No. 707,967. Patented Aug. 26, 1902.

A. C. GRISCOM.

AUTOMATIC SWITCH FOR ELECTRIC PUMPS.

(Application filed Nov. 12, 1901.)

(No Model.)

Fig. 1.

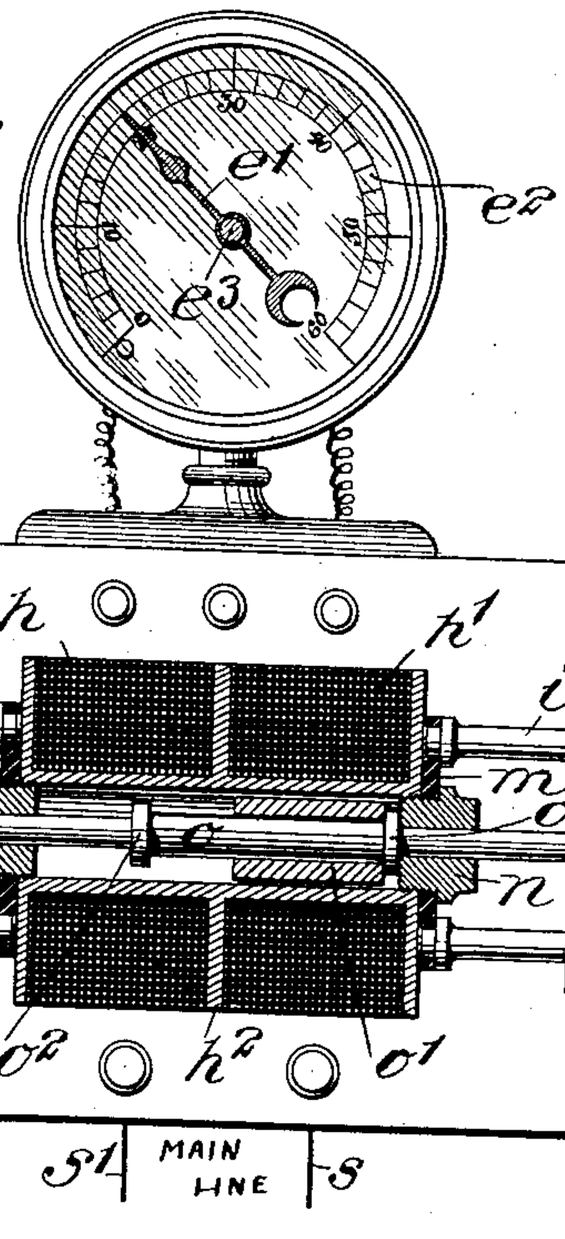
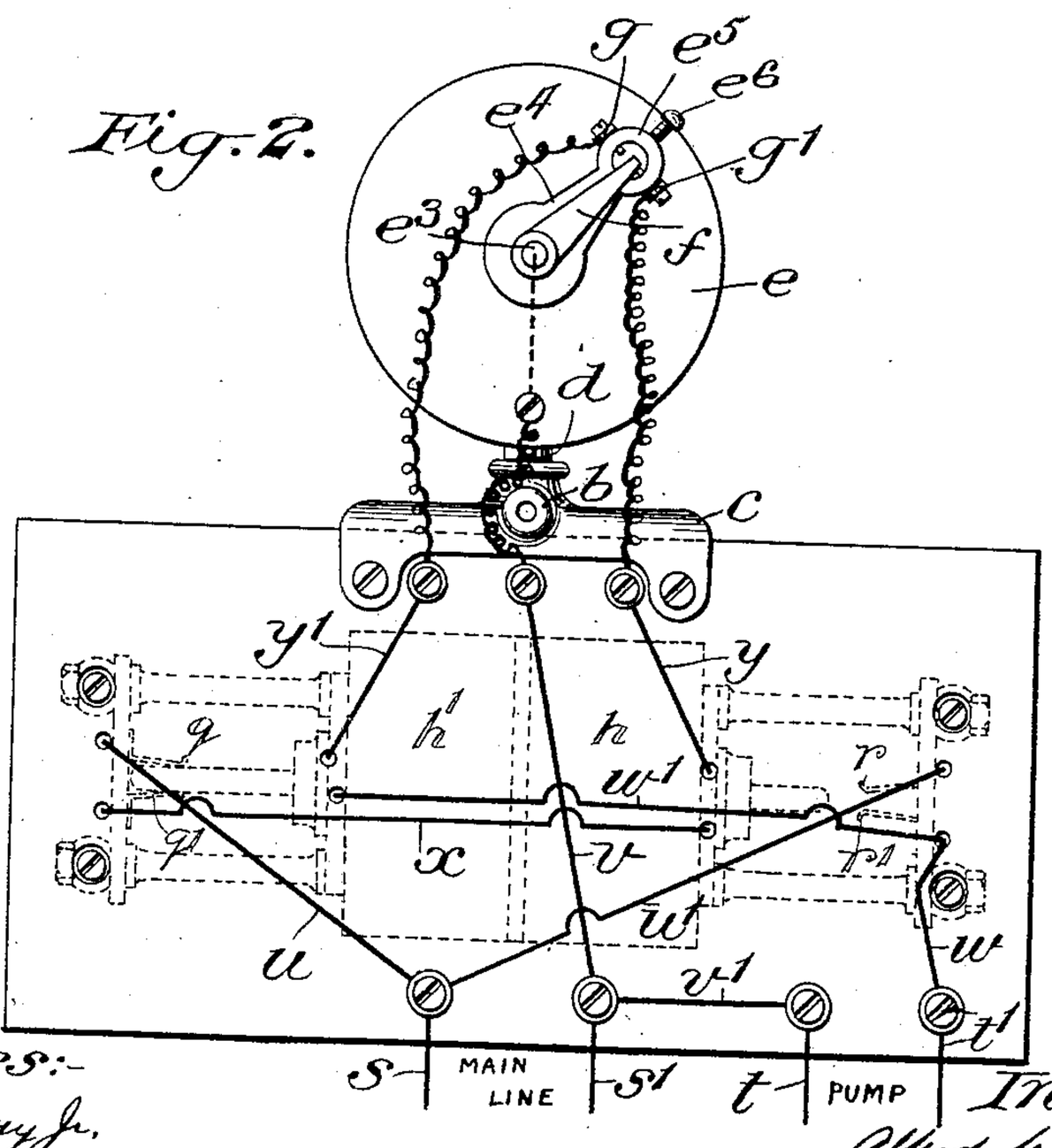


