J. C. COULOMBE.

SIGNAL.

APPLICATION FILED AUG. 13, 1914.

1,292,436.

Patented Jan. 28, 1919.

2 SHEETS—SHEET 1.

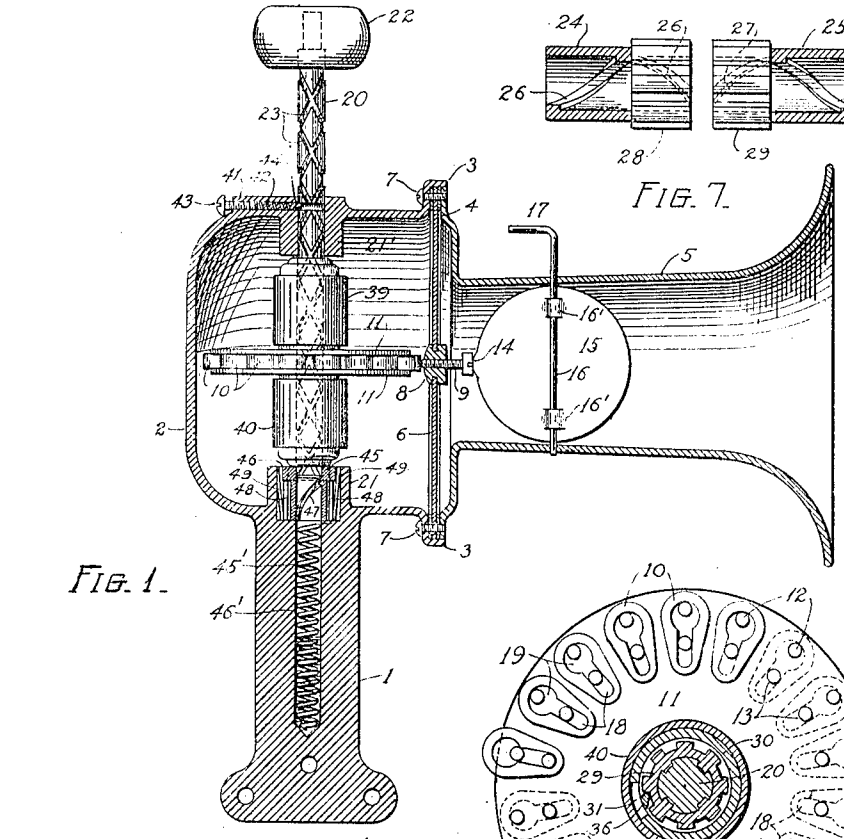


FIG. 1.

FIG. 7.

FIG. 3.

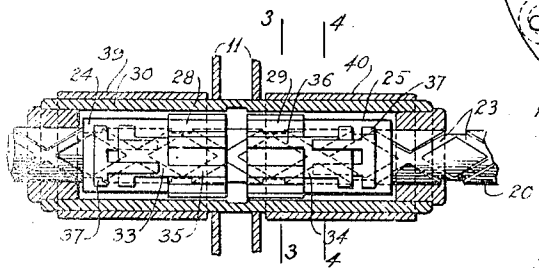


FIG. 2.

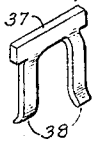


FIG. 5.

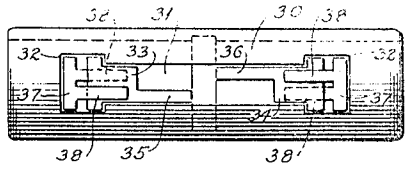


FIG. 6.

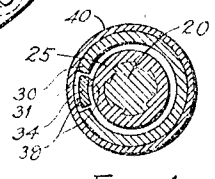


FIG. 4.

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2 SHEETS—SHEET 2.

FIG. 8.

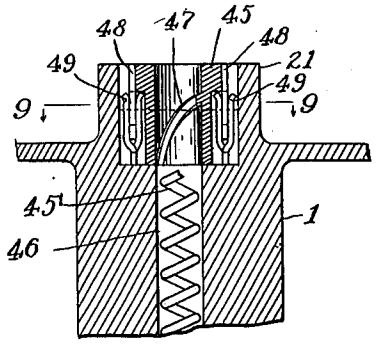
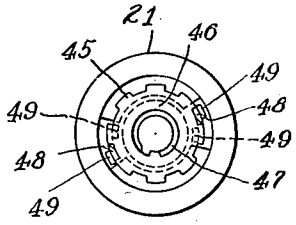


FIG. 9.



