

H. WHEELER.  
 MULTIPLE FUSE HOLDER FOR SINGLE POLE CIRCUITS.  
 APPLICATION FILED MAR. 10, 1909.

954,838.

Patented Apr. 12, 1910.

3 SHEETS—SHEET 1.

Fig. 1.

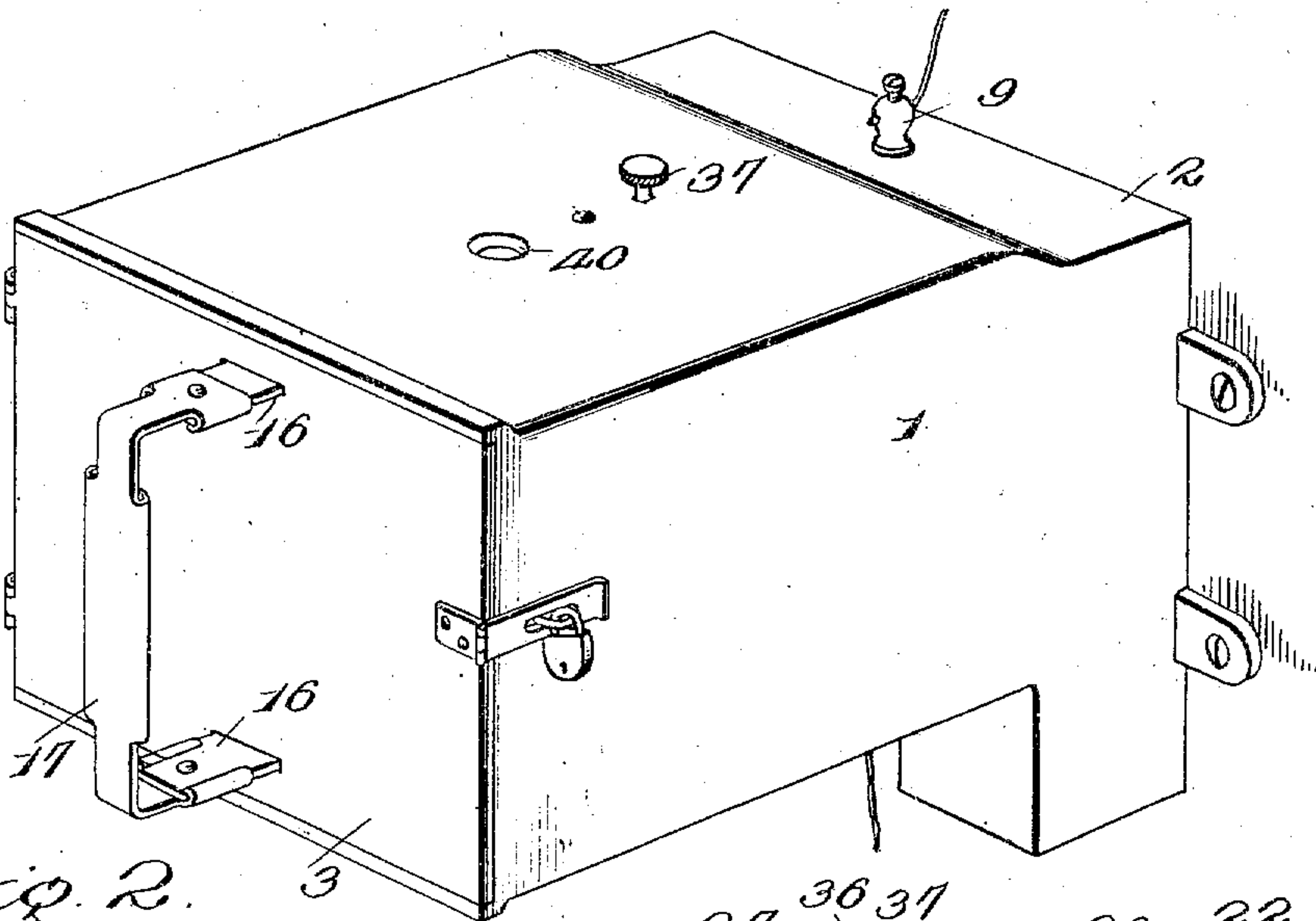
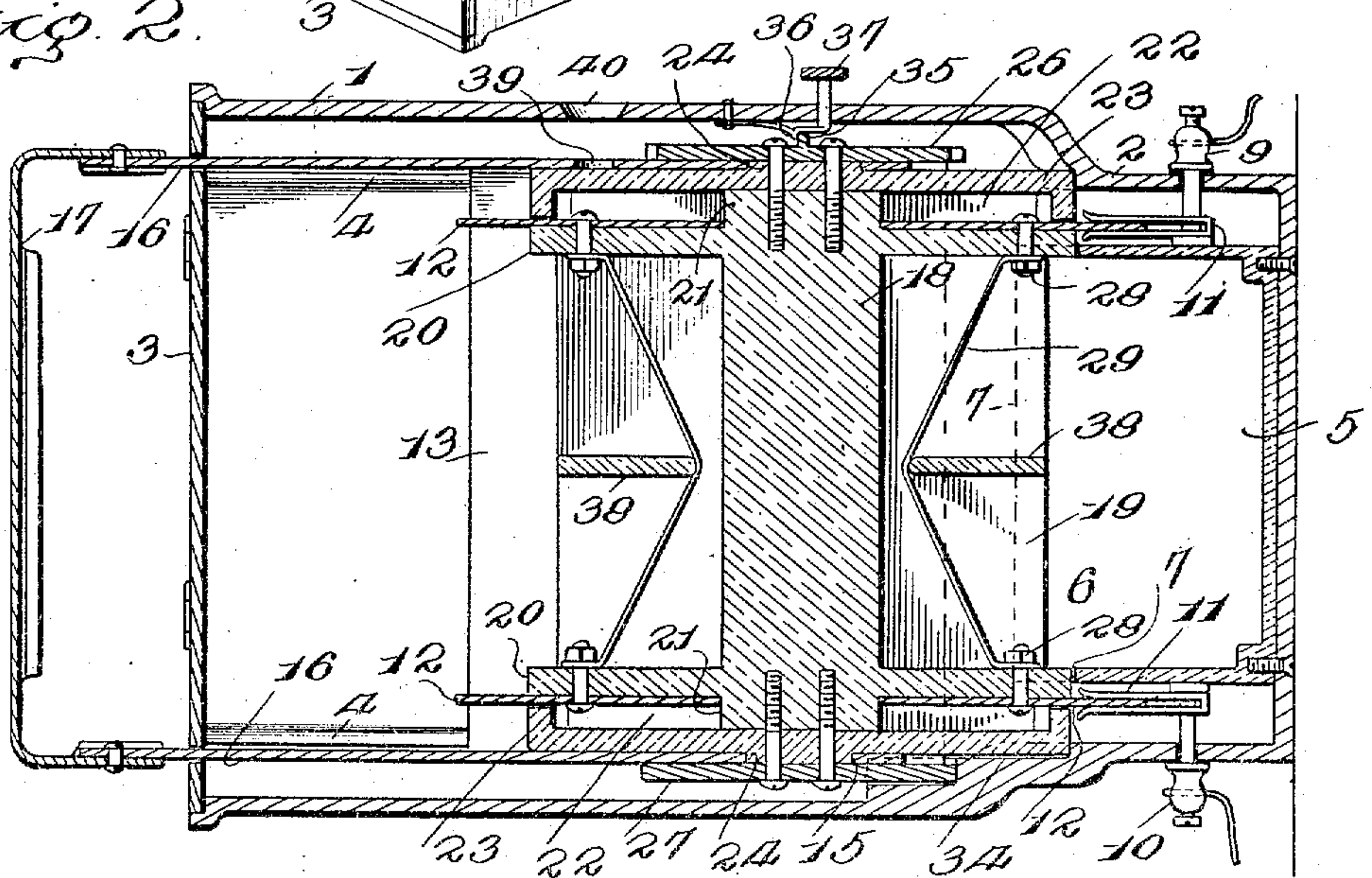


