

Aug. 18, 1942.

T. O. HAYNES

2,293,462

HYDRAULICALLY OPERATED DOOR

Filed Jan. 31, 1939

2 Sheets-Sheet 1

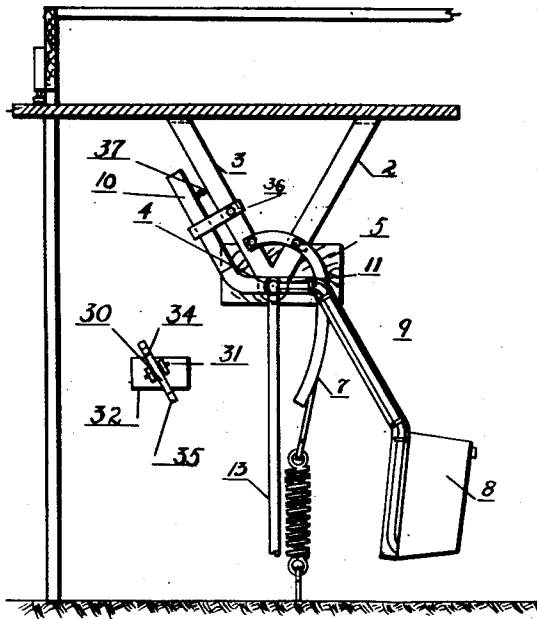


Fig. 2

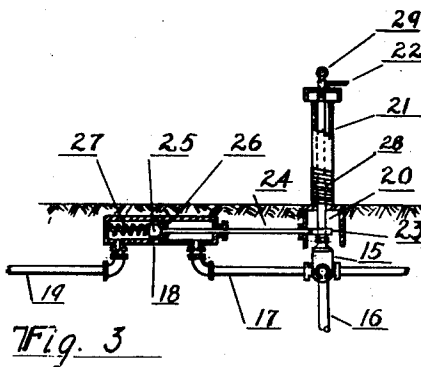
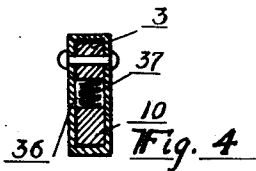
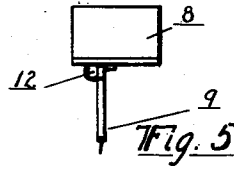


