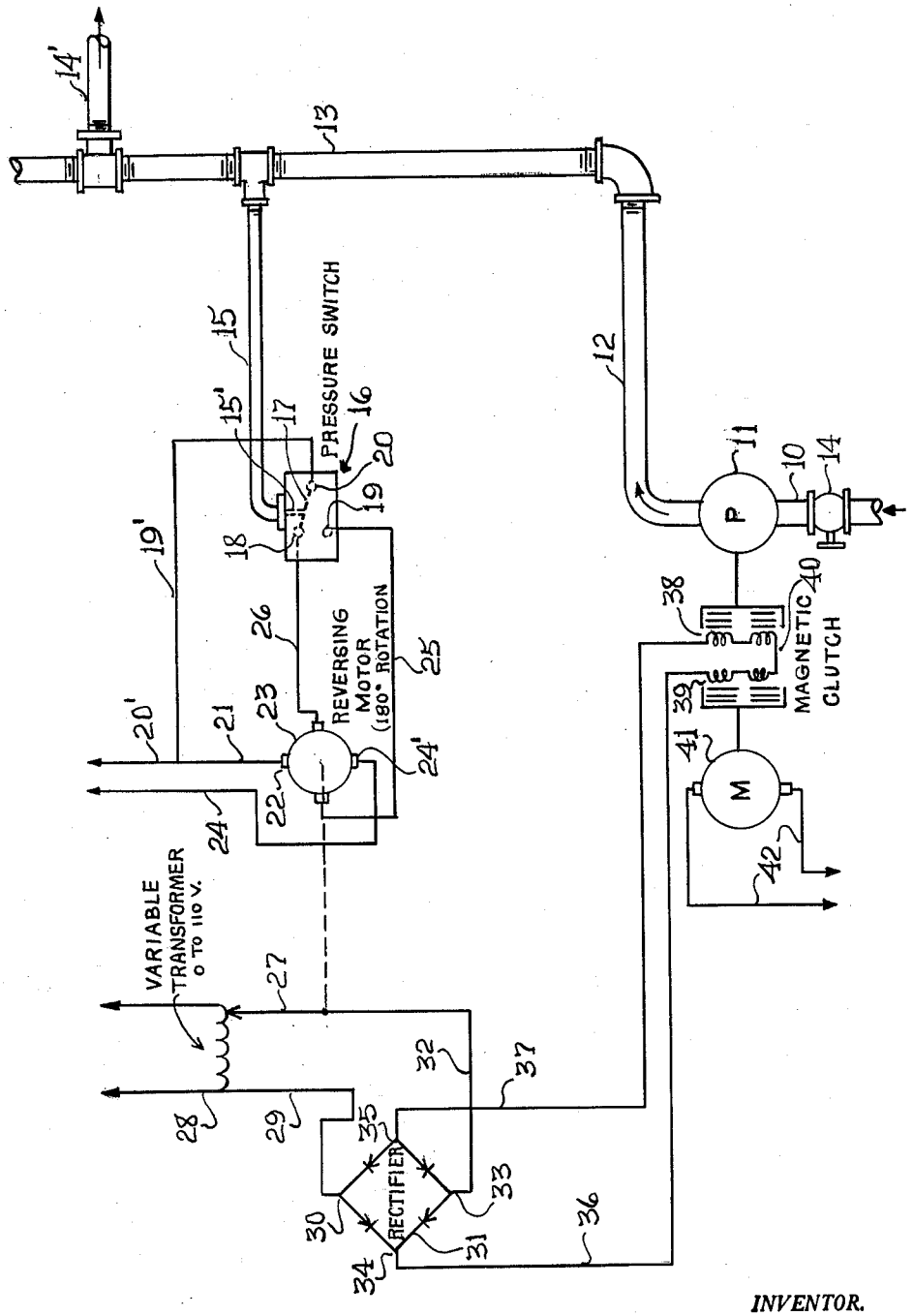
July 16, 1963 H. FINZEL 3,097,606

WATER BOOSTER SYSTEM

Filed Oct. 20, 1961



INVENTOR.
HERMAN FINZEL
BY Dhreedy & Dhreedy
HIS ATTORNEYS.

