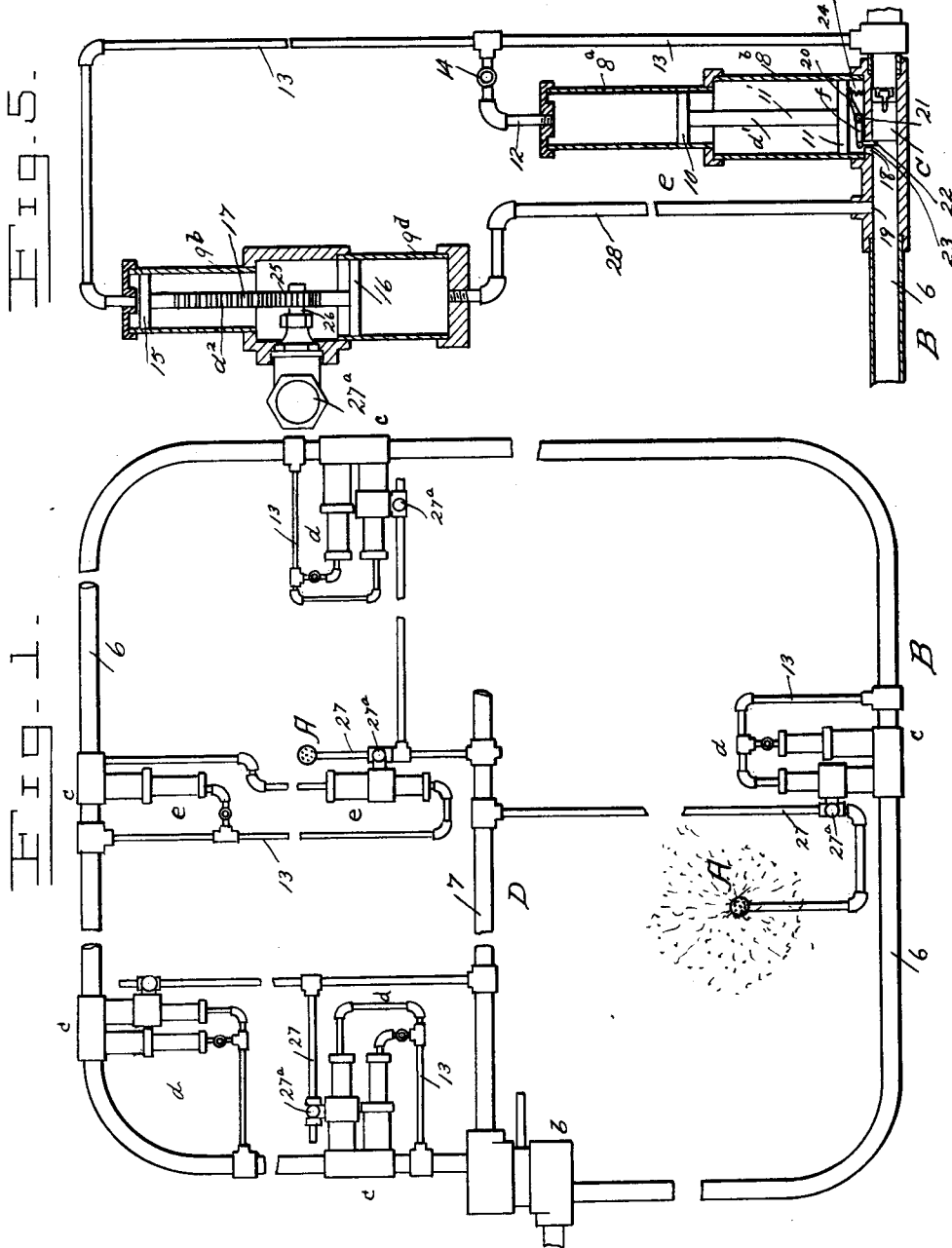


J. S. HADDEN & F. H. JOHNSON.
 SYSTEM AND MEANS OF CONTROL.
 APPLICATION FILED DEC. 26, 1914.

1,163,818.

Patented Dec. 14, 1915.

