor shaft.

Fig. 13 is a top plan view of the bracket seen in Fig. 12 with a part of the motor base shown in section.

Fig. 14 is a face view of the brake operating mechanism with frame parts shown in section as on the line 14—14, Fig. 1.

Fig. 15 is a sectional detail on the line 15—15, Fig. 14.

And, Fig. 16 is a view from the left, with respect to Fig. 14, illustrating the connection between the brake band and the solenoid magnet.

In the drawings similar reference numerals refer to similar parts throughout the several views.

The siren proper is of known construction and which briefly described is as follows:—

Two fan wheels or rotors 1, 1 are keyed to the shaft 2 of a motor 3, on each side of the motor, the latter being bolted upon a base 4 and enclosed within a weather-proof hood 5. Each fan has an opening 6 in its outer face for the intake of air and is formed with a plurality of regularly spaced radial blades 7 which form air pockets with adjoining portions 8 of the peripheral surface, these latter portions alternating with port openings 9. The fans revolve within open ended cylindrical stators comprising housings, one of which is indicated by the numeral 10 while 11 indicates the other. These stators 10 and 11 are provided with outwardly turned annular flanges 12, the flange on the stator 10 being bolted to a back member 13 which in turn is bolted to end lugs 14 on the motor 3, such back member having a laterally extending flange 15 fitted within the

stator to sustain the weight thereof, and the stator 11 is similarly secured to and carried by an intermediate housing 16 for a brake mechanism later to be described, this brake housing being carried by a motor back 17 also bolted to lugs 14 on the motor.

These stators or fan housings 10 and 11 are also provided with peripheral port openings 18 which are alternately opened and closed as the fans revolve and are the outlets for the air drawn into the fans through their respective intakes 6.

Carried by the fan housings are axially extending flaring mouthed projectors 19 and over the fan housings 10 and 11 and secured thereto are circularly formed sounders 20 and 21, respectively, the sounder 21 also being of a width to extend over the brake housing 16.

The siren as thus far described operates as follows:—The rotors 1, 1 driven by the motor shaft 2 cause air to be drawn in through the projectors 19 and discharged centrifugally through the port openings in the rotors and their respective housings, the siren sound being created by the rapid alternate opening and closing of the ports 18 in said housings and this sound is intensified and driven toward the ground by the sounders 20 and 21. When the circuit through the motor is closed the siren starts slowly with a low heavy roar, the sound rising in pitch as the motor gains in speed until it is a loud and piercing shriek and at which time the circuit through a remote control, as an alarm box, is broken so that the motor comes to a stop before the siren gives another blast.

As hereinabove stated an object of the invention is to bring the motor to an abrupt stop after reaching high speed in order that a code number may be blown more quickly and, also, to give a more distinctive alarm than results when the motor is allowed to coast or is more slowly brought to a stop, and to this end an electro-mechanical brake is employed and is of such construction and operation as now to be described.

Keyed to the motor shaft 2 intermediate the motor and one of the rotors 1 is a brake wheel 22 arranged within the housing 16 and encircling this wheel is a split brake band 23 provided with a suitable brake lining 24 and supported, in this instance, on a fixed stud 25 at a point diametrically opposite the split in the brake band. This stud 25 extends transversely of the brake band and is carried by a side wall of a lateral offset 26 formed on the housing 16, a nut 27 on a threaded end of the stud holding it against axial movement. The brake band is supported for lateral adjustment upon a squared portion of the stud 25 by means of a plate 28 riveted to the brake band and having a rearwardly extending U-shaped portion 29 which engages over and is slidable on the stud, the offset 26 forming a chamber 30 for receiving the band supporting member 28. A rod 31 axially movable in a bushing 32 in the outer end of the part 29 has its forward end threaded through the stud 25 and bears against the brake band 23, a coiled spring 33 being interposed between the stud and the end wall of the part 29. Thus, a lateral adjustment of the brake band may be effected for properly centering it with respect to the brake wheel, an adjustment of the rod 31 in one direction moving the brake band forwardly while adjustment of such rod in the other direction permits a rearward movement of the band, the spring 33 functioning to hold the brake band in contact with the inner end of the adjusting rod. A pin 34

through the end wall of the part 29 and a slot in the rod 31 serves to hold the latter in adjusted position.

Secured to the free ends of the brake band are plates 35 and 36, the upper plate 35 carrying a projection 37 which has an opening therethrough for slidably receiving the upper end of a combined brake adjusting and clamping rod 38, and the lower plate 36 having spaced ears 39 in which is journaled a pin 40 providing pivotal connection between the brake band and an eccentric 41. Also eccentrically pivoted in this member 41, by means of a pin 40^a, is a head 42 on the lower end of the rod 38, the latter having a nut 43 on its threaded end for effecting with the rod 38 a circumferential adjustment of the brake band. The eccentric 41 is formed on one end of a shaft 44 and is grooved, as indicated, to receive the rod member 42 and ears 39. This shaft 44 has bearing in a hub 45 extending laterally from a wall of the brake housing 16, and fixed to the other end of the shaft is a two arm operating lever 46 one end of which has pivotal connection with means for operating the lever to apply the brake, and the other arm having connection with a retraction spring 47 for effecting release of the brake.