Fig. 2.



Inventor

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Witnesses

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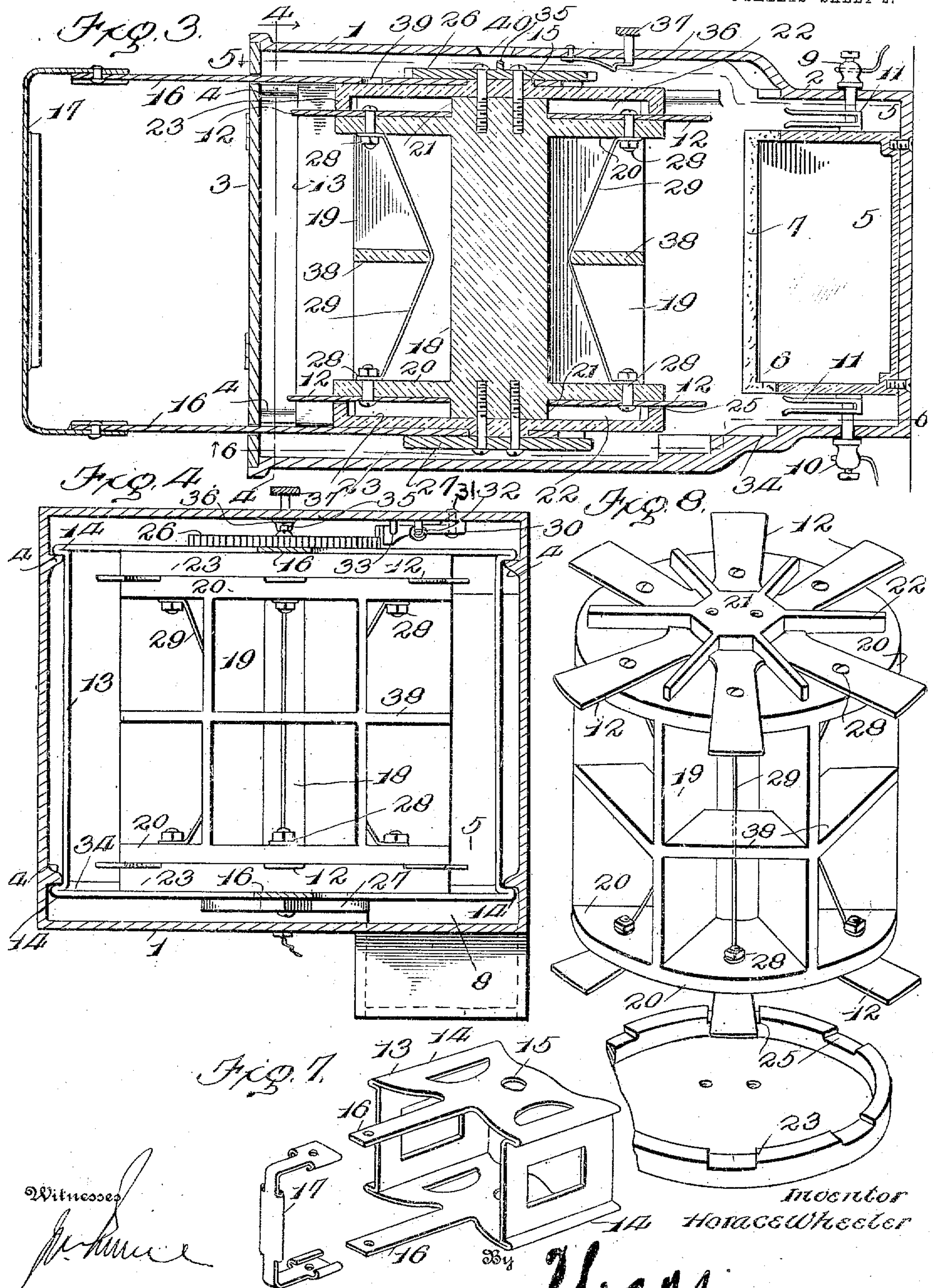
*[Signature]* Attorneys