Fig. 2.



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AUTOMATIC SWITCH FOR ELECTRIC PUMPS.

SPECIFICATION forming part of Letters Patent No. 707,967, dated August 26, 1902.

Application filed November 12, 1901. Serial No. 81,983. (No model.)

To all whom it may concern:

Be it known that I, ALFRED C. GRISCOM, a citizen of the United States, and a resident of the borough of Manhattan, in the city and State of New York, have invented a new and useful Automatic Switch for Electric Pumps, of which the following is a specification.

My invention relates to an automatic switch for electric pumps, with the object in view of providing simple and effective means for maintaining the pressure in the reservoir or vessel supplied by the pump within very narrow limits of variation.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 is a view of the switch and its operating mechanism in front elevation, the solenoids being shown in section; and Fig. 2 is a rear view of the same.

a represents a plate, preferably of non-conducting material—such, for example, as hard rubber. It is here shown as oblong rectangular in form; but its shape may be changed at pleasure, as its purpose is simply to form a support for the several parts to be hereinafter described. The plate *a* may be provided with any well-known or approved means (not shown) for attaching it in the desired position relative to the vessel or reservoir in which the pressure is to be maintained by the pump controlled by the switch. As the pump and reservoir form no part of my present invention, they are not shown and may be of any well-known and approved form. For the purposes of my present invention the circuit connecting the pump is indicated by the word "pump," and the circuit leading to the main line for supplying electricity to the switch is denoted by the words "main line." The connection with the reservoir or vessel in which the pressure is to be maintained is made through a nipple *b* on the back of a clip *c*, fixed to the top of the plate *a* and provided with a tubular standard *d*, which forms a support for a pressure-gage *e* of well-known or approved form, the fluid being admitted to the interior of the gage through the nipple *b* and standard *d* to move the pointer e' of the gage over the dial-plate e^2. The central arbor e^3 of the gage, on which the pointer e' is fixed, is extended through the back of the gage, as shown in Fig. 2, either by making the arbor sufficiently long to project through or by attaching an extension to the said arbor, and a radial arm e^4 is mounted on said arbor and so close to the back plate of the gage as to produce a frictional contact sufficient to hold the arm e^4 against displacement during the rotary movement of the arbor e^3. The arm e^4 is provided with a head e^5, the side walls of which are spaced from each other to permit the free end of a vibrating contact-tongue *f* a limited movement between them. The vibrating contact-tongue *f* is fixed on the arbor e^3 to rotate together with the pointer e' of the gage, and its free end is in position to make contact with each of the two contact-pins *g* g', set in the opposite walls of the head e^5. The head e^5 is conveniently provided with a small screw e^6, tapped therein and extending slightly beyond the periphery of the gage for the purpose of swinging the arm e^4 and because of the engagement of the tongue *f* with either the pin *g* or g', at the same time swinging the tongue *f* and the arbor e^3 and pointer e' into position to set the pointer at the degree of pressure to be maintained. When so set, the arm e^4 will remain fixed in position until positively moved to some other predetermined degree, and the tongue *f*, together with the arbor and pointer e', will vibrate within the narrow limit between the contact-pins *g* g' as the pressure falls below and rises to the predetermined degree to be maintained. The contact of the tongue *f* with the pin *g* or pin g' serves to energize the one or the other of two solenoids or the one or the other section of a single solenoid to start and stop the action of the electric pump for maintaining the pressure in the reservoir to which the gage is connected, as follows: The solenoid for making and breaking the circuit for starting and stopping the action of the electric pump is conveniently formed in two sections (denoted by *h* h') wound on a single spool and separated by a central partition h^2. The opposite ends of the spool are provided with supporting-bars—in the present instance two bars—extending from each of its two opposite ends, those extending from one end being denoted by *i* i' and those from the opposite end

being denoted by $j\,j'$. These bars are fixed at their outer ends to short posts extending oppositely from the face of the plate a, those at one end being denoted by $k\,k'$ and those at the opposite end being denoted by $l\,l'$. The bars $i\,i'$ and $j\,j'$ are connected at their ends toward the end of the spool by a piece of insulated material m, forming a support for a central bearing n for supporting one end of the reciprocating core o. The rods or bars $j\,j'$ at the opposite ends of the spool support a piece of insulating material m', which in turn supports a bearing n', in which the opposite ends of the reciprocating core slide. At the outer ends of the bars $i\,i'$ and $j\,j'$ are pieces of insulating material $p\,p'$, respectively, which pieces of insulating material in turn support pairs of spring contact-jaws, those at one end being denoted by $q\,q'$ and those at the opposite end being denoted by $r\,r'$. The spring contact-jaws $q\,q'$ and $r\,r'$ are adapted to receive between them the outwardly-projecting ends of the core o, the said projecting ends of the core being rounded, and the outer edges of the jaws being turned outwardly for the purpose of causing the ends of the core to enter and force the jaws apart to insure a perfect contact.

In order to overcome the inertia of the reciprocating core o and also the friction between its opposite sides and the jaws with which it is engaged and at the same time keep the solenoid within moderate dimensions and resistance, I have provided a sliding auxiliary core o', which has a limited movement between the collars $o^2\,o^3$ on the core. This auxiliary core o' being perfectly free to slide on the core o will take the initiative as the one or the other of the solenoid-sections becomes energized, and by means of the momentum which it generates during its short quick movement it will strike the one or the other of the shoulders $o^2\,o^3$ on the core, giving the core o a quick impulse, as from the stroke of a hammer, sufficient to release it from the jaws $q\,q'$ or $r\,r'$, when its further and complete movement will readily take place under the influence of the energized solenoid-section.

The wires leading from the main line to binding-posts on the plate a are denoted by $s\,s'$, and those leading from the pump to binding-posts on the plate a are denoted by $t\,t'$. The wire s connects by branch wires $u\,u'$ with the jaws q and r, respectively. The wire s' connects by branch wires $v\,v'$ with the vibrating tongue f and with the pump-wire t, respectively. The pump-wire t' connects by wires $w\,w'$ with the contact-jaw r' and with one pole of the section h' of the solenoid. The contact-jaw q' connects by a wire x with one pole of the section h of the solenoid. The opposite poles of the sections h and h' of the solenoid are connected by wires $y\,y'$, respectively, with the contact-pins $g'\,g$ on the arm e^4 at the back of the gage.

