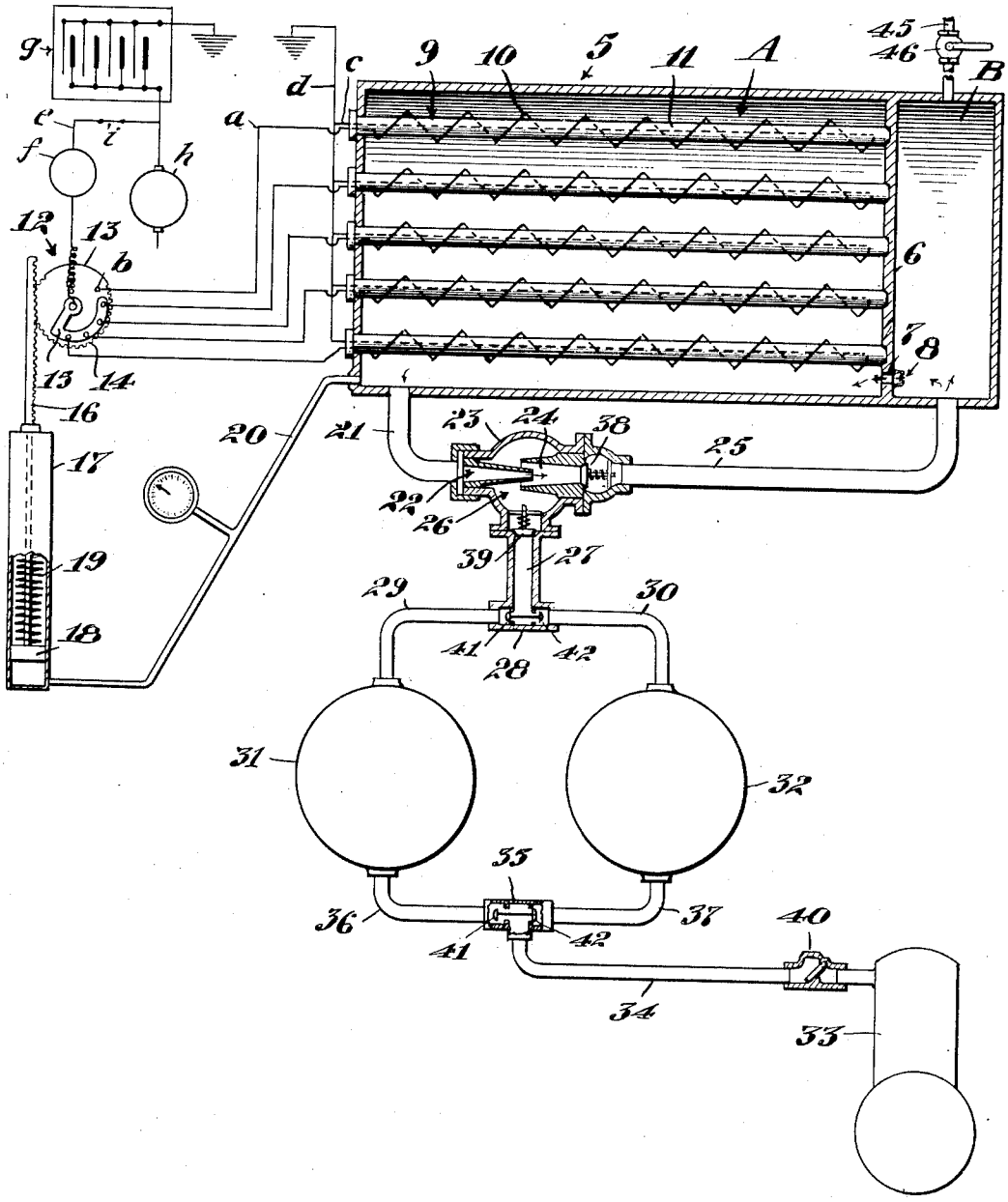
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FLUID PRESSURE GENERATOR

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FLUID-PRESSURE GENERATOR.