From the foregoing it will be observed that provision is made for centering the brake band with respect to the brake wheel, that further provision is made for circumferential adjustment of the brake band, that turning of the eccentric in one direction, through its connection with the operating lever 46, will draw the rod 38 downward, thus moving the free ends of the band toward each other to apply the brake to the wheel 22, and that turning of the eccentric in the reverse direction through action of the spring 47 will release the brake.

As a means for electrically controlling the operation of the mechanical brake, I provide a solenoid magnet having a frame comprising a base 48, which is longitudinally adjustable and secured by bolts 49 to the under side of a bracket 50 extending outwardly from the brake housing 16 in the direction of the hub 45, and guide rails 51 at right angles to the base. The coil 52 of the magnet is carried by plates 53 and 54 connected by tie-bolts 55 and secured thereby to ears 56 extending laterally from the sides of a member 57 fixed to the side rails 51. The core or plunger 58 is similar to the member 57 but is opposed relatively thereto and is slidably supported on the rails 51. This core member carries ears 59 having pivotal connection with one end of an adjustable link 60 the other end of which pivotally connects with one arm of the operating lever 46, which arm is raised when the coil 52 is energized and the core 58 drawn upward thus turning the eccentric 41 to apply the brake. When the coil is deenergized the retraction spring 47 swings the lever 46 in the reverse direction to release the brake.

A bracket 61 secured by bolts 62 to the motor back 17 is provided with spaced arms 63 which straddle a center rib 64 of the motor base 4, these arms being tied at their ends by a bolt 65 and having adjustable stop screws 66 which bear against the side faces of the rib 64. Thus, it will be observed that torsional strain exerted when the brake is applied is sustained by the base 4 and the frame parts of the siren.

The motor shaft 2 is extended to the left, with respect to Fig. 1, and is mounted in a ball bearing 67 supported in the hub 68 from which radiate obliquely disposed spider arms 69 and 69^a formed

integrally with the stator 11. On this shaft extension is a centrifugal governor comprising, in this instance, end members 70 and 71 movable relatively toward and from each other by means of a plurality of pairs of flexibly connected weighted links 72, a link of each pair having pivotal connection with ears 73 on its respective end member, the end member 70 being slidable on the shaft 2 while the member 71 is fixed to the shaft by means of a spline 74, set screw 75 and clamping screw 76 which binds a split hub portion 77 of the member 71 to the shaft.

A sleeve 78 on the shaft 2 and interposed between the members 70 and 71 limits relative movement of such members toward each other as the weighted links swing outwardly, this movement of the end members being against the action of a helical spring 79 encircling the sleeve 78 and which acts to move the end members relatively from each other when the governor closes.

An insulating disk 80 is secured to the governor member 70 and bearing against this disk is one end of a switch arm 81 fulcrumed at 82 on a bracket 83 secured to an insulating plate 84 fastened by screws 85 to the under side of a removable plate 86, the insulating plate 84 also carrying a terminal 87 with which the outer end of the switch arm 81 makes electrical contact when the governor opens. The switch arm 81 is normally held open by the governor and against the action of a compression spring 88 which functions to close the switch and hold the ball end thereof in engagement at all times with the governor part 80.

The governor is protected from the elements by a housing 89 integrally formed on the stator 11 and having side walls 90 extending upwardly to the arm 69^a this arm having an opening 91 for receiving the switch mechanism on the plate 86 which latter forms a weatherproof covering for such opening and is secured in place by screws 92. Sight openings 93 and 94 are formed in the housing 89 for viewing both ends of the switch arm 81.

In operation, the fans 1, 1 are caused to revolve and the siren sound rises in pitch as the speed of the motor increases. At about 400 R. P. M. the centrifugal governor functions and allows the switch arm 81 to close under action of the spring 88, a connection thus being made in a circuit which is closed at a remote point when the circuit through the motor is broken, this circuit which includes the switch 81 energizing the coil 52 of the solenoid magnet which in the manner hereinbefore described operates to apply the brake to the wheel 22, the brake being again released when the governor slows down and functions to permit the switch 81 to open. This action is repeated the desired number of times and at predetermined time intervals to blow a code number.