The operation of the switch may be briefly described as follows: The gage having been set to maintain the pressure at twenty pounds, (20 lbs.,) as denoted by the pointer e', Fig. 1, and the pressure having fallen slightly below that amount, sufficient to bring the tongue f in contact with the pin g', the electric circuit has been completed from the pin g' to one pole of the section h of the solenoid, thence to the opposite pole of the solenoid, thence through wire x to the contact-jaw q', thence through the core o to the jaw q, thence along branch wire u to main wire s, thence back along wire s' and wire v to the vibrating tongue f and to the pin g', the point of starting. This will energize the section h of the solenoid, causing the auxiliary core o' to plunge against the shoulder o^2 on the core o and force the latter out from between the jaws $q\,q'$ and into engagement between the jaws $r'\,r$. This movement of the core o will break the circuit through the solenoid-section h by leaving a space between the jaws $q\,q'$, and, what is more important, will break the circuit between the vibrating tongue f and pin g', so that there will be no tendency for the contact at that point to burn out when the movement of the tongue f slowly away from the pin g' takes place, as will be hereinafter shown. This movement of the core o will, however, close the circuit through the pump, as follows: Beginning with main wire s, through branch wire u' to contact-jaw r, thence through core o now in contact with the jaws $r\,r'$ to jaw r', thence through wire w and t' to pump back to wire t, and wire v' to the other main-line wire s'. The action of the pump will continue until the pressure has reached the limit of twenty pounds, (20 lbs.,) to which the gage has been set, at which moment the tongue f will come into engagement with the pins g, thereby completing circuit through the section h' of the solenoid, as follows: from pin g through wire g' to one pole of the solenoid-section h', from the opposite pole of said section along wire w' to the jaw r', thence through core o to jaw r, thence along wire u' to main-line wire s, thence back through main-line wire s' and along wire v to the vibrating tongue f and to the contact-pin z. This will energize the section h' and move the core o, first moving the auxiliary core o', as before explained, away from the jaws $r\,r'$ and into engagement with the jaws $q\,q'$. By leaving the open space between the jaws $r\,r'$ the circuit through the section h' of the solenoid and through the contact-pin g' and vibrating tongue f will be broken, so that there will be no tendency to burn out its contact when the tongue f shall move slowly away from the pin g, and at the same time the circuit through the pump will be broken as it is completed through the jaws $r\,r'$, as above described. The pump will then stop until the pressure shall have fallen slightly below the predetermined amount—in the present instance, twenty pounds (20 lbs.)—just sufficiently below to bring the vibrating tongue f in contact with the pin g',

when it will again be started, as above described. It will be observed that the variation in the pressure will depend upon the distance the vibrating tongue *f* is permitted to move between the contact-pins *g g'*, and this may be made so small that the variation in the pressure will be almost imperceptible.

It is obvious that changes might be resorted to in the form, construction, and arrangement of the several parts without departing from the spirit and scope of my invention. Hence I do not wish to limit myself strictly to the structure herein set forth; but

What I claim is—

1. In combination, a main-line circuit, a pump-circuit, a pressure-gage, a solenoid and contact-pieces at the opposite ends of the solenoid, the core of the solenoid being so located with respect to the said contact-pieces that it will make circuit through one set and break circuit through another set at each movement of the core, thereby simultaneously making or breaking circuit through the pump and breaking circuit through the solenoid, substantially as set forth.

2. In combination, a main-line circuit, a pump-circuit, a pressure-gage, a solenoid and means under the control of the gage for energizing the solenoid and thereby making and breaking the pump-circuit, the said means comprising a vibrating tongue fixed to move with the gage-arbor, an arm for swinging the gage-arbor together with the vibrating tongue into any position within the limits of the gage and contact-pieces carried by the said arm for limiting the vibratory movement of the tongue in any position in which it may be set, substantially as set forth.

3. The combination with the reciprocating core of the solenoid, of an auxiliary core having a limited movement on the main core, substantially as set forth.

4. The combination with the solenoid, its core and yielding jaws for receiving the opposite ends of the core, of an auxiliary core having a limited initial movement along the main core for imparting a driving movement to the main core to release it from the contact-jaws, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 8th day of November, 1901.

ALFRED C. GRISCOM.

Witnesses:
FREDK. HAYNES,
HENRY THIEME.