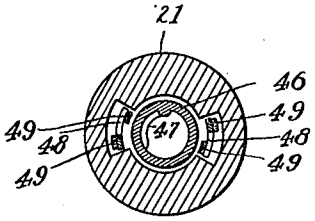


FIG. 10.

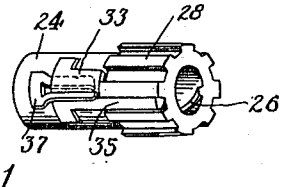


FIG. 11.

FIG. 13.

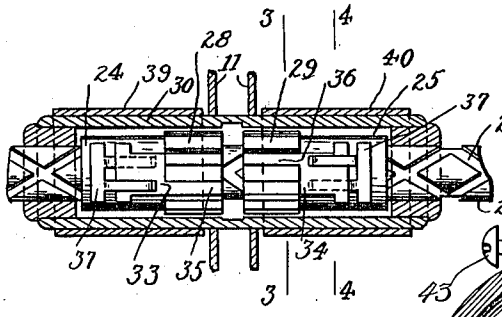
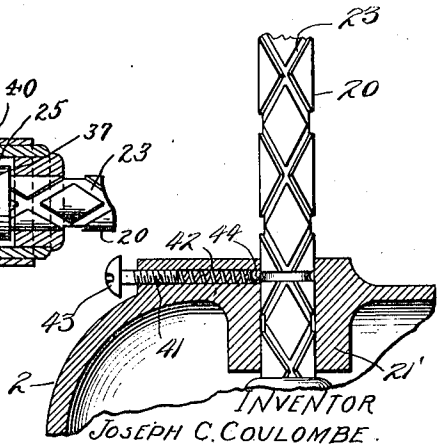


FIG. 12.



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SIGNAL.

1,292,436. Specification of Letters Patent. Patented Jan. 28, 1919.

Application filed August 13, 1914. Serial No. 856,684.

To all whom it may concern:

Be it known that I, JOSEPH C. COULOMBE, a citizen of the United States, residing at Lowell, county of Middlesex, Commonwealth of Massachusetts, have invented certain new and useful Improvements in Signals, of which the following is a specification.

This invention relates to signaling devices and particularly to an automobile horn.

My present invention has for its object to improve signals of this character and to make their action more effective and more completely responsive to actuation. To this end, my invention contemplates the use of a rotor having a circumferential series of centrifugally acting impact elements or hammers pivotally and slidably mounted thereon and effective to progessively contact with and impart vibrations to the sound reproducing medium as they are revolved therepast. The sound producing elements of my invention are capable of use in either the electrical or so called "mechanical" horns, but for the purposes of my present application, I shall show and particularly discuss its embodiment in a mechanically operable structure.

The drive for the rotor is such that it will be continuously revolved in the same direction in both movements of the reciprocable actuating plunger therefor. The movement of the rotor actuating plunger in one direction is opposed within predetermined limits by a frictional resistance device, whereby, when the resistance is overcome, the plunger will descend quickly and suddenly to impart an effective impulse to the rotor to overcome its inertia and immediately set it to rotating at sufficient velocity to produce the desired pitch. These and other features which will appear more particularly hereinafter are secured in my improved signal.

The construction and operation of my invention will be more fully disclosed and discussed in the specification which follows. In the drawings forming a part of that specification I have shown as an illustrative embodiment a form of signal which has proven efficient and satisfactory in use. Throughout specification and drawings like reference numerals are correspondingly applied, and in these drawings:

Figure 1 is a vertical central section of a signal in accordance with my invention.

Fig. 2 is a detail, partly in elevation and partly in longitudinal section of the rotor operating mechanism of my invention.

Fig. 3 and Fig. 4 are detail sections on the lines 3—3 and 4—4 respectively, of Fig. 2.

Figs. 5, 6 and 7 are details of parts to be more fully described hereinafter.

Fig. 8 is an enlarged view of the sleeve 45 and associated parts.

Fig. 9 is a plan view thereof.

Fig. 10 is a transverse section on the line 9—9 of Fig. 8.

Fig. 11 is a perspective view of the sleeve 24 and pawl 35.

Fig. 12 is a vertical central section through the sleeves 39 and 40, and,

Fig. 13 is an enlarged detail section particularly illustrating the spring-controlled detent for temporarily opposing the descent of the plunger.