Fig. 3

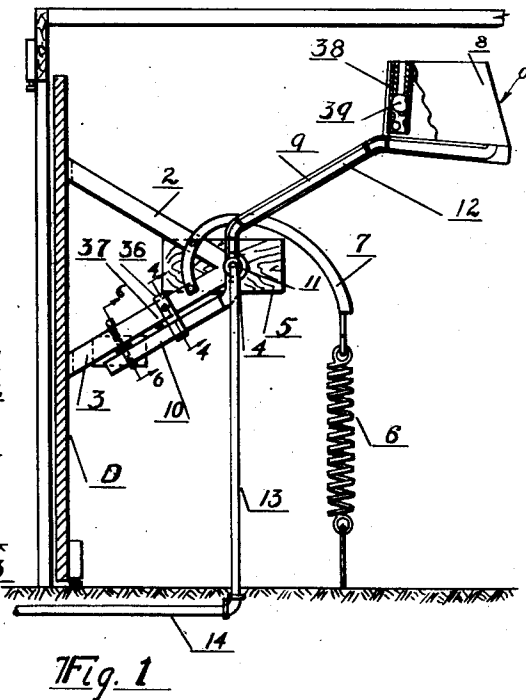


Fig. 1

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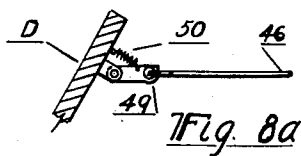
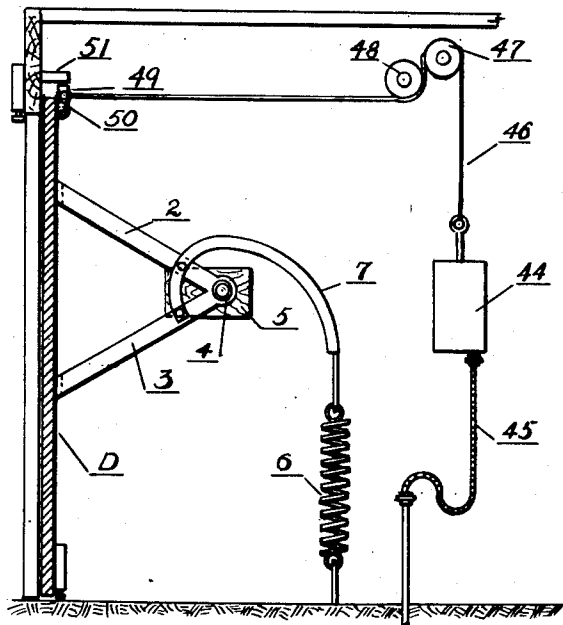
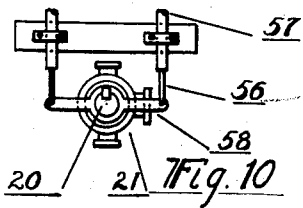
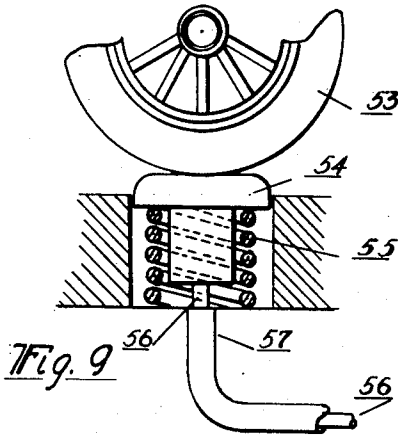
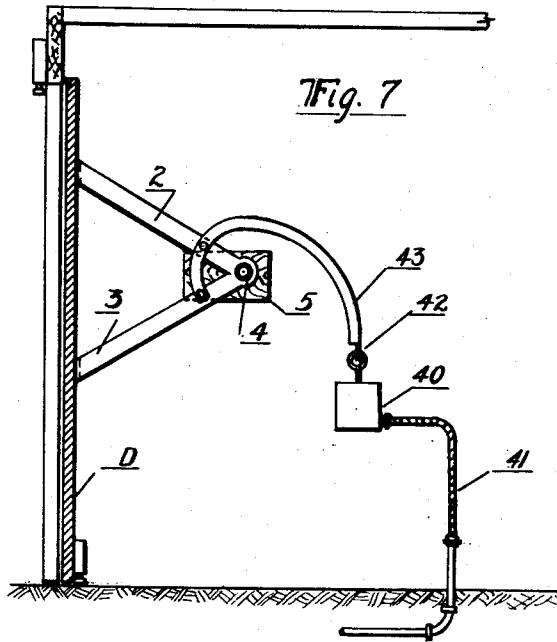
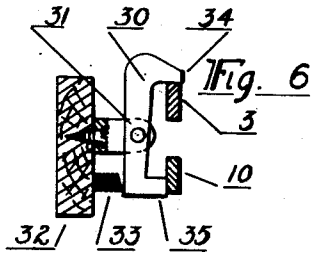
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HYDRAULICALLY OPERATED DOOR

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Application January 31, 1939, Serial No. 253,835

5 Claims. (Cl. 268—30)

My invention relates to garage and other doors of the like which are operated in opening and in closing by automatic means through energy from sources outside of hand labor. As to this invention here shown the door is operated by means of hydraulic water systems of public or private sources.

It is an object of this invention to provide an automatic door control for overhead garage doors of the like, operable from a point remote from said garage, the operating mechanism being preferably positioned so as to obviate the necessity of alighting from the automobile (which is particularly disagreeable in inclement weather) to unlock and open or close garage doors before driving in.

It is also an object of my invention to provide locking means inside the garage or the like, the same being so positioned as to render the mechanisms incapable of being tampered with from the outside.

A further object of the invention is to provide special mechanisms for use in operating the door that are highly efficient, cheap to construct and inexpensively operative.