United States Patent Office 3,097,606 Patented July 16, 1963

3,097,606
WATER BOOSTER SYSTEM

Herman Finzel, Chicago, Ill., assignor to Weil Pump Company, Chicago, Ill., a corporation of Illinois

Filed Oct. 20, 1961, Ser. No. 146,515
1 Claim. (Cl. 103—23)

My invention relates to improvements in a water booster system especially designed for use in water systems for industrial, commercial and residential use, where there is a heavy drain upon the water system.

An object of my invention is to produce an economical and dependable system of boosting the available water pressure in a building and then maintaining a constant pressure throughout the system although the pressure at the source as well as the demand in the system is constantly changing.

Another and equally important object of the invention is to provide a control for the system which is completely pre-wired, pre-assembled, and arranged in a single cabinet containing all the components necessary to control the pump in the system.

Another and equally important object of my invention is to provide a control system which incorporates a simple, dependable and easily installed arrangement to prevent unnecessary operation and damage to the pump when demand is placed upon the system.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings showing the preferred form of construction, and in which:

The single FIGURE schematically illustrates the water booster system embodying my invention.

In this connection, **10** indicates a main water supply pipe leading to a pump **11** of any approved construction or design which will best serve the purpose. The output side of the pump **11** through the medium of a pipe **12** communicates with a header pipe **13**. Preferably there is incorporated in the main pipe **10** a suitable shut-off valve **14** which is normally open but which may be closed should occasion require. From the header pipe **13**, branch pipes **14'** extend to supply water to various points within the building.

At an appropriate point in the header pipe **13** is a pipe **15** which communicates with a pressure-responsive element **15'** of a proportioning pressure control switch **16** diagrammatically shown in the drawing and including a pressure operated switch blade **17** and contacts **18** and **19** adapted to be alternately engaged by the blade **17**. By a lead wire **19'**, the terminal **20** of the blade **17** is connected to a power line **20'**, which power line is connected by a line **21** to one terminal **22** of a reversing motor **23**, the other terminal **24'** of the motor being connected to a power line **24** leading to the other side of a source of supply. The reversing coils of the motor **23** are connected by lines **25** and **26** to the contacts **18** and **19**, respectively.

For reasons hereinafter set forth, the switch blade **17** is always in contact with either contact **18** or contact **19**. The arrangement is such that when there is a decrease in pressure, the pressure-responsive element **15'** will actuate the switch blade **17** in a manner well known in the art, bringing the blade **17** into contact with the contact **18** as shown to cause the motor **23** to rotate in a clockwise direction. When the pressure element is actuated due to an increase in pressure, the switch blade **17** will be moved from contact with the contact **18** into contact with the contact **19** and thereby cause the reversing motor **23** to rotate in a counterclockwise direction. The motor **23** is of the type which will rotate in a clockwise and counter-

clockwise direction through 180° for reasons which will presently become apparent.

The motor **23** operates a wiper arm **27**. This wiper arm **27** is part of a variable transformer **28** which has a potential of from zero to 110 volts. When the wiper arm **27** is moved to its highest point, or at the termination of the 180° rotation of the motor **23**, it will be in a 110 volt position, and when in its lower or zero position it will be at zero point (as shown). Thus, the voltage potential is varied from zero to 110 volts. The variable transformer **28** has connection by means of a line **29** to one terminal **30** of a rectifier **31**, which rectifier **31** is preferably what is known as a "bridge type." The wiper arm **27** by a line **32** is connected to a terminal **33** of the rectifier **31**. The positive and negative terminals **34** and **35** of the rectifier by lines **36** and **37** are connected to the coils **38** and **39**, respectively, of a magnetic clutch **40**. The clutch **40** is interposed between the pump **11** and a driving motor **41**, the latter having power supply lines **42**.