I have indicated at 1 a standard adapted to be attached to an automobile or other vehicle in conveniently operable relation to the driver's seat. The standard 1 terminates at its upper end in a hollow head or casing 2 in which the sounding members of the signal and their operating parts are located. The casing 2 is formed as a suitably shaped shell closed at its rear end and open at its front end. At its front end, said casing is turned upwardly and then over laterally in the form of a circumferential flange 3. Between this flange and the inner flanged end of an outwardly flaring trumpet or horn 5 a vibratory disk or diaphragm 6 is fastened by screws 7. The diaphragm 6 completely seals the front open end of the shell 2. Set centrally of the diaphragm is a bearing 8 in which a contact member in the form of a screw 9 is adjustably set up. The pointed end of the screw 9 is positioned for progressive contact with a peripheral series of centrifugal impact elements or hammers 10 pivotally and slidably mounted on a rotor in the form of a pair of laterally disposed disks 11 by two circumferential rows of radial pins 12 and 13. The delivery of sound emitted through the horn 5 is controlled by a muffler 15 pivotally mounted within the horn 5 on a pivot rod 16. The rod 16 passes through the lugs 16^1 on the muffler and has an end 17 extending through the horn 5 whereby the muffler may be adjusted. The muffler has an ear 14 on its periphery adapted to bear against the headed end of the screw 9 whereby to flex

the diaphragm inwardly. This limits the vibration of the diaphragm to that set up on the rebound by the impact of the hammers of the rotor, thereby changing the quality of the sound emitted.

The hammers 10 of the rotor are preferably of the shape and have the arrangement best shown in Fig. 3. Referring to this figure, it will be seen that the hammers extend radially about the periphery of the rotor in a circumferential series. Each hammer is in the form of a closed loop or band having an inner restricted end gradually tapering to an outer enlarged contact end. The sides of each hammer near its inner end define a straight narrow slot 18 in which the pin 13 is located. Each slot 18 terminates at its outer end in a circular slot 19, in which the pin 12 is located. The pins guide and limit the travel of the hammers. The arrangement is such that when the hammers are thrown out past the periphery of the disks 11 by the centrifugal force developed when the rotor is revolved, they progressively strike against the screw 9 with a yielding contact effective to prevent breakage of the parts.

The rotor is revolved by means of a vertically reciprocable plunger or push rod 20 guided in alined bearings 21 and 21^1 in the casing 2 and having an operating knob 22 swiveled to its upper end in conveniently operable reach of the driver.

The plunger 20 has two oppositely pitched spiral grooves 23 extending from end to end thereof. Two vertically disposed spaced sleeves 24 and 25 have operative connection with said plunger by means of two oppositely pitched spiral ribs or threads 26 and 27 thereon fitting in said grooves 23. At their opposed ends the sleeves 24 and 25 have each a circumferential ratchet 28 and 29. Inclosing both sleeves is a sleeve 30 to which the rotor disks 11 are rigidly fixed. The sleeve 30 has a longitudinal slot 31 extending between its ends and terminating in a cross slot 32 at each end. Two pawls 33 and 34 are inserted in the opposite ends of the slot 31. Each pawl has a headed outer end fitting in the cross slot 32 and each carries at its inner end a projection or tongue 35—36. The tongues 35 and 36 are beveled in opposite directions so as to present each an abrupt straight face and an inclined face to the square teeth of the ratchets 28 and 29. The tongues 35 and 36 extend toward each other in different parallel planes and are adapted for engagement with the ratchets 28 and 29 of the sleeves 24 and 25. The tongues are each yieldingly held in place by a spring 37. Each spring consists of a cross piece 37 and two depending legs 38 bent in opposite planes as clearly shown in Fig. 5. In assembling, the pawls are dropped in place in the slot 31 and the springs 37 laid on top of the pawls with their legs 38 straddling the pawls so that the inside leg of each spring bears against the outer face of one of the ratchet sleeves and the outside leg against the inner face of one of a pair of external covering sleeves 39 and 40 set on the sleeve 30. The purpose of the sleeves 39 and 40 is to cover the slot 31 and prevent the pawls and springs from falling out.

For the purpose of giving an increased rotation on the down stroke the bearing 21 is formed as a counter bore to receive a sleeve 45 having an internal thread 47 corresponding to the thread 27 of the sleeve 25. The sleeve 45 is formed with an external ratchet 46 corresponding to 28 and 29 of the sleeves 24 and 25. This ratchet is engaged by the pawl 48 which is held in operative position by the spring member 49.

The action of this sleeve 45 therefore is to rotate the plunger 20 on its downward stroke so as to produce a double resultant turn of the rotor. On the return of the plunger the sleeve 45 runs free leaving the sleeve 25, which engages the same groove as 45, free to rotate the rotor.

