My invention relates to mechanism for opening and closing doors. Perhaps its largest field of usefulness lies in swinging double garage doors open and shut by power means, but in its broader aspects the invention is not confined to the operation of garage doors, nor necessarily to the use of swinging doors, nor essentially to the use of power means to operate such doors. However, the principles of my invention and the scope thereof will be better understood as this specification progresses, and may be ascertained from a study of the specification, the drawings accompanying it, and the claim at the end of the specification.

One of the objects of my invention is to provide means for operating the doors of a garage between open and closed position, or controlling such operation, with which means there is associated an electrical device not inherently connected to an electrical power source, but capable of being connected, through a connector affixed to the automobile which is authorized to enter the garage, to the battery of this automobile or other electrical power source thereon, thus to supply current to the electrical device so that it may initiate the operation of the power means or control the opening of the doors. It is also an object to provide like means for controlling closing of the doors, all to the end that the operation of the doors may only occur when an automobile thus equipped arrives outside the garage, and so that it is convenient for the occupant of such an automobile to operate the doors, but impossible for anyone in an automobile not thus equipped so to operate the doors.

It is a further object in connection with door operating means as described above to provide manually operable means, one inside the garage and capable of opening the doors, and one outside and capable of closing the doors, but so connected that neither is capable of operating the doors reversely, so that after departure of the automobile the doors can be closed from the outside of the garage, but cannot again be opened until the arrival of the automobile thus equipped, and vice versa, to enable the opening of the doors from inside the garage without the necessity of the presence of the properly equipped automobile, but preventing closing of the doors from the inside of the garage.

It is a further object to provide door swinging mechanism which may be so disposed in the garage that it is substantially entirely outside of the margins of the entrance, affording free access through the entrance, and which is connected from side to side only by a single link or like member extending overhead, to the end that the overhead mechanism is eliminated so far as possible, and there is nothing to drip oil or grease down upon the car or a person within the garage.

It is a further object to provide garage door swinging mechanism which will swing the doors into wide open position, and which in such position will lie snugly against the doors, to the end of affording the greatest possible freedom of ingress and egress.

A further object is to provide door swinging mechanism of the general character indicated above, which will engage the swinging doors and their inside lower swinging corner, which is the point where such doors will frequently stick, to the end that the power to open the doors may be most efficiently applied, and the doors swing with the least racking.

These and other objects will appear as this specification progresses.

My invention comprises the novel door operating or controlling mechanism, and the novel control therefor, as shown in the accompanying drawings, described in this specification, and more particularly pointed out by the claim which terminates the same.

In the accompanying drawings I have shown my invention embodied in illustrative forms, though not necessarily the forms which I prefer to employ commercially, but adapted for the purpose of best illustrating the principles of my invention.

Figure 1 is an elevational view, showing the manner of controlling opening of the doors from outside the garage and from an authorized and properly equipped car.

Figure 2 is a transverse horizontal section through the garage and doors, taken at about the plate level, and illustrating the door operating mechanism and conventionally the electrical controls therefor.

Figure 3 is an elevation or section substantially on the line 3—3 of Figure 2, illustrating the door operating mechanism at one side of the entrance.

Figure 4 is an elevation, with parts broken away, of the external door control mechanism, and Figure 5 is a plan view, with parts broken away, illustrating the same.

Figure 6 is an elevation and partial section of an authorized key for mounting upon an automobile, and Figure 7 is an end view of the same with the protective cap removed.

As indicated above, it is part of my invention...
to provide outside of the garage a device in the nature of a stand or post, carrying a head, within which are sets or pairs of terminals 21 and 22, respectively, or at least one such set of terminals, connected to mechanism within the garage to effect or control opening of the doors, and if two sets of terminals are employed, to control also the closing of the doors. These terminals 21 and 22 may take the form of jacks, or they may take the form of plugs, but a cooperating element, for example a plug 3 carrying the terminals 21, is affixed to the car, preferably by a flexible cable or wire 30, by which means it may be connected to the car battery 32, the two terminals 31 being connected to the opposite terminals of the battery. The circuits which include the terminals 21 and 22, respectively, are normally devoid of any electrical power source, so that they can only be closed by plugging in the terminals 31, whereupon the circuit including these terminals 21 or 22 is placed in connection with an electrical power source which is the battery 32, and when so connected the circuits including these terminals 21 or 22 become energized, and this energization may be employed to initiate the operation of power means, or in some instances actually operate the power means from the car battery, or in other instances merely to control a lock. These various operations depend wholly upon the electrical connections, and it will be evident that various connections might be employed to effectuate the operations described above and others.