2 SHEETS—SHEET 1.



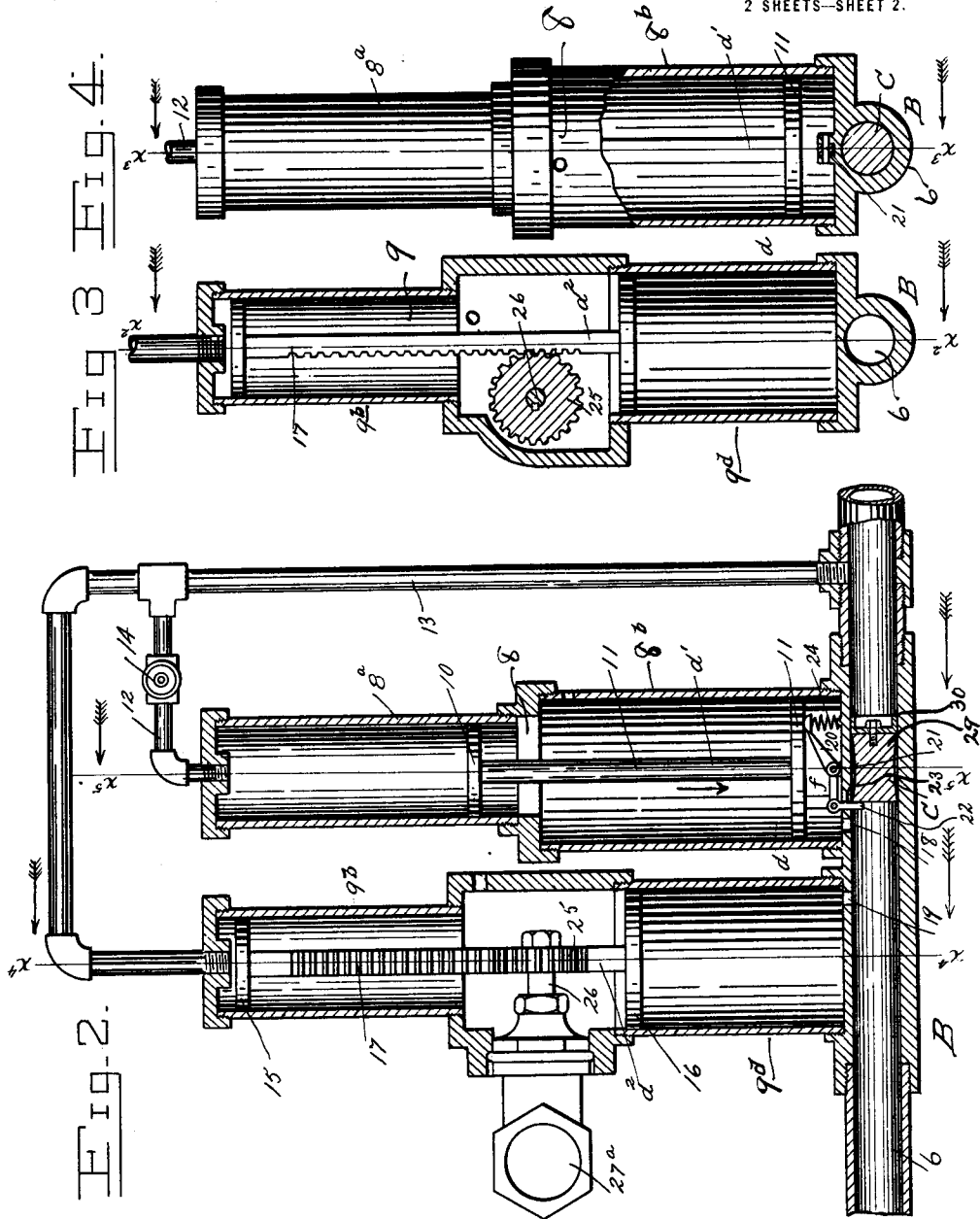
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UNITED STATES PATENT OFFICE.

JOHN S. HADDEN, OF HUNTINGTON PARK, AND FREDERICK H. JOHNSON, OF SOUTH PASADENA, CALIFORNIA, ASSIGNORS TO HADDEN AUTOMATIC SPRINKLER COMPANY, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

SYSTEM AND MEANS OF CONTROL.

1,163,818.

Specification of Letters Patent.

Patented Dec. 14, 1915.

Application filed December 26, 1914. Serial No. 879,163.

To all whom it may concern:

Be it known that we, JOHN S. HADDEN and FREDERICK H. JOHNSON, both citizens of the United States, residing at Huntington Park and South Pasadena, in the county of Los Angeles and State of California, respectively, have jointly invented new and useful Improvements in Systems and Means of Control, of which the following is a specification.

This invention relates to systems and means of control, and has for its object to provide improvements of this character which will be adapted for association with or coöperation with a wide range of apparatus, mechanisms and things, and for use in a wide range of service and in various and sundry arts and departments of industry, and whereby a traveling controlling member may successively operate upon, cause to be actuated, energize or set into play or activity a plurality of such apparatus or devices or things, all responsive to predetermined conditions relating to sequence or periodicity, and likewise with respect to the duration or action of the controlled devices or features.