Any suitable circuit connections may be employed for controlling the siren. However, a siren of this character is usually operated through a remote control at a central station or one of a number of street boxes and to this end circuit connections illustrating a remote control are shown diagrammatically in Fig. 5 and are as follows:—

The code wheel 95 of an alarm box or central station transmitter is shown in operative engagement with one of a pair of spring contacts 96 which by wires 97 and 98 are normally in closed circuit with the coil 99 of an electro magnet and one of the windings of a transformer 100 the

other winding of which is connected to line wires 101 and 102, the relay coil 99 functioning to hold a switch 103 in open position. When the contact 96 is broken by one of the lugs 104 on the wheel 95, which latter is driven by suitable means as a spring motor, the switch 103 automatically closes and a circuit is established from line wires 101 and 102 through switch 103 and coil 105 of an electromagnet which functions to close a two-pole switch 106. With this switch closed a circuit is established from the line wires 101 and 102, switch 106 and through wires 107 and 108 to the motor 3. Then as the motor gains in speed the governor opens and permits the switch arm 81 to make contact with the terminal 87. When the spring contact 96 is again closed as the wheel 95 continues to revolve, the switch 103 opens and thus breaks the circuit through the coil 105 permitting the switch 106 to automatically open. The coil 52 of the solenoid is connected by wire 109 to the terminal 87 and by wire 110 to a switch 111 which, when closed, connects with line wire 101, the other line wire 102 being connected through wire 112 to a terminal on the bracket 83 and flexible connector 113 to the switch arm 81. An arm 114 on the switch 106 functions to open the switch 111 when the switch 106 closes and this switch 111 automatically closes when the switch 106 opens. Thus, with the circuit broken through the motor by the switch 106 and with the switches 111 and 81 closed, the latter owing to the speed of the governor, a circuit is established from line wires 101 and 102 through the solenoid coil 52 whereupon the solenoid operates to apply the brake, this latter circuit being again broken when the governor slows down to permit the switch 81 to open. Then, when another lug 104 on the wheel 95 breaks the contact 96 the action is repeated and another blast sounded by the siren.

It may be added that angular throw of the operating lever 46 in one direction is limited by the inward movement of the plunger 58 of the solenoid and, in the other direction, by a stop 116 extending laterally from a split ring 115 adjustably clamped about the outer end of the shaft bearing 45.

The governor, as hereinbefore stated, opens when the motor shaft reaches approximately 400 R. P. M. and consequently closes and permits the switch 81 to open and break the circuit through the solenoid magnet 52 when the motor has been reduced to this speed. The speed of the motor is reduced abruptly and therefore the brake is released almost instantaneously after being applied with the result that the inertia in the revolving parts keeps them under motion at a speed below 400 R. P. M. which is insufficient for an audible sound to be made by the siren, and permits a succeeding blast of the siren to be given without having to start the motor from a dead stop.

What I claim is:

1. A signalling system comprising a rotatable siren, means for rotating the siren at an audible speed and for retarding rotation of said siren, mechanism for initiating action of said retarding means, and separate mechanism for rendering said retarding means ineffective when said siren has been retarded to a substantially inaudible speed of rotation.

2. A signalling system comprising a rotatable siren, means for rotating the siren and for retarding rotation of said siren, mechanism for initiating action of said retarding means, and

mechanism including a speed-responsive governor for rendering said retarding means ineffective when said siren has been retarded to a predetermined speed of rotation.

5 3. A signalling system comprising a rotatable siren, means including an electric circuit for retarding rotation of said siren, a switch in said circuit tending to render said retarding means effective, and means including a second switch
10 in said circuit for rendering said retarding means ineffective when said siren has been retarded to a substantially inaudible speed of rotation.

4. A signalling system comprising a rotatable siren, means including an electric circuit for
15 rotating said siren at an audible speed, a switch for opening said circuit to render said rotating means ineffective, means for retarding rotation of said siren, mechanism normally effective upon opening said switch to render said retarding
20 means effective to retard the siren, and mechanism for rendering said retarding means ineffective when said siren has been retarded to a substantially inaudible speed of rotation.

5. A signalling system comprising a rotatable siren, means including an electric circuit for

rotating said siren, a switch for opening said circuit to render said rotating means ineffective, a brake for retarding rotation of said siren, a second electric circuit for operating said brake, a second switch in said circuit, means operated by
5 opening of said first named switch for closing said second switch for normally completing said second circuit to render said brake effective, a speed-responsive governor, and means controlled
10 by said governor for opening said second circuit to discontinue operation of said brake when said siren has been retarded to a predetermined speed of rotation.

6. A signalling system comprising a rotatable siren, means for rotating said siren, means for
15 rendering said rotating means effective and ineffective, means for retarding rotation of said siren, mechanism normally rendering said retarding means effective when said rotating means
20 is rendered ineffective, and mechanism for rendering said retarding means ineffective when said siren has been retarded to a predetermined speed of rotation.

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