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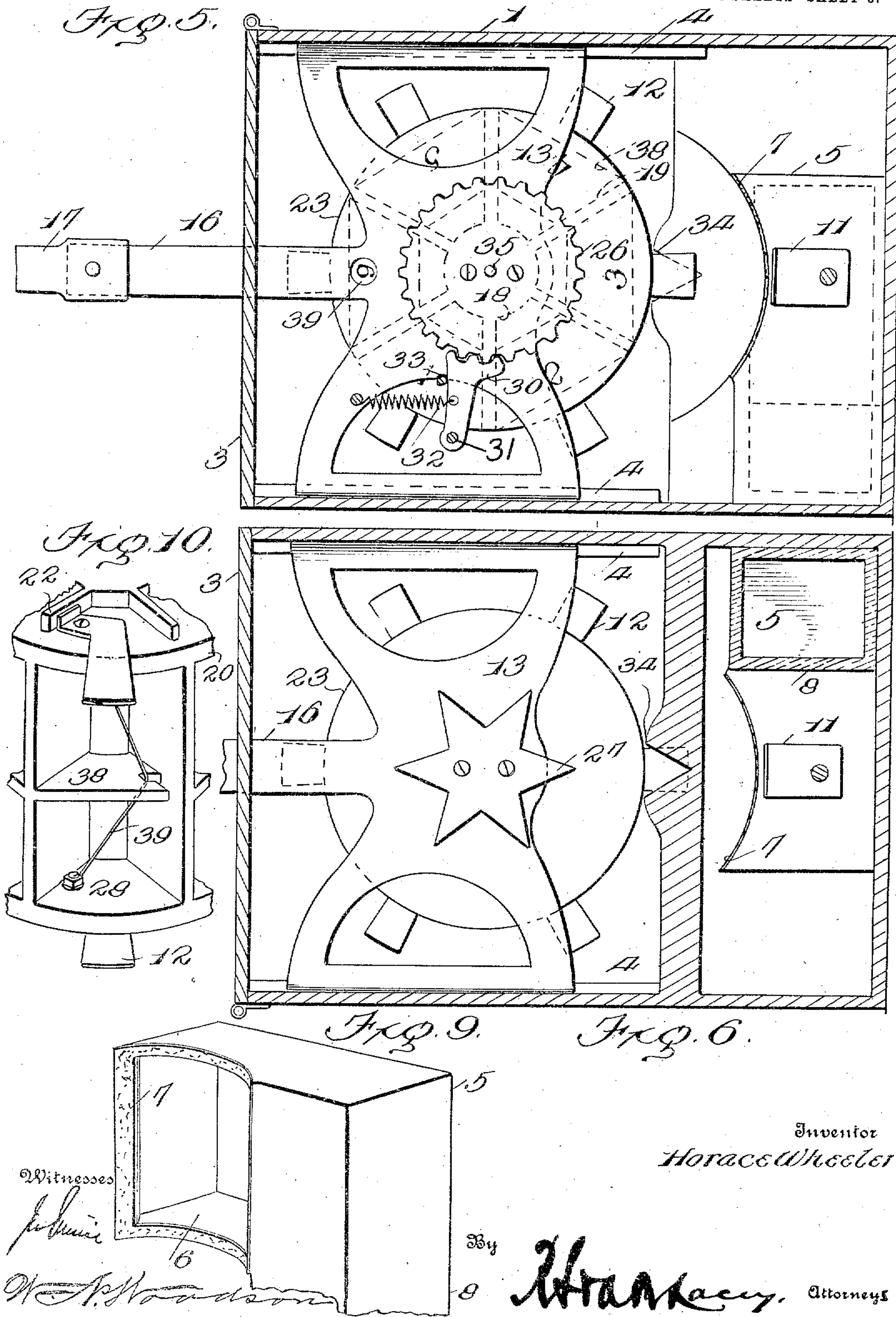


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# UNITED STATES PATENT OFFICE.

HORACE WHEELER, OF HARTFORD, CONNECTICUT, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## MULTIPLE-FUSE HOLDER FOR SINGLE-POLE CIRCUITS.

954,838.

Specification of Letters Patent.

Patented Apr. 12, 1910.

Application filed March 10, 1909. Serial No. 482,578.

*To all whom it may concern:*

Be it known that I, HORACE WHEELER, citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Multiple-Fuse Holders for Single-Pole Circuits, of which the following is a specification.

This invention appertains to fuses or blow-out devices adapted to be interposed in electric circuits to protect electric apparatus from injury in the passage of abnormal current of electricity.

The present invention provides means of the character aforesaid embodying a plurality of fuses in a single device, whereby in the event of one fuse blowing out, another fuse may be quickly brought into operative position to establish the circuit without the loss of time and danger experienced in replacing the usual single fuse by a new one.

The present invention contemplates a carrier provided with a series of fuses which are arranged in pockets or compartments constituting sections of a blow-out chamber, a stationary combustion section adapted to register with any one of the pockets or compartments of the fuse carrier to isolate the fuse in circuit from the remaining fuses and electric contacts, one set of contacts for the lead wires and another set for each fuse, said contacts being separated when the fuse carrier is moved away from the combustion section of the blow-out chamber, and in electrical engagement when the sections of the blow-out chamber are brought together, means for automatically moving the fuse carrier to bring a new fuse in operative position, means for centering or fixing the position of the fuse carrier to insure registry of the sets of electric contacts and the sections of the blow out chamber, means to prevent the casual separation of the blow-out chamber sections, and indicating means to designate the number of fuses intact, upon the fuse carrier.