Reference will be had to the accompanying drawings in which Fig. 1 is an elevation through a transverse section of the door showing the mechanisms of the door hangings in elevation on the wall or partitions from which the door is supported. In this figure the door is in closed position. Fig. 2 is a similar view to that of Fig. 1 with the door in open position. Fig. 3 is a section through a part of the operating mechanism which is exterior to the door. Fig. 4 is a detailed section on line 4—4 of Fig. 1. Fig. 5 is an elevation of the water tank inside the garage of Fig. 1 looking in the direction of the arrow *a* of Fig. 1.

Fig. 6 is a section on line 6—6 of Fig. 1. Fig. 7 is a modified form of the invention in position of the parts when the door is closed and looking substantially in the same direction as that indicated in Fig. 1.

Fig. 8 is a second modified form in the same position as that of Fig. 7. Fig. 8a is a detail of the locking device for the door of Fig. 8. Fig. 9 is a sectional elevation of a modified form of the control of the hydraulic actuating mechanism when the same is put in action by the wheel of a vehicle. Fig. 10 is a plan detail of the connections of the valve stand when coupled up in association with the use of the mechanism shown in Fig. 9.

In the drawings D indicates the door body in

all the figures as that is not modified by the supporting and operating mechanisms.

No front view of the doors and their operating mechanisms is here shown in the drawings as the edge views of the doors together with the elevational views of the supporting mechanisms of the doors mounted on the side walls or partitions of the room so clearly show the mechanisms thereto associated, that it is not thought necessary to show transverse views of these mechanisms.

The mechanisms of this invention relate to doors which are opened by being lifted to horizontal positions.

Figs. 1 and 2 show the preferred form of the operating mechanisms. The door D is connected at its vertical edges to and supported by arms 2 and 3 joined together at a central hinge pin 4 secured to a block 5 on the wall of the room. The location of this hinge pin 4 is such that the center of gravity of the door and its fixtures when the same is open and in horizontal position, there is an overbalance as relates to the pin 4 which permits gravity to swing the door down to closing position.

The normal weight of the door about the pin is counterbalanced somewhat by a spring 6 secured at the floor and connected to a curved arm 7 secured to the arms 2 and 3 which support the door.

A water tank 8 is supported by a bar 9 which extends down to and is hinged on the pin 4. An extension or leg of bar 9 extends over and beyond the pin 4 and along and below the arm 3 which supports the door.

Concentric with the hinge pin 4 there is a hinged pipe joint 11 of a pipe 12 extending to the tank 8 at its right bottom end. This pipe 12 through the medium of the hinged pipe joint 11 is connected to a fixed pipe 13 which extends downward and is connected by a pipe 14 which extends horizontally to a three-way valve 15.

The valve 15 opens and closes from the pipe 14 to a waste pipe 16 and also to a supply pipe 17 which in turn is connected to a horizontal valve 18 connected to pipe 19 to any suitable supply of water under pressure, such as public service or other constant water supply.

The three-way valve 15 is controlled by a valve stem 20 supported in a stand 21 amounting to what may be termed a hydrant.

This valve stand 21 is located in any desired position away from the garage and accessible to be reached and operated by the driver of the vehicle without getting out of his seat when he

will locate his car closely enough to this stand 21 which will permit him to reach out and operate the handle 22 of the valve stem 20.

On the stem 20 there is fixed a cam block 23 which moves a rod 24 extending to the valve 18 and connected to a valve block 25 which opens and closes the port 26 through which the rod passes. A spring 27 closes the port 26 by moving the block 25 toward the right when the cam block 23 permits such movement. This block 23 opens the port 26 at the periods desired when opening of the door D.

The valve stand 21 and its valve stem 20 are constructed to permit bending and yielding slightly when accidentally contacted without breaking the parts, which collision may happen when the vehicle is driven too closely to the stand 21. This flexible feature of stand 21 is indicated as a spring construction 28 in the body of the stand. The stem 20's flexibility is preferably made by a flexible tube or rod or by a universal joint in its body as desired.

To prevent the operation of the valve stem 20 by any but authorized persons there is provided a locking device of any suitable form operable by a key whose position is indicated by 29.