In this class of devices it is desirable that the rotor be suddenly and rapidly set in motion when the plunger is depressed, instead of developing a gradually accelerated velocity, so that the elastic hammers will be forcibly impelled to working position by the suddenly developed centrifugal force. In effecting this, I provide a predetermined frictional resistance to the downward reciprocation of the plunger. This detent automatically releases when its limit is reached and passed to permit a sudden descent of the plunger with consequent initial rotation of the rotor at maximum velocity. This friction detent may conveniently be in the form shown in Fig. 1. In that figure I have shown the upper bearing 21^1 for the plunger 20 as having a lateral extension 41. The extension 41 has a bore in which a coiled spring 42 is seated. The compression of the spring, and thus the limit of resistance of the detent, is adjusted by a set screw 43 threaded into said extension 41. Yieldingly confined between the inner end of the spring 42 and the plunger 20 is a friction element in the form of a ball 44. The action of the spring is to force the ball against the plunger and to thereby resist the depression of the plunger until the pressure has been increased sufficiently to overcome the tension for which the spring is set, whereupon the plunger descends quickly and sets the rotor into rapid initial rotation. The detent 44 also catches the stem on its return and prevents an uneven rebound of the actuating stem.

The downward travel of the plunger is further resisted, after the spring 42 has been overcome, by a coiled spring 45^1 seated

in a bore and oil well 46^1 in the standard 1. The action of this spring is to take up the drive of the rotor when the downward travel of the push rod has been overcome by it, and to return the plunger to original position and in this return to continue to revolve the rotor in the same direction as given it by the downward reciprocation of the plunger. This action is effected through the arrangement of ratchet sleeves and spiral grooves described.

The operation is as follows. The damper 15 having been set to regulate the volume of sound emitted and the tension of the spring 42 having been adjusted to the desired degree of frictional resistance, the plunger 20 is depressed. As soon as the resistance offered by the spring 42 has been overcome the plunger moves abruptly downward. On the downward movement of the plunger the sleeve 24 drives the rotor and the sleeve 25 ratchets. This operation is reversed on the return movement of the plunger. As the plunger descends the right hand thread 26 of the sleeve 24 and the left hand thread 47 of the sleeve 45 are simultaneously engaged by the opposite grooves 23 of the plunger. This rotates the sleeve 24 in a counterclockwise direction, looking down upon the rotor, and imparts to the sleeve 45 a tendency to rotate in the opposite direction but which rotation is prevented by the pawl 48. The rotation of the sleeve 24 in this direction causes the pawl 35 to lock with the teeth 26 of said sleeve and to thereby rotate the sleeve 30 which carries the rotor. The engagement of the thread 47 of the non-rotating sleeve 45 with the other groove of the plunger rotates the plunger as it passes through said sleeve, thereby doubling the speed of the sleeve 24 and thus the speed of the rotor. The knob 22 of the plunger being swiveled, permits the plunger itself to rotate without itself rotating in the hand. In this downward movement of the plunger, the sleeve 25 remains stationary, being prevented from rotating by its pawl 36, and the sleeve 30 rotates about the sleeve 25. The centrifugal force developed by the rapidly revolving rotor causes the movable hammers 10 to slide outwardly beyond the edges of the disks 11, and progressively contact the end of the screw 9, thereby vibrating the diaphragm 6 and producing a succession of staccato sounds. When the plunger has reached the limit of its downward travel, the spring 45^1 which has been compressed by this downward movement becomes effective to return the plunger to raised position. In this return movement the sleeve 25 is rotated in the same direction as sleeve 24 was rotated on the down-stroke of the plunger, causing pawl 36 and teeth 39 to engage and revolve the rotor in the same direction of rotation as imparted to it on the downward stroke of the plunger. The sleeve 24 and pawl 35 and the sleeve 45 and pawl 48 both ratchet so that the plunger turns freely, but is guided by the threads 47 and 26.

Various modifications in the form and construction of my device may obviously be made, all without departing from the spirit of my invention if within the limits of the appended claims.

What I therefore claim and desire to secure by Letters Patent is:

1. In a device of the class described, a casing, a vibratory element, a plunger mounted for reciprocation through said casing and having opposite spirals, a rotor on said plunger, a pair of members oppositely ratcheted to said rotor and each having a threaded engagement with one of said spirals and a third member ratcheted to said casing and having a threaded engagement with one of said spirals, and means for reciprocating said plunger.