For a full understanding of the invention and the merits thereof and also to acquire a knowledge of the details of construction and the means for effecting the result, reference is to be had to the following description and accompanying drawings.

While the invention may be adapted to different forms and conditions by changes in the structure and minor details without

departing from the spirit or essential features thereof, still the preferred embodiment is shown in the accompanying drawings, in which:

Figure 1 is a perspective view of a multiple fuse holder embodying the invention. Fig. 2 is a central longitudinal section of the device, showing the relation of the parts when the sections of the blow-out chamber are together. Fig. 3 is a view similar to Fig. 2, showing the position of the parts when the fuse carrier is moved outward and the sections of the blow-out chamber are separated. Fig. 4 is a transverse section on the line 4—4 of Fig. 3, looking in the direction of the arrow. Fig. 5 is a horizontal section on the line 5—5 of Fig. 3, looking down. Fig. 6 is a horizontal section on the line 6—6 of Fig. 3, looking up. Fig. 7 is a perspective view of the rack or carriage and handle, the latter being detached. Fig. 8 is a perspective view of the fuse carrier, parts being separated and arranged in the relative position which they occupy when assembled. Fig. 9 is a perspective view of the stationary combustion section of the blow-out chamber. Fig. 10 is a perspective view of a modified form of fuse carrier.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

The device comprises a casing 1 having an extension 2, the same being of any size and construction depending upon the capacity and particular use for which the multiple fuse is designed. The casing may be of metal or other material and is closed at one end by means of a door 3 which may be secured by a lock device of any variety to prevent tampering with the device by unauthorized parties. As shown, the casing is provided with apertured ears to receive fastenings by means of which it is secured to any suitable support. Inner shoulders are provided along the sides of the casing near the top and bottom thereof and form guides to direct the rack or carriage in its reciprocating movements. The stationary combustion section of the blow-out chamber is located in the extension 2 of the casing and is formed of porcelain or other refractory material. The stationary combustion section 5 is closed at its top, bottom, back and sides and has an opening 6 in its



front to register with any one of the pockets or compartments of the fuse carrier. The edges of the walls surrounding the opening 6 are supplied with a suitable packing 7 of asbestos or other heat-resisting material, so as to insure the formation of a close joint between the sections of the blow-out chamber when brought together. The section 5 is located at one side of the extension 2 and has a tubular projection 8 which extends through an opening in the bottom of the extension 2 at one side thereof so as to carry off the heat and gases resulting from the blowing out of a fuse. Binding posts 9 and 10 are fitted to the upper and lower ends of the extension 2 and are insulated therefrom. The lead wires of the circuit are adapted to be connected to the binding posts. Electric contacts 11 are attached to the inner ends of the respective binding posts and may be of any construction which will insure positive connection when the cooperating contacts are in engagement. The contacts 11 are of U-form, the members of each being adapted to yield so as to grip opposite sides of the contacts 12 attached to the fuse carrier.

The rack or carriage 13 is mounted in the casing 1 to slide backward and forward and is provided with upper and lower outer ribs 14 which are mounted upon the inner shoulders or guides 4 to insure proper movement of the rack. The rack or carriage involves a light structure and is constructed preferably of sheet metal and is provided in its top and bottom with openings 15 which receive the journals of the fuse carrier. Arms 16 project from the top and bottom of the carrier and extend through openings in the door 3 of the casing and have a handle 17 detachably fitted thereto, said handle being likewise constructed of sheet metal and having edge portions curved to strengthen the same, provide a smooth and extended grip and to obtain firm engagement with the arms 16. The handle is detachably connected to the arms 16 to admit of opening the door 3 to gain access to the interior of the casing and to provide for removal of the rack or carriage from the casing when desired. The fuse carrier preferably appears in the form of a spool or drum and is mounted in the rack or carriage 13 both for movement therewith and to turn about its own axis, whereby provision is had for bringing the several fuses in position as they are used or blown. The fuse carrier is preferably constructed of porcelain or other refractory material, so as to resist the action of the heat and to prevent conduction of the current. The fuse carrier comprises a core 18, wings 19 radiating from the core, ends 20 and extensions 21 and 22 upon the outer side of the ends 20. The extensions 22 consist of ribs in line with the wings 19

but terminating short of the outer edges thereof. The extensions 21 are in line with the core 18 and correspond in height to the extensions or ribs 22. The spaces formed between the extensions 21 and 22 receive the contacts 12 attached to the fuse carrier. It is not essential that the ribs 22 be in line with the wings 19, but such arrangement is preferable as the spaces upon the outer sides of the end pieces 20 correspond with the pockets or compartments inclosed between the wings 19.