The invention has certain features in common with that disclosed in another application for United States Letters Patent for systems and controlling means, filed by us July 16, 1914, Serial Number 851,379.

The present invention relates more particularly to improved features capable of utilization in a system or as means of control the general objects and purposes of which are set forth in said other application.

The present invention has for its object the provision of improvements of the character stated which will be superior in point of relative simplicity and inexpensiveness of construction and organization, convenience and facility in installation and operation and control, positiveness in action and reliability and durability, freedom from liability to get out of repair, and which will be generally superior in efficiency and serviceability.

With the above and other objects in view, the invention consists in the novel and useful provision, construction, combination, formation, association, relative arrangement and inter-relation of parts, members, elements, features and devices, all hereinafter

generally as well as particularly described, shown in the drawings and finally pointed out in claims.

In the drawing: Figure 1 is a plan view, partly diagrammatic, and partly broken away for convenience of illustration, of an improved system and means of control embodying the invention, and shown as utilized for the purpose of regulating the supply of water to a plurality of separate sprinklers for watering lawns and the like; Fig. 2 is an enlarged detail fragmentary horizontal sectional view through the features of the system and means shown in Fig. 1, and taken more particularly upon the lines x^2-x^2 and x^3-x^3 , in Figs. 3 and 4, and looking in the direction of the appended arrows, parts being in elevation; Figs. 3 and 4 are similar views taken on the lines x^4-x^4 and x^5-x^5 , Fig. 2, and looking in the direction of the appended arrows, parts being in elevation; and Fig. 5 is a view similar to Fig. 2 of a modified form of provision, construction, arrangement, association and inter-relation of parts and features.

Corresponding parts in all the figures are designated by the same reference characters.

Referring with particularity to the drawings, in which as stated, the invention is shown as adapted and applied for the purpose of controlling the supply and periods of supply of water to a plurality of lawn sprinklers A, B designates a circuit adapted to be traversed by a controlling member C, which controls a plurality of lawn sprinklers A, the latter being arranged in a series the members of which are disposed as desired, at different points from or in juxtaposition to the circuit B, and which are visited successively, or in accordance with the predetermined scheme or plan, by the controlling member C which sets the sprinklers into operation, causing such operation to be maintained for a predetermined period of time; and, after the lapse of such predetermined period of time such controlling member passes to the next of the series of sprinklers and causes the actuation of the same. It will be understood that a single one of the sprinklers might be provided upon such circuit B, to be operated by the controlling member C, as at a point remote from that at which the excursions of such member are controlled or initiated. The circuit B is

preferably a closed circuit, that is a circuit the ends of which are brought together at a common point or end station *b*. This end station merely serves to check the controlling member after it has once traversed the circuit, and provides for its transfer to the starting point in the circuit, or the starting end of the circuit, for a successive traverse of the circuit. Such an end station *b* is fully disclosed in the other application for Letters Patent initially hereinabove identified; and as it does not enter specifically into the present invention is not described or disclosed in detail herein or in the drawings. It is manifest that the controlling member might be manually transferred from the terminal end of the circuit to the initial end of the circuit. All of this is optional as far as the matter of the present invention is concerned.

The circuit B may consist of a pipe 6 or other conduit which is broken at the several stations *c* to include the controlling means, *d* in Figs. 1 to 4 inclusive and *e* in Fig. 5, whereby the respective sprinkler or the like A of such station is set into or thrown out of operation.

D designates fluid supply means for the circuit or conduit 6, and also for the several sprinklers A, and the same may consist of a water main 7 the coupling of which with the circuit and the sprinklers will be hereinafter described.

Referring to Figs. 1 to 4 inclusive, each controlling means *d* comprises a pair of two-part cylinders, 8 and 9, within each of which is mounted a reciprocatory or pulsating member, *d*¹ and *d*² respectively, the cylinder 8 and its member *d*¹ serving to determine the period through which the sprinkler or the like A is operated or permitted to operate through the agency of the cylinder 9 and the member *d*². Such cylinders and members therein are operated by the pressure of a fluid in the conduit 6 of the circuit B, as permitted by the controlling member in the traverse of such circuit. The direction of advance of the member C through or along the circuit B is indicated by arrows in the several figures. The cylinder 8 is provided with one part 8^a of preferably smaller diameter, and another part 8^b of preferably larger diameter, the member *d*¹ comprising pistons 10 and 11 respectively having working fits within said parts 8^a and 8^b and such pistons being joined by a stem or rod 11', the two pistons together constituting a differential piston device. The cylinder part 8^a is joined at its outer end by a pipe 12 with a controlling means service pipe 13 which is coupled to the circuit conduit 6 at a point ahead of the cylinders 8 and 9 in terms of direction of movement of the controlling member C. Said branch pipe is provided with a regulating valve 14 whereby the sup-