With an arrangement of the character so far described it will be evident that it is necessary to provide at least one circuit for operation by the plug 3, which will open the doors when the automobile has approached the garage preparatory to entering. Thus the doors may be caused to open through the instrumentality of electric current supplied from the car battery, and in this connection it may be pointed out that the plug terminals 31 may be variously contoured, or may be formed as key elements, so that only one such plug will operate a given pair of terminals 21 or 22. It is preferable that a second similar circuit be employed so that when the car has been driven out of the garage the doors may be caused to close by means of the plug 3. This, however, is not essential, but the arrangement shown permits operation in this manner.

In addition it will usually be desirable to provide external means, such as an ordinary switch or push-button, which, when the doors are left open, may be operated to effect closing of the doors. Since this device is outside the garage, and can only be operated from outside the garage to close the doors, it is unlikely that a child will operate this device and then reenter the garage and be caught inside. However, to permit anyone caught inside the garage with the doors closed to emerge, or to permit the driver who wishes to drive out to open the doors before entering the car, it is desirable also to provide means, such as a simple switch or push-button, and placed inside the garage, whereby the doors may be swung open. For example, in the event of a fire should break out within the dwelling it may be desirable to provide similar means inside the garage whereby the doors may be swung shut.

The arrangement which I have illustrated permits these operations to be effected, and the control mechanism will shortly be described in detail, but first I shall describe the door swinging mechanism.

The entrance to the garage is normally closed by swinging doors 4 and 40 hinged at the sides of the entrance at 41 and 42, respectively. Inside of the garage, and substantially in a plane passing through each edge of the entrance, is mounted an upright post or shaft 58. Support brackets 59 and 60 support it at top and bottom. To the bottom of each such shaft is secured an arm 61 which is connected by a link 52 either to the corresponding door directly or preferably through a link 53. The connection to the door is at the inside lower swinging corner, since this corner is usually the one which sticks, due to sagging of the door or the hinges, hence the outward pressure to swing the doors open is concentrated at or near the point where the door tends to stick. These elements 51, 52 and 53 are of such total length in the position they occupy when, by rotation of the shaft the door is swung open, that the links 52 and 53 lie snugly against the inside of the door, and hold the door outwardly swung substantially in a plane normal to the entrance, as may be seen by the dot and dash lines in Figure 2. For convenience in swinging each such arm 51, each shaft is provided with an arm 54 at its upper end, which arms are connected across by a cross link 55 which extends well above the top of the automobile passing through the entrance, and which by its inherent character requires no lubricant, and consequently there is nothing to drip from above. To accomplish swinging of the doors there is mounted upon the shaft 5, preferably adjacent its lower end, a third arm 56, which is connected by a link 57 or other suitable means to a nut 68 threaded upon a screw 69 which is connected for rotation with a reversible motor 6. The latter mechanism is preferably supported on or near the floor of the garage, and preferably entirely shielded at one side of the entrance of the garage, so that it is not in the way of an automobile entering or leaving, and so that it is accessible and cannot drip grease or oil upon the car or a person beneath, as it might were it elevated.