Caps 23 are fitted to the ends 20 and cover the extensions 21 and 22 and are formed upon their outer sides with circular projections 24 which constitute journals, since they are mounted in the openings 15 of the rack or carriage 13 and form parts about which the fuse carrier turns. The caps 23 correspond in diameter to the diameter of the end pieces 20 so as to come flush therewith. Notches 25 are formed in the rims of the caps to receive the contact pieces 12, thereby admitting of the caps obtaining a close fit upon the end pieces 20.

A cog wheel 26 is secured to the raised portion or journal of the upper cap and a star wheel 27 is similarly connected to the lower cap. Both cog wheel 26 and the star wheel 27 are arranged exterior to the rack or carriage. The contacts 12 are secured to the end pieces 20 by fastenings 28, which also serve to connect the fuse wires 29 to said contacts. The inner ends of the contacts are widened so as to abut against the ribs 22 and thereby prevent turning of the contacts upon the fastenings 28. The contacts 12 consist of plates which project beyond the sides of the fuse carrier so as to be clamped between the spring members of the contacts 11. The spaces inclosed between the ends and the wings 19 form pockets or compartments which receive the several fuse wires and which constitute sections of the blow-out chamber.

The rack or carriage is slidable within the casing by moving the handle 17 in or out. The fuse carrier is automatically turned the distance of a pocket or compartment at each complete movement of the rack or carriage. This is effected by means of a dog 30 which is pivoted at 31 to the upper side of the casing, the end of the dog being toothed to mesh with the teeth of the cog wheel 26. A light spring 32 connects the dog 30 with a part of the casing so as to return the same to normal position. A stop 33 limits the rearward movement of the dog 30. Upon moving the rack or carriage outward, with reference to the casing, the toothed end of the dog 30 engages with the teeth of the cog wheel 26 and moves said cog wheel a sufficient distance to bring the next fuse in position so that the pocket or compartment of the fuse carrier will register with the section



5 when the two sections comprising the blow-out chamber are brought together, upon moving the rack or carriage forward. When the rack or carriage is pushed inward or forward, the toothed end of the dog 30 in mesh with the cog wheel 26 moves inward therewith until the rack or carriage reaches a point within a short distance of its inward movement when the teeth of the cog wheel clear the dog and the latter is returned to normal position, against the stop 33, by the spring 32. When the carriage or rack is moved outward, the toothed end of the dog 30 engages with the teeth of the cog wheel 26 and moves the same, and the fuse carrier, a sufficient distance to bring the next fuse in proper position to be included in the circuit, when the carriage is again pressed forward to bring the cooperating contacts and the sections of the blow-out chamber together.

To insure registering of the sections of the blow-out chamber, as also of the sets of contacts 11 and 12, centering-means are provided, the same consisting of the star wheel 27 and a cooperating element, the latter consisting of a tapered depression 34 provided in the lower portion of the casing near the inner end thereof and adapted to receive the points or spurs of the said star wheel. As the rack or carriage is pushed forward a point or spur of the star wheel 27 enters the tapered depression 34 and insures a correct position of the fuse carrier, because should the latter be moved forward too far or not be moved forward sufficiently far, the inclined edges or sides of the point engaging with the inclined edges of the depression 34 will correct the error and insure moving the fuse carrier either backward or forward to cause the sections of the blow-out chamber to accurately register.

To prevent outward movement of the fuse carrier by the force resulting from the burning-out of a fuse, a detent mechanism is employed for holding the carriage and fuse carrier when moved inward. This detent mechanism consists of a stop and a catch 36, the latter being spring actuated and having a button or finger piece 37 connected therewith, the same being located exterior to the casing for convenience of operation. The stop 35 is centrally disposed, thereby serving to hold the carriage and fuse carrier, when moved inward, with any one of the pockets or compartments in register with the combustion section 5. When the carriage or rack is pushed inward and the fuse carrier makes close connection with the stationary combustion section 5, the stop 35 is engaged by the catch 36. Before the carriage may be drawn outward, it is necessary to release said carriage; this being effected by pulling the button 37 outward, thereby withdrawing the catch 36 from engagement with the stop 35, after which a pull upon the

handle 17 moves the carriage or rack with the fuse carrier outward.