ply of fluid to the cylinder part 8^a may be regulated. The service pipe 13 likewise extends to the outer end of the cylinder part 9^b of the cylinder 9 which is smaller in diameter than the cylinder part 9^a of said cylinder; pistons 15 and 16 have respectively working fits in said cylinder parts 9^b and 9^a, such pistons being connected by a toothed stem or rack 17 constituting with such pistons 15 and 16 a differential piston device. The outer ends of the cylinder parts 8^b and 9^a respectively communicate with the conduit 6 by ports 18 and 19, such ports being farther advanced in the circuit B than the point therein at which the controlling member C cooperates with a temporary check device *f* which is released by the member *d*¹ or differential piston device, to permit the controlling member C to continue its traverse of the circuit B and admit fluid to the cylinder parts 8^b and 9^a through the ports 18 and 19 respectively, restoring the differential piston device *d*¹ to normal position for a further actuation of the control means *d*, and restoring the differential piston device *d*² to normal position after the same has put into operation one of the sprinklers A. The temporary check device *f* may consist of a spring pressed bell crank 20 pivotally mounted within the cylinder part 8^b, as at 21, and carrying at one end or upon one member a pivoted catch finger 22 adapted to play through an opening 23 in the conduit 6 so as to be normally opposed to the controlling member C in its path of traverse of the circuit B, to hold such member in the position above mentioned, during the operation of the remaining parts of the controlling means *d*, until the differential piston device *d*¹ has been forced in the direction indicated by the arrow in Fig. 2 to rock the bell crank 20 against the compression spring 24 which is applied to the same, and withdraw the trip finger 22 from the path of the controlling member C to release the same for a continuation of traverse of the circuit.

It will be understood that the differential piston device *d*¹ operates slowly, permitting fluid through the service pipe 13 to actuate the differential piston device *d*² so that its rack 17 may rotate a pinion 25 upon the end of a valve stem 26 of a valve 27^a applied to the branch pipe 27 from the water main 7 which supplies the respective sprinklers A. As soon as the check device *f* is tripped the controlling member, which has withheld fluid from the ports 18 and 19, passes such ports, admitting fluid into the cylinder parts 8^b and 9^a, to restore the differential piston devices *d*¹ and *d*² to normal positions, and actuate the valve stem 26 to shut off water from the respective sprinkler A by means of the valve 27^a.

In the modified form of construction shown in Fig. 5, the two cylinders 8 and 9

are provided, together with the attendant features disclosed in the other figures, pertinent to such cylinders and the differential piston devices d^1 and d^2 therein; together also with the service pipe 13 and its branch pipe 12 and controlling valve 14, but the cylinder 9 instead of being in juxtaposition to the cylinder 8 is spaced, as remotely as may be desired, from the cylinder 8, so that the valve 27^a controlling the sprinkler or the like may be remote from the circuit B or conduit 6 thereof, whereas the cylinder 8 is upon such circuit. In this modified form of construction, the cylinder 9 communicates with the conduit 6 through a pipe 28, at the outer end of the cylinder portion 9^a, such pipe opening into the conduit 6 in the place and stead of the port 19. The operation of this modified form of construction is the same as that of the other form of construction first described, the temporary check device f acting to retain the controlling member C, and being operated to release such member C, in the same manner as first described.

It will be understood that when pressure is admitted to the smaller cylinder part 8^a or 9^b, in either form of construction, the differential piston device will move because pressure is relieved from the larger cylinder part, being suspended by the controlling member C in the conduit; that as soon as the controlling member C is released from the check device f and passes the ports 18 and 19 or port 18 and the pipe 28, an equal pressure takes place in both parts of both cylinders, the differential piston device moving in response to the preponderance or over balance of pressure exerted upon the largest pistons 11 and 16.

In Fig. 1 one of the controlling means e is illustrated as installed in connection with the circuit B, so that view shows the application of both types of controlling means.

As soon as the piston device d^1 has left the check device f , the finger 22 of the latter is in position to again engage the controlling member C upon its next traverse of the circuit B for repetition of the phases of operation of the controlling means d or e . The controlling member C may comprise an elongated cylindrical and centrally contracted body 29 to one end of which is applied a packing ring or cup 30 whereby the controlling member has a fluid tight working fit within and to traverse the circuit B.