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This invention relates to an apparatus for generating fluid pressure for use in operating fluid pressure actuated mechanisms, and particularly pertains to a device for developing air pressure.

An object of the invention is to provide an apparatus in which compressed air may be subjected to the action of heat in a heating chamber to effect expansion thereof and thereby increase its pressure, and to provide a means for automatically feeding the compressed air to the heating chamber to displace air drawn from the chamber so as to maintain a supply of compressed air in the heating chamber.

Another object is to provide an automatic mechanism for varying the heating effect of a series of electrical heating elements in a combined heating and expansion chamber operable by variations of pressure in the chamber.

A further object is to provide a means whereby air under pressure in a reservoir may be inducted into a heating and expansion chamber containing air at a pressure exceeding that of the compressed air and operable by effecting reduction of pressure in the heating and expansion chamber.

With the foregoing objects in view, together with such other objects and advantages as may subsequently appear, the invention resides generally in the provision of a combined heating and expansion chamber containing a series of electrical heating elements controlled by a pressure actuated mechanism whereby electrical current may be directed through or cut off from one or more of the heating elements independently of the others, and in providing a source of compressed air communicating with the heating and expansion chamber through an injector operable on reduction of pressure in the heating and expansion chamber to effect induction of compressed air into said chamber.

The invention further resides in the parts and in the combination, construction and arrangement of parts hereinafter described and claimed and illustrated by way of example in the accompanying drawings, in which:

The figure is a diagrammatic view showing the apparatus with parts in vertical section.

Referring to the drawings more specifically, 5 indicates a combined heating and expansion chamber which is separated into two chambers A and B, by a wall 6 which wall is formed with a port 7 fitted with a check valve 8 arranged to open to the chamber A to afford a restricted communication between chambers A and B and normally closing the chamber B with respect to chamber A. A series of electrical heating elements 9 of any suitable number are arranged in the chamber A each of which elements embodies an electrical conductive and resistance wire 10 spirally wound in the form of a coil around an insulating core 11; one end of which wire connects with a conductor *a* leading from a contact point *b* on a rheostat 12 and the other end of which wire connects with a conductor *c* leading longitudinally through the core 11 and connecting with a conductor *d* leading to ground. The rheostat 12 is thus provided with a series of the contact points *b* connecting through separate conductors with the spiral heating elements 9. The contact points *b* are mounted on an oscillatory member 13 turnable on an axis 14 and is provided with a fixed segmental contact arm 15 with which the contact points *b* are moved successively in and out of electrical connection on oscillation of the member 13. The arm 15 connects with a conductor *e* connecting with a source of electrical supply through a transformer *f*; the source of electrical supply being here shown as comprising a battery *g* and an electrical generator *h* which may be of any suitable construction. The rheostat member 13 is formed with peripheral teeth which intermesh with a rack bar 16 extending into a cylinder 17 and fitted with a piston 18; a spring 19 bearing on the piston 18 and normally maintaining the rack bar in its lowermost position with the contact points *b* in electrical connection with the arm 15.

Leading from the chamber A and connecting with the lower end of the cylinder 17 below the piston 18 is a pipe 20 through which air under pressure is delivered from the chamber A to effect upward movement of the rack bar in opposition to the spring 19 so as to cause the contact points *b* to successively move out of electrical connection with the arm 15 and thereby cut off flow of such electrical current as air pressure in the chamber A increases and directing electrical current to one or more of the electrical heating elements.

Leading from the chamber A is a pipe 21 connecting with an injector nozzle 22 in an injector housing 23 which nozzle discharges into a throat 24 connecting with a pipe 25 leading to the chamber B. A chamber 26 in the injector housing, communicating with the throat 24, connects with a passage 27 connecting through an automatic double acting valve 28 with feed pipes 29 and 30 leading from a pair of compressed air reservoirs 31 and 32 to which reservoirs compressed air is delivered from an air compressor 33 through a discharge pipe 34 leading from the latter and connecting with an automatic double acting valve 35 from which leads conduits 36 and 37 communicating with the reservoirs 31 and 32. A check valve 38 is provided in the communication between the injector and the chamber B being here shown as arranged in the connection between the throat 24 and the pipe 25, which valve normally closes the throat 24 against back pressure from the chamber B. A check valve 39 is provided between the chamber 26 and passage 27 and normally closes the latter against back pressure from the injector. A check valve 40 is arranged in the pipe 34 between the reservoirs 31 and 32 and the air compressor 33 to prevent back flow of pressure from the reservoirs.