As mentioned above, the electrical controls may be varied in arrangement, and will necessarily be varied to suit varying conditions. As herein shown the terminals 21 are connected through conductors 22 to a motor 26 which is a simple electromagnet or a self-holding relay, and the terminals 22 are connected through similar leads 24 to a similar relay 25. The lines 23 and 24 are not connected with any electrical power source, such electrical current being supplied solely from the battery of the automobile, in the manner heretofore described. When so connected in one such circuit or the other, corresponding relay is energized, and effects operation of a reversing switch 69. This may be connected between the power mains, indicated at 61, and the reversing circuits of the motor, as is seen diagrammatically in Figure 2, so that upon energization of the relay 26 the motor is operated in a direction to open the doors, and upon energization of the relay 25 the motor is operated in the reverse direction to close the doors. Such the garage is excited disconnected and terminated by circuit breakers 21 and 28, disposed at opposite ends of the path of travel of the nut 58. Thus when the nut 58 contacts the circuit breaker 21 it opens this switch and breaks that circuit to the motor 6 which causes it to turn in a direction to open the doors, but when circuit breaker 28, however, is spring-held closed at such a time so that upon reversal of the switch 75.

The entrance to the garage is normally closed by swinging doors 4 and 40 hinged at the sides of the entrance at 41 and 42, respectively. Inside of the garage, and substantially in a plane passing through each edge of the entrance, is mounted an upright post or shaft 58. Support brackets 59 and 60 support it at top and bottom. To the bottom of each such shaft is secured an arm 61 which is connected by a link 52 either to the corresponding door directly or preferably through a link 53. The connection to the door is at the inside lower swinging corner, since this corner is usually the one which sticks, due to sagging of the door or the hinges, hence the outward pressure to swing the doors open is concentrated at or near the point where the door tends to stick. These elements 51, 52 and 53 are of such total length in the position they occupy when, by rotation of the shaft the door is swung open, that the links 52 and 53 lie snugly against the inside of the door, and hold the door outwardly swung substantially in a plane normal to the entrance, as may be seen by the dot and dash lines in Figure 2. For convenience in swinging each such arm 51, each shaft is provided with an arm 54 at its upper end, which arms are connected across by a cross link 55 which extends well above the top of the automobile passing through the entrance, and which by its inherent character requires no lubricant, and consequently there is nothing to drip from above. To accomplish swinging of the doors there is mounted upon the shaft 5, preferably adjacent its lower end, a third arm 56, which is connected by a link 57 or other suitable means to a nut 68 threaded upon a screw 69 which is connected for rotation with a reversible motor 6. The latter mechanism is preferably supported on or near the floor of the garage, and preferably entirely shielded at one side of the entrance of the garage, so that it is not in the way of an automobile entering or leaving, and so that it is accessible and cannot drip grease or oil upon the car or a person beneath, as it might were it elevated.

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the motor can be started in a direction to open
the doors, but so long as the circuit breaker
switch 27 remains open the motor cannot be op-
erated further in a direction to close the doors.
The reverse is also true, as will be understood
from the diagram of Figure 2.

In order that the doors may be operated with-
out the presence of the car and its key, I may
provide an opening switch or push-button 71,
which may well be in a normal 110 volt circuit,
connected through a transformer 73 to a circuit
75 in shunt across the circuit 23. Such a switch
71 may be located inside the garage, and when
closed energizes the relay 25 to open the doors.
A similar switch 72 may be located outside or in-
side the garage, connected in the 110 volt mains,
and connected through a transformer 74 to a
shunt circuit 76 connected in the circuit 24, so
that upon closure of the switch 72 the relay 25
will be energized to effect closing of the doors.

It is preferred that the plug 3 be provided with
means such as the lamp 33 mounted in its base
34 and controlled by a switch 35, so that the plug
terminals 31 may be illuminated at night, and

the proper jack terminals 21 or 22 may be dis-
covered. It is also preferred that a protective
cap 36 be securable over the exposed terminals
31 so that they may not be accidentally con-
tacted while the plug 3 is in the car. These,
however, are mere details, and are more prop-
erly conveniences than essential to my inven-
tion.

What I claim as my invention is:

In combination with garage door operating 10
mechanism, means to effect operation of said
mechanism, including an electric circuit termi-
nating in two jacks, and devoid of an electric
power source, means supporting said jacks in an
 elevated position alongside the garage drive-
way, and a flexible conductor carried by an auto-
mobile, within reach of the driver, and termi-
nating in two plugs electrically connected to the
opposite terminals of the automobile's battery,
and adapted for manual insertion by the auto-
mobile driver in the respective jacks, to supply
electric current to said circuit to effect operation
of the door operating mechanism.

HARRY BARLOW.