The mechanism of opening and closing the door is at all times in normal service controlled by the valve stem 20 in the stand 21. To prevent the door being operated otherwise and tampered with on the outside there is provided on the inside a locking means which holds the door closed save only when it is to be opened by the hydraulic means here shown. This locking mechanism is indicated by Fig. 6. A locking lever 30 is hinged at 31 to a bracket fastened to a block 32 fixed to the wall of the garage. A spring 33 releases the hook end 34 of the lever 30 over the arm 3 which supports the door. A projection 35 of the lever 30 abuts against the leg 10 of the bar 9, and thus no upward movement of the arm 3 can take place while the parts are in position of a closed door.

The leg 10, see Fig. 4, is embraced by a clevis 36 which is secured to the arm 3 and embraces the leg 10. A spring 37 is mounted between the arm 3 and leg 10 to keep those parts separated to the limit of movement permitted by the clevis 36.

When the tank 8 is loaded with water this weight causes a movement of the arm 9 and its leg 10 about the hinge 4 and compresses the spring 37 which brings about a movement of the leg 10 upward toward the arm 3, see Fig. 6, and when this movement has proceeded to clear the leg 10 from contact with the projection 35 of the lever 30, then a spring 33 moves the hooked end 34 off of the arm 3, and thus releases the locking down of the door.

The operation of the mechanisms is brought about by turning the valve stem 20 which opens the valves to allow water to flow into the tank 8 which when sufficiently loaded, its weight moves it down and swings the bar 9 downward and the leg 10 upward and thereby the arm 3 and its companion 2 carries the door about the hinge 4 to the open position of the door as indicated by Fig. 2.

To close the door the valve stem 20 is turned to cause the three-way valve 15 to close the pipe 17 and open the pipes 14 and 16 to discharge the water from the tank 8 out through the waste or drain pipe 16, whereby the door will move to close itself by gravity moving around the hinge

pin 4, thus restoring the position of Fig. 2 to that of Fig. 1.

In the tank 8 there is an outlet pipe 38 which outlet is closed by a ball valve block 39 which as the water rises in the tank when being filled floats up and closes the escape from the tank, but this closure does not take place until the tank is partly filled with water, and thereafter the block 39 acts to trap air in the tank which is then compressed by the incoming water. The purpose of the compressed air is to assist in starting a siphonic action in the pipe 13 when the door is to be closed. The compressed air in the tank is for a starting action only of the siphon which then completes the withdrawal of the water out of the tank 8, permitting gravity then to close the door as before described.

The valve 18 is provided for a prime closure or shut-off of the water from the water service supply and thus is an insurance against water escape and also to permit the cutting off entirely of the water system of the apparatus.

The modified form as indicated by Fig. 7 relates to the mounting of the water tank to operate the opening of the door in the arrangement wherein the tank 40 is supplied by a flexible tube 41 from the source of water supply, in the same manner of valve arrangements shown in Figs. 1 and 2. The tank 40 is connected by a flexible connection 42 trained over a curved arm 43 which is connected to arms 2 and 3 which support the door in the same position as that shown in Figs. 1 and 2.

The loading and discharging of the contents of the tank 40 actuates the opening and the closing of the door as previously described.

The modified form of Fig. 8 indicates a tank 44 connected by a flexible hose 45 to the water supply. The tank 44 is connected by a flexible member 46 which is trained over pulleys 47 and 48 and extends to and connected to a hinged block 49 hinged to the top of the door. A spring 50 holds the block upright in position shown by Fig. 1 normally when the door is closed. This serves to lock the door closed as in order to open the door it must be lifted upward and in doing this the block 49 will hit against a fixed block 51 fastened to the wall of the building and thus form a lock against opening the door.

When the door is opened by the movement of the tank 44 going down under load of water the flexible connection 46 pulls the block 49 clear of the block 51, see Fig. 8a, and this frees the locking feature of block 49. On return of the door to closure the block 49 is pulled to locking position by the spring 50.

When desired the hydraulic mechanism may be controlled to act for moving the door by mechanism that can be contacted by the wheel of the vehicle as indicated by Figs. 9 and 10. The wheel 53 contacts block 54 located at the surface of a driveway and is mounted on a spring 55 and is connected to a flexible member 56 mounted to slide within a tube 57. The tube 57 extends to the region of the valve stand 21 in any suitable manner, see Fig. 10, at which the member 56 is connected to a cross arm 58 which is mounted to move the valve stem 20 controlling the hydraulic action before described.