2. In a device of the class described, a casing, a vibratory element, a plunger mounted for reciprocation in said casing, means for rotating said plunger in one direction, a rotor and a pair of oppositely ratcheted operating connections between said plunger and said rotor for imparting continuous rotation to said rotor therefor.

3. In a warning signal, a vibratory element, a rotor comprising a pair of spaced disks fastened to rotate together, an annular series of substantially radially reciprocable hammers pivotally and slidably mounted between said disks for limited movement toward and from said vibratory element and having rounded contact faces adapted to strike said element with a yielding impact permitting an oscillatory movement of said hammers on their pivots.

4. In a device of the class described a vibratory disk, means for vibrating said disk, a sound delivery horn, a muffle plate pivoted in said horn adjacent to said disk and having a disk contacting projection on its periphery adapted to be moved into and out of contact with said disk.

5. In a device of the class described, a vibratory element, a rotor, impact elements associated with said rotor and disposed for contact with said vibratory element, means for rotating said rotor, and means effectively disposed to offer a predetermined resistance to the operative movement of said rotor operating means.

6. In a device of the class described, a vibratory element, a rotor, impact elements associated with said rotor and disposed for radially yieldable contact with said vibratory element, reciprocable means for rotating said rotor, and a detent effectively disposed to offer a predetermined resistance to the reciprocation in one direction of said rotor operating means.

7. In a device of the class described, a vibratory element, a rotor, impact elements associated with said rotor and disposed for radially yieldable contact with said vibratory element, a reciprocable plunger for rotating said rotor, and a spring pressed friction element effectively disposed to offer a predetermined resistance in one direction to the reciprocation of said plunger.

8. In a device of the class described, a vibratory element, a rotatable element, impact elements associated with said rotatable element and disposed for contact with said vibratory element, reciprocable means having an operative connection with said rotatable element effective to rotate said element continuously in the same direction in either direction of reciprocation, and a detent effectively disposed to offer a resistance within predetermined limits to the reciprocation in one direction of said rotor operating means.

9. In a warning signal, a vibratory element, a rotor, a hammer mounted thereon, a reciprocable and rotatable rotor driving member operatively connectible with the rotor, means for converting the reciprocatory motion of said member into rotary motion to rotate said member and thus the rotor continuously in the same direction in either direction of reciprocation of the said driving member.

10. In a device of the class described, a vibratory element, a rotatable element, impact elements associated with said rotatable element and disposed for contact with said vibratory element, a plunger having a pawl and ratchet connection with said rotatable element effective to rotate said element continuously in the same direction in either direction of reciprocation, and a spring friction element effectively disposed to offer a frictional resistance within predetermined limits to the reciprocation in one direction of said plunger.

11. In a warning signal, a vibratory element, a rotor, a hammer mounted thereon, a reciprocable and rotatable rotor driving member operatively connectible with the rotor, means for converting the reciprocatory motion of said member into rotary motion to rotate said member and thus the rotor continuously in the same direction in either direction of reciprocation of the said driving member, and means for imparting an increased rate of rotation to said driving member upon reciprocation in one direction.

12. In a warning signal, a vibratory element, a rotor, a hammer mounted thereon, a reciprocable and rotatable rotor driving member operatively connectible with the rotor, means for converting the reciprocatory motion of said member into rotary motion to rotate said member and thus the rotor continuously in the same direction in either direction of reciprocation of the said driving member, and means for rotating the rotor independently of the rotation of the driving member upon the return movement of said member.

13. In a warning signal, a vibratory element, a reciprocable plunger, a pair of oppositely revoluble devices, and a rotor-carrying member rotated by one of said devices upon reciprocation of the plunger in one direction and rotated by the other device upon reciprocation in the opposite direction, whereby the rotor is revolved constantly in the same direction upon reciprocation of the plunger in either direction.

14. In a warning signal, a rotor, a reciprocable plunger, a pair of motion converting and transmitting connections between said plunger and rotor and rotated by said plunger, and means for imparting rotation to said plunger during its reciprocation in one direction to increase the rotation of one of said connections.

15. In a warning signal, a rotor, a reciprocable plunger, a pair of ratchet elements, one remaining stationary and the other rotating in an effective direction respectively upon movement of the plunger in one direction, and a ratchet element held against rotation on a movement of the plunger in one direction to rotate the plunger itself and thereby increase the rate of revolution of the ratchet element which is being rotated in an effective direction and rotating idly on a movement of the plunger in another direction.