The regulating valve 14 permits the period of operation of the sprinkler or other device A to be varied, serving to vary the rate of flow of fluid through the branch pipe 12 into the cylinder 8.

The method of use, advantages and mode of operation of the systems and means of control will be readily understood from the foregoing description and statement, taken

in connection with the accompanying drawings.

The utilization of the invention enables one or more devices or mechanisms or apparatus to be automatically set into operation and automatically thrown out of operation, at a point or base more or less remote from the point of control of the member C, as at the end station b . This obviates the necessity of visiting the several stations c and manually or voluntarily causing and terminating the operation at such stations.

The entire system may be operated in response to the pressure of the same medium that is utilized in the several working stations, but this is of course only one specific form, and the specification and drawings disclose only one specific embodiment of the invention, which may be widely varied in its adaptability to varying conditions of use and service, in both construction, inter-relation and application of parts and features, all within a fair spirit of interpretation of the invention.

Having thus disclosed our invention, we claim and desire to secure by Letters Patent:

1. Improvements of the character disclosed, comprising an operable device, controlling means therefor, a controlling member, and means for causing the controlling member to independently visit said controlling means and cause the operation thereof; said latter means comprising a fluid circuit which the controlling member traverses under pressure applied to the fluid thereof; said controlling means comprising a pair of working chambers communicating each at one end with said fluid circuit, differentially acting parts within said working chambers, means operatively connecting one of said differentially acting parts with said operable device, and a temporary check device adapted to halt the controlling member within the circuit, said check device being subject to actuation by the other differentially acting part to liberate the controlling member.

2. Improvements of the character disclosed, comprising an operable device, controlling means therefor, a controlling member, and means for causing the controlling member to independently visit said controlling means and cause the operation thereof; said latter means comprising a fluid circuit which the controlling member traverses under pressure applied to the fluid thereof; said controlling means comprising a pair of working chambers communicating each at one end with said fluid circuit, differentially acting parts within said working chambers, means operatively connecting one of said differentially acting parts with said operable device, and a temporary check device adapted to halt the controlling member within the circuit, said check device being subject to actuation by the other differen-

tially acting part to liberate the controlling member; and a valve for regulating the flow of fluid to the working chamber the differentially acting part of which controls said temporary check device.

3. Improvements of the character disclosed; comprising an operable device, controlling means therefor, a controlling member, and means for causing the controlling member to independently visit said controlling means and cause the operation thereof; said latter means comprising a fluid circuit which the controlling member traverses under pressure applied to the fluid thereof; said controlling means comprising a pair of working chambers communicating each at one end with said fluid circuit, differentially acting parts within said working chambers, means operatively connecting one of said differentially acting parts with said operable device, and a temporary check device adapted to halt the controlling member within the circuit, said check device being subject to actuation by the other differentially acting part to liberate the controlling member; said latter differentially acting part comprising a differential piston device, and said temporary check device comprising a pivoted member provided with a part normally projecting within said circuit and being retracted from said circuit by engagement of said differential piston device with said pivoted member.

4. Improvements of the character disclosed, comprising an operable device, controlling means therefor, a controlling member, and means for causing the controlling member to independently visit said controlling means and cause the operation thereof; said latter means comprising a fluid circuit which the controlling member traverses under pressure applied to the fluid thereof; said controlling means comprising a pair of working chambers communicating each at one end with said fluid circuit, differentially acting parts within said working chambers,

means operatively connecting one of said differentially acting parts with said operable device, and a temporary check device adapted to halt the controlling member within the circuit, said check device being subject to actuation by the other differentially acting part to liberate the controlling member, said differentially acting part which is operatively connected with said operable device comprising a differential piston device having a toothed stem, and said operable device being provided with a pinion with which said toothed stem coöperates.

5. Improvements of the character disclosed, comprising an operable device, controlling means therefor, a controlling member, and means for causing the controlling member to independently visit said controlling means and cause the operation thereof; said latter means comprising a fluid circuit which the controlling member traverses under pressure applied to the fluid thereof; said controlling means comprising a pair of working chambers communicating each at one end with said fluid circuit, differentially acting parts within said working chambers, means operatively connecting one of said differentially acting parts with said operable device, and a temporary check device adapted to halt the controlling member within the circuit, said check device being subject to actuation by the other differentially acting part to liberate the controlling member; said operable device comprising fluid distributing means; and common means for supplying fluid thereto and to said circuit.

In testimony whereof, we have signed our names to this specification in the presence of two subscribing witnesses:

JOHN S. HADDEN.
FREDERICK H. JOHNSON.

Witnesses:

ALFRED H. DAEHLER,
TYCIE FULLEN.