It is to be understood that the fuse carrier may be provided with any number of pockets or compartments forming sections of the blow-out chamber, and in order that the centering mechanism may perform the desired result, the star wheel 27 will have as many points or spurs as there are pockets or compartments. To prevent the formation of an arc between the contacts after a fuse has been burned out, the fuse wire is deflected from a straight line and one or more baffles 38 are interposed in the length of the pockets or compartments. The fuse wires may be deflected radially or laterally. The provision of the pockets or compartments prevents interference between the several fuses, so that the fuse in circuit may be burned out without affecting any other fuse in position upon the carrier.

After the carrier has been charged, that is, supplied with the required number of fuses, the door of the casing is closed and locked, after which the rack or carriage is pushed forward to bring one of the pockets or compartments of the fuse carrier in register with the stationary combustion section 5. This movement causes the sets of contacts 11 and 12 to engage and complete the circuit through the fuse wire inclosed by the blow-out chamber. The fuse carrier is positioned so that the last fuse is the one first included in the circuit. This is determined by numbers applied to the upper cap of the fuse carrier, one number being employed for each pocket or compartment of the fuse carrier and the numbers running consecutively and adapted to be exposed through openings 39 and 40 formed in the top of the rack or carriage and the casing, respectively, said openings registering when the carriage or rack is pushed inward. When a fuse is burned out, the gas and vapors evolved escape through the extension 8 of the combustion section 5 in the manner herein stated.

It will be understood from the foregoing that a multiple fuse holder constructed and capable of operation in the manner specified, possesses many advantages over a single fuse holder or like appliance. A fuse holder constructed in accordance with this invention when installed on a motor car, admits of a fuse being replaced in a minimum length of time without danger of the operator receiving a shock, even though the trolley pole be in position and both switches closed. The terminals are rendered dead by withdrawal of the contacts 12 from the contacts 11 when the fuse carrier is removed for reloading. It will be understood that the fuse carrier serves the double purpose of a switch, as also a holder for the fuses. It is also understood that the installed fuse is protected from drafts of air and is thereby more liable to



fuse or burn out at the predetermined temperature or capacity. Another advantage is that an inexperienced hand, when charging the fuse carrier, is not liable to cut the fuse wires by a too great pressure upon the binding screws, nor are the fuses liable to blow prematurely by reason of insufficient contact, and where cars are used having motors of different sizes, the proper fuses may be installed for each of the respective cars. It is further noted that when the current carrying capacity of a fuse has been exceeded, the fusing will take place in a chamber separated from other fuses, the gases and vapors being carried off below the binding posts, thereby preventing the latter, as also the insulation, being injured by said gases.

Having thus described the invention, what is claimed as new is:

20 1. A multiple fuse holder including a casing having a combustion chamber, and a rotary carrier slidably mounted within the casing and provided with a series of fuses adapted to register with said combustion chamber.

25 2. A multiple fuse holder including a casing having a combustion chamber and provided with circuit contacts, a rotary fuse carrier slidably mounted within the casing and provided with a series of fuses, contacts for each fuse adapted to make electrical connection with the circuit contacts, and means whereby any fuse may be brought into registration with the combustion chamber.

35 3. In a multiple fuse holder, the combination of a fuse carrier having a series of pockets or compartments, each consisting of a fuse-carrying section and adapted to receive a fuse, a cooperating combustion section adapted to register with each pocket or compartment of the fuse carrier, and cooperating sets of contacts, one set being provided for each fuse, thereby admitting of a fuse being included in the circuit when the fuse carrier is moved to cause a pocket thereof to register with said combustion section and complete the blow-out chamber.

4. In combination, a pair of circuit contacts, a fuse carrier provided with a series of fuses, a pair of contacts for each fuse adapted to make electric connection with the said circuit contacts, and means for imparting both a sliding and a rotary movement to the fuse carrier to admit of the several fuses being brought into operative position.

5. In a multiple fuse holder, the combination of a pair of circuit contacts, a carriage, a fuse carrier mounted upon the carriage and movable therewith and provided with a series of fuses and pairs of contacts therefor, and means for automatically turning said fuse carrier, as the carriage is reciprocated, to bring the several fuses into operative position.