The motor **41** is a continuously operating motor operating at a constant rate of speed, and when employed in the water booster system embodying my invention, it is not subjected to the usual wear and tear which would result if it were required to stop and start in accordance with the decrease or increase of the water pressure in the water system. This I have accomplished by interposing between the motor **41** and the pump **11** the magnetic clutch **40** which controls the demand upon the pump **11** through the required pressure in the water system to maintain an available water supply. This control of the operation of the pump **11** is brought about by the components of my improved water booster system operating harmoniously in the following manner:

Assuming that the water pressure in the pipe **15** has decreased because of drain upon the header pipe **13** through the branch pipes **14'**: The pressure-responsive element **15'** of the proportioning pressure control switch **16** will move the switch blade **17** into contact with the contact **18**, resulting in the operation of the motor **23** in a clockwise direction, moving the wiper arm **27** likewise in such direction as, for example, from right to left as viewed in the drawing. The movement of such wiper arm will increase the voltage output of the transformer **28** so that the magnetic field of the magnetic clutch **40** is increased by creating stronger eddy currents. This results in an increase in the speed of operation of the pump **11**, with the result that the pressure in the header pipe **13** is increased. When the pressure in the header pipe is increased to that called for by the demand of water supply from the header pipe **13**, the pressure-responsive element **15'** will act accordingly and move the switch blade **17** into contact with the contact **19**, causing the motor **23** to rotate in a counterclockwise direction to move the wiper arm **27** in a like direction as, for example, from left to right as viewed in the drawing and thus decrease the voltage potential through the rectifier and to the field coils **38** and **39** of the clutch **40**, with the result that the magnetic field is decreased by reducing the eddy current. This results in the pump operating at a speed necessary to maintain the required pressure in the header pipe **13**.

As before stated, all the component parts of the system, including the proportioning pressure control switch, the reversing motor, the variable transformer, and the rectifier, can be assembled in a single control box. One of the features of my invention results from the fact that the entire system occupies a minimum of floor space, requires no booster or storage tanks or the starting and stopping of the pump driving motor, the components of the system are relatively few; they are economically operated and easily installed. When demand is made upon the water supply system there is no delay in its delivering, and the pressure at all outlets remains constant.

While I have illustrated and described the preferred from of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I therefore do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

A water booster system for industrial, commercial and residential use comprising a constant operating motor, a pump for delivering water from a supply main to a header pipe, an electromagnetic clutch providing connection between the motor and the pump, means responsive to variation of water pressure in said header pipe resulting from drain of water from the header pipe, for actuating said clutch to vary the speed of operation of the pump while the speed of operation of the motor remains constant, said means comprising a reversing motor having a degree of rotation of 180°, a variable transformer actuated by said reversing motor and in circuit with the clutch for varying the magnetic field thereof and having a

potential of zero to 110 volts, a rectifier having circuit connections with said transformer, a pressure-responsive switch for controlling the direction of operation of the reversing motor in response to variation of pressure in said header pipe, and a single conduit opening communication between the header pipe and said switch and through which water flows in opposite directions in response to the variation of water pressure in said header pipe.

References Cited in the file of this patent

UNITED STATES PATENTS

887,252	Jackson	May 12, 1908
1,012,821	Cutler	Dec. 26, 1911
2,093,981	Horton	Sept. 21, 1937
2,146,102	Weigand	Feb. 7, 1939
2,180,400	Coberly	Nov. 21, 1939
2,276,794	Ricci	Mar. 17, 1942
2,317,135	Crittenden	Apr. 20, 1943
2,408,851	Hillier et al.	Oct. 8, 1946
2,850,654	Jaeschke	Sept. 2, 1958
2,972,071	Leonard	Feb. 14, 1961
3,007,414	Long	Nov. 7, 1961