The valves 28 and 35 are complementary and each embody a pair of oppositely opening valve members 41 and 42 connected together by a stem 43 and are operable to alternately open and close the communications leading to and from the reservoirs 31 and 32; the valve member 41 in the valve 28 and the valve member 42 in the valve 35 being normally closed when the complementary valve members 41 in valve 35 and valve 42 in valve 28 are opened and vice versa.

Leading from the chamber B is a discharge pipe 45 fitted with a control valve 46.

In the operation of the invention, air under pressure is initially created in the chambers A and B by means of the compressor 33; the air flowing from the compressor being delivered through either of the reservoirs 31 and 32 and through the injector and into the chambers A and B wherein the air is trapped under pressure by the check valve 39.

On closing a switch *i* in the conductor *e* electrical current will be directed through the rheostat and thence through certain of the heating elements according to the contact points *b* positioned in electrical connection with the contact member 15, which is determined by the pressure of the air in the chamber A. The heating elements, through the coils of which electrical current is thus directed, will effect a heating action and thereby cause expansion of the compressed air in the chamber A, thus increasing its pressure. As this pressure increases the number of heating elements in operation will be diminished. Excess pressure thus developed in the chamber A will be transmitted to the chamber B through the pipes 21 and 25. On opening the valve 46 to discharge the air under pressure from chamber B reduction of pressure in this chamber will cause air to flow through pipe 21 and through injector nozzle 22 into the throat 24 and thence to the chamber B. The air flowing through the injector will act to induct compressed air from either of the reservoirs 31 or 32 into the chamber B thereby replenishing the air supply.

In event excess pressure is developed in the chamber B such pressure is vented through the check valve 8 in the chamber A.

By the provision of the automatic valves 28 and 35 air pressure may be inducted from the reservoirs 31 or 32 while a diminishing supply of air under pressure in the other reservoir is being replenished.

While we have shown and described a specific embodiment of our invention, we do not limit ourselves to the exact details of construction or arrangement shown but may employ such changes and modifications as clearly come within the meaning and scope of the appended claims.

We claim:—

1. In a fluid pressure generating device, a combined air heating and expansion chamber, a series of electric heating elements in said chamber, a source of electric current supply, means for directing electrical current from said source of supply to said heating elements, a source of compressed air supply, an inductor operable by the flow of air from said chamber to feed air from the source of compressed air supply to said chamber.

2. In a fluid pressure generating device, a combined air heating and expansion chamber, a series of electric heating elements in said chamber, a source of electric current supply, means for directing electrical current from said source of supply to said heating elements, a source of compressed air supply, an inductor operable by the flow of air from said chamber to feed air from the source of compressed air supply to said chamber, and means operable by variation of pressure in said pressure chamber for controlling the flow of electric current to the heating element.

3. In a fluid pressure generator, a combined heating and expansion chamber, electric heating elements therein, a source of electric current supply, a reservoir, an air compressor for delivering air under pressure to said reservoir, a connection between said reservoir and said heating and expansion chamber, a check valve in said connection

operable to close same under the urge of excess pressure on said chamber, an injector interposed in said connection between said chamber and check valve, and a valve controlled outlet for said chamber communicating with the discharge side of said injector.

4. In a fluid pressure generator, a heating chamber, a series of electrical heating elements therein, a chamber having a valve controlled outlet, a restricted port affording a communication between said chambers; a check valve in said port opening to the heating chamber, a pipe affording a second communication between said chambers, an injector in said pipe, a source of compressed air supply communicating with said injector, and means operable by variable pressure in the heating chamber for varying the heating effect in said heating element.

In testimony whereof, we hereunto affix our signatures.

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