16. In a warning signal, a rotor, a reciprocable plunger having oppositely pitched spiral grooves, a pair of ratchet elements rotated by said plunger and each having a thread corresponding in pitch to one of said grooves, a pair of pawls coöperating with said ratchets and effective therewith to rotate the rotor upon reciprocation of the plunger, a third ratchet element having a thread corresponding to one of the plunger grooves, and a pawl holding said third ratchet element against rotation by said plunger in one direction of reciprocation thereof whereby the plunger is rotated as it runs through said ratchet and the rotation of one of said pair of ratchets is increased and permitting said plunger-rotating ratchet to turn freely without rotating the plunger on the return movement thereof.

17. In a warning signal, a reciprocable and rotatable plunger having a swiveled operating portion, a rotor, and means for converting the reciprocatory motion of the plunger into rotative motion and applying it to the plunger and rotor to rotate the same.

18. In a warning signal, a reciprocable plunger, a pair of ratchets operatively connectible therewith, one ratchet remaining

stationary and the other rotated upon reciprocation of the plunger in one direction and the action of the ratchets being reversed upon the return movement of the plunger, and a rotor-carrying element operated alternately by said ratchets and rotated in a constant direction thereby.

19. In a warning signal, a reciprocable plunger, a pair of ratchets operatively connectible therewith, one ratchet remaining stationary upon reciprocation of the plunger in one direction, whereby to impart an initial rotation to the plunger and the other ratchet revolved by the plunger upon reciprocation in said direction, and a rotor-carrying element revolved by the rotating ratchet.

20. In a warning signal, a reciprocable plunger, a pair of ratchets operatively connectible therewith, one ratchet remaining stationary upon reciprocation of the plunger in one direction, whereby to impart an initial rotation to the plunger, and the other ratchet revolved by the plunger upon reciprocation in said direction, and a rotor-carrying element revolved by the rotating ratchet and comprising a revoluble member having a pawl engageable with the said rotating ratchet and rotated thereby to revolve said revoluble member.

21. In a warning signal, a reciprocable plunger, a pair of ratchets operatively connectible therewith, one ratchet remaining stationary upon reciprocation of the plunger in one direction, whereby to impart an initial rotation to the plunger, and the other ratchet revolved by the plunger upon reciprocation in said direction, and a rotor-carrying element revolved by the rotating ratchet, and means for increasing the speed of rotation of the plunger and thus of the rotor after the rotated ratchet has started to rotate.

22. In a warning signal, a reciprocable plunger, a pair of ratchets operatively connectible therewith, one ratchet remaining stationary to thereby rotate the plunger and the other ratchet being rotated by the plunger upon reciprocation thereof in one direction, and said stationary ratchet being rotated and said rotated ratchet remaining stationary in the return movement of the plunger, and a rotor-carrying member revolved in a constant direction alternately by said rotating ratchets, whereby the movement of the plunger in both directions is utilized.

23. In a warning signal, a reciprocable plunger, a pair of ratchets operatively connectible therewith, one ratchet remaining stationary to thereby rotate the plunger and the other ratchet being rotated by the plunger upon an inward reciprocation of the plunger, a third ratchet operatively connectible with the plunger and remaining stationary upon the inward movement thereof to increase the rotation of the rotated ratchet and thus the plunger, and a rotor-carrying member revolved by said rotated ratchet.

24. In a warning signal, a reciprocable plunger, a pair of ratchets operatively connectible therewith, one ratchet remaining stationary to thereby rotate the plunger and the other ratchet being rotated by the plunger upon an inward reciprocation of the plunger, a third ratchet operatively connectible with the plunger and remaining stationary upon the inward movement thereof to increase the rotation of the rotated ratchet and thus the plunger, and a rotor-carrying member revolved by said rotated ratchet, said stationary ratchet of the pair of ratchets rotated by the plunger upon the return movement thereof and rotating the rotor-carrying member in the direction of rotation imparted to it by the rotated ratchet upon the inward movement of the plunger.

25. In a warning signal, a reciprocable plunger, a pair of oppositely revoluble elements, one of which remains stationary to revolve the plunger and the other of which is rotated by the plunger upon an inward movement of the plunger, the action of said elements being reversed upon the return movement of the plunger, and a rotor-carrying member alternately connectible with the rotated element of said pair of elements, whereby said member is rotated in a constant direction upon both the inward and return moves of the plunger.

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

JOSEPH CLEOPHAS COULOMBE.

Witnesses:

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ARTHUR HARRISON.