65 6. A fuse holder including a blow-out

chamber, contacts secured to the opposite ends of said chamber, a transverse baffle interposed between the length of the blow out chamber, and a fuse having its opposite ends connected with the contacts and its intermediate portion bearing against the adjacent edge of the baffle to prevent arcing when a fuse is blown out.

7. A multiple fuse holder including a casing, a pair of circuit contacts, a rotary fuse carrier slidably mounted within the casing provided with a series of fuses, contacts for the several fuses to make electrical connection with the said circuit contacts, a centering means for the fuse carrier consisting of a star wheel attached to the fuse carrier, and a tapered depression for cooperation with the points of said star wheel.

8. A multiple fuse holder including a casing, a pair of circuit contacts, a rotary fuse carrier slidably mounted within the casing and provided with a series of fuses and contacts therefor, the latter adapted to make electric connection with the said circuit contacts, and means for automatically turning the fuse carrier during its reciprocal movements.

9. A multiple fuse holder including a casing, a pair of circuit contacts, a rotary multiple fuse carrier provided with contacts for the several fuses adapted to make electrical connection with the said circuit contacts, and a centering device for properly positioning said fuse carrier.

10. In a multiple fuse holder, the combination of a stationary combustion section, a multiple fuse carrier having a series of pockets, each adapted to register with the said stationary combustion section and form therewith a blow-out chamber, means for imparting movement to the fuse carrier to bring each of its compartments in registry with said combustion section, and cooperating contacts for establishing the circuit through the fuse brought into operative position.

11. A multiple fuse holder including a casing, circuit contacts, a rotary multiple fuse carrier slidably mounted within the casing and provided with a series of fuses and contacts to make electrical connection with the said circuit contacts, means for moving the fuse carrier to bring the several fuses into operative position, and indicating means to designate the number of live fuses mounted upon the carrier.

12. In a multiple fuse holder, the combination of circuit contacts, a rack or carriage, a fuse carrier mounted upon the rack to move therewith and to turn about an axis, and means for turning the fuse carrier simultaneously with the movement of the rack.

13. In a multiple fuse holder, the combination of circuit contacts, a rack or carriage, a fuse carrier mounted upon the rack to

move therewith and to turn about an axis, means for turning the fuse carrier simultaneously with the movement of the rack, and centering-means for properly positioning the fuse carrier to insure registering of the cooperating contacts.

14. In a multiple fuse holder, a fuse carrier comprising a series of pockets, each adapted to receive a fuse, caps fitted to the ends of the fuse carrier and inclosing a space, extensions subdividing said spaces to correspond with the number of pockets, and contacts located in the subdivision of said spaces and having connection with the respective fuses, the free ends of the contacts being interposed between the carrier and caps respectively, and projected laterally beyond the peripheral edges of said caps.

15. In a fuse holder, the combination of a casing, circuit contacts fitted to the casing, a rack slidable within the casing, a fuse carrier provided with a series of fuses, and contacts for the several fuses adapted to make electrical connection with the said circuit contacts, said fuse carrier being mounted in the rack to turn, means exterior to the rack and comprising complementary parts, one attached to the fuse carrier and the other to the casing for turning the fuse carrier, and centering means exterior to the rack for properly positioning the fuse carrier and comprising cooperating complementary parts, the one attached to the carrier and the other to the casing.

16. In a multiple fuse holder, the combination of a combustion section, a fuse carrier having a series of pockets each provided with a fuse and contacts, the fuse carrier adapted to be moved to bring each of its pockets in register with the said combustion section to form a blow-out chamber, and means for holding the fuse carrier when positioned to prevent its displacement or movement when a fuse is blown.

17. In a multiple fuse holder, the combination with a casing, a stationary combustion section located therein and having a tubular opening through the casing, a fuse carrier having a series of pockets and adapted to be moved to bring the several pockets in register with the combustion section to form a blow-out chamber, circuit contacts fitted to the casing, other contacts for each pocket and fuse carrier and adapted to make electrical connection with said circuit contacts, means for turning the fuse carrier, centering means to properly position the fuse carrier to insure registering of the cooperating contacts and the sections comprising the blow-out chamber, and means for securing the fuse carrier against accidental displacement.

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

HORACE WHEELER. [L. S.]

Witnesses:

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EDWD. W. LENDIN.