As desired the mechanism of Fig. 9 may be duplicated at another location so that in driving in the wheel may contact alternately the blocks 54 to cause the opening or closing of the door. In the arrangement of the duplicate mech-

anism of Fig. 9 then the flexible member will be connected at the left end of cross arm 58 as shown in Fig. 10.

What I claim is:

1. A door mounted to be lifted from vertical closed position to a horizontal position over the entrance by means of connecting arms extending to a hinge pin center around which the door swings in movement, a bar hinged on approximately the same hinge pin center as that of the said arms and extending on the opposite side of the said hinge pin center and a water tank mounted on the outer end of said bar, a water pipe connected to the said tank and connected to a hinge pipe connection located approximately to the same hinge pin center to which arms are connected, a fixed pipe for water supply connected to the said hinge pipe connection in combination with valves connecting the said fixed pipe to a source of water supply under pressure, said valves located outside of said door enclosure.

2. In a door mounting of the class described, wherein a door is moved from closed to open position by means of a tank of water moving downward under a load of water, hydraulic means for loading said tank with water and unloading the water therefrom, a three-way valve for controlling the circulation of the said water in the said means; in combination with a shut off valve interposed in the water supply pipe before its connection to the said three-way valve and means connected to the valve stem of the said three-way valve to operate the said shut off valve in the opening thereof and a spring arranged to close the said valve.

3. A door connected by arms to hinge pin centers located in the side walls of the room and positioned to carry the door as the same is moved around the said hinge pin centers from a vertically closed position to an upward horizontal open position, a locking lever hinged to the wall inside the room and adapted to engage one of the aforesaid arms and thereby hold the door closed, mechanism for actuating the door in opening composed of a water tank supported on a bar oppositely arranged from said arms as relates to the door and said bar hinged in relation to said arms and provided with an extending leg located along and asunder from one of said arms, a clevis holding said leg and bar in association of limited maximum distance from said arm, a spring interposed between said arm and leg and adapted to be compressed and permit the said leg to move toward the said arm and thereby release the said locking lever from the said arm to permit the said tank when loaded with water to move the door upward to open position.

4. In a door mechanism, hinged to be lifted

from closed vertical position to an upward horizontal open position above the entrance of the room, a water tank supported on a bar which is connected to the door and adapted to swing from an upright position to a downward location by being loaded with water and thereby move the door to open position, hydraulic means for loading and unloading said tank with water, a pipe in said tank open to the air and a valve in said pipe automatically closed by water as it fills said tank and this closure taking place before the tank is entirely filled with water to thereby trap an amount of air in the tank to be compressed by incoming water and thus store this compressed air to be released and assist in discharging water from the tank at the unloading position of said tank.

5. In a door mechanism, a door body, supporting arms for said body, said arms attached to the vertical edges of said door and extending back into the interior of the door inclosure and provided on their inner edges with bearings for being supported by hinge pins, hinge pins fixed inside the enclosure at the clear way of the vertical edges of said door body whereby said body is supported by the said hinge pins and adapted to be raised and lowered by being rocked about said hinge-pins as a center in opening and closing the said door, a counter balancing arm connected to said supporting arms and extending inwardly beyond the said hinge-pins centers and the inner end of this counter balancing arm connected to a counter balancing spring, a counter balancing spring fixed to the inner end of said counter balancing arm and extending to a connection in form to act in counter balancing the weight of the said door body; in combination with a bar mounted on one of said hinge-pins and extending upwardly and inwardly of said hinge pins on the opposite side of the pins from the location of the said door, a water tank mounted on the inner end of the said bar, a water pipe the upper end of which is connected to the said water tank and this pipe extending from the said tank to a hinged pipe connection and connected therewith, this hinged pipe connection located substantially in the axis of the said hinge-pins and a fixed water pipe connected to this hinge pipe connection, and said fixed pipe connected by valves to a source of water supply, the aforementioned bar on which said tank is supported connected to and associated with the said supporting arms for the door body whereby when said arms rock about their supporting hinge-pins the said bar and its connected tank move in like manner but on opposite sides of the said hinge-pins from the location of said door.

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