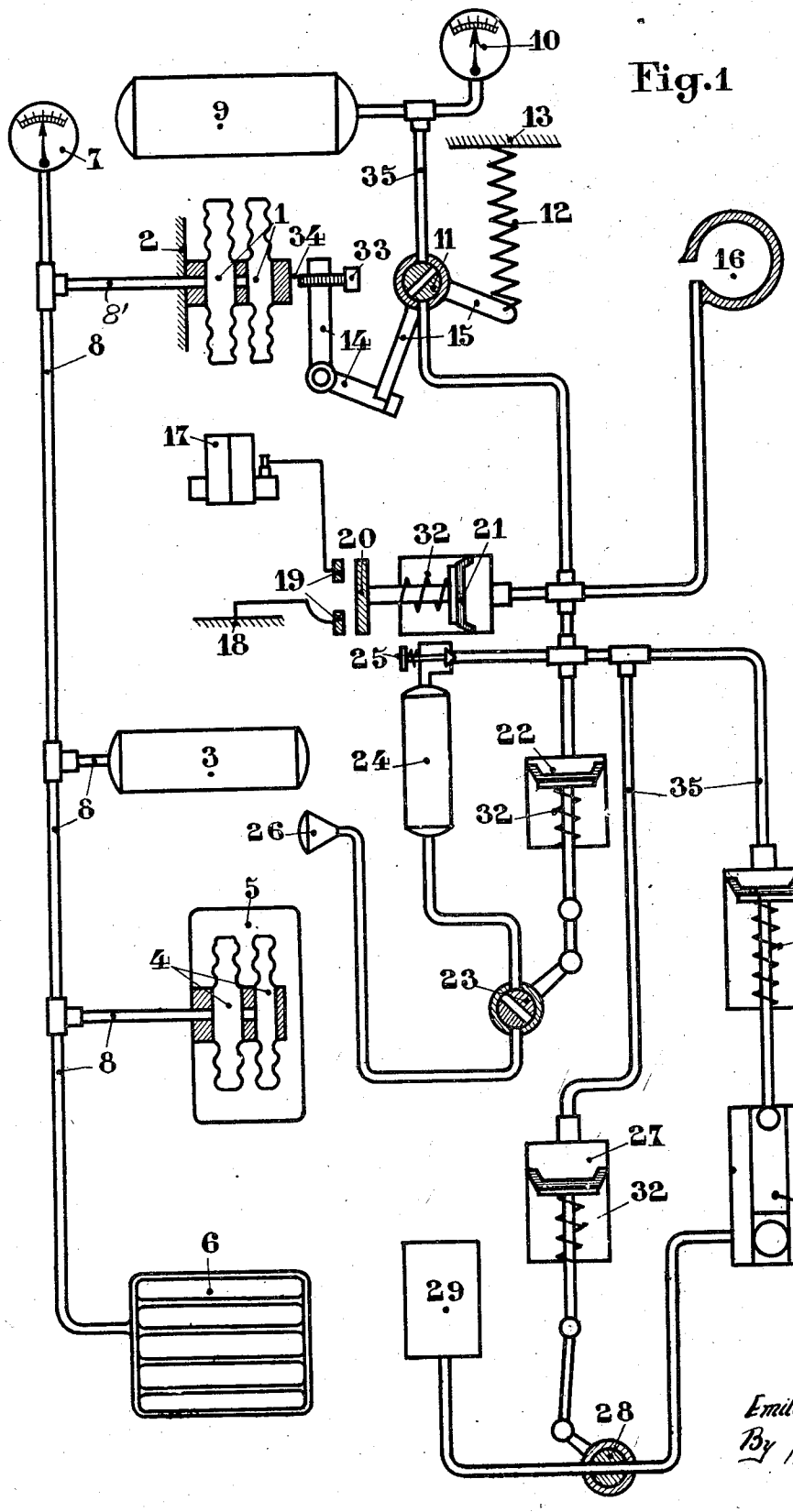
May 31, 1927. E. J. BECHARD 1,630,251

FIRE EXTINGUISHING AND LIKE APPARATUS

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Fig.1



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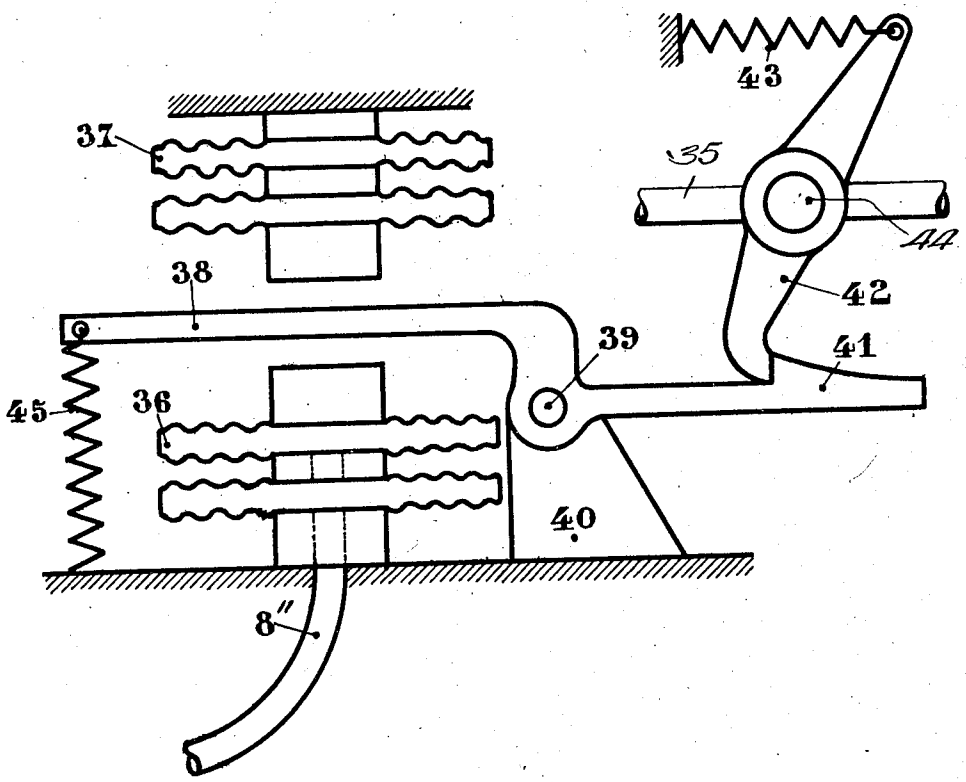
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FIRE EXTINGUISHING AND LIKE APPARATUS

Filed June 16, 1924 2 Sheets-Sheet 2

Fig. 2



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Patented May 31, 1927. 1,630,251

UNITED STATES PATENT OFFICE.

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FIRE-EXTINGUISHING AND LIKE APPARATUS.

Application filed June 16, 1924, Serial No. 720,461, and in France July 21, 1923.

This invention relates to a signalling apparatus and an automatic fire extinguisher for over-heating and fire, which can also be operated by hand.

The apparatus may also be actuated by a pressure in a tank or enclosure, such as the crank case of an engine, tanks for petrol, alcohol, petroleum and so forth.

In general in the case of fire, when the flames appear, the fire has already started as frequently the fire is caused by a more or less rapid heating, even without flames, due to heating, to an increase of pressure, to friction, to fermentation and so forth.

This apparatus permits of perceiving these various causes as soon as they are produced and thus acting upon the fire before it has actually obtained a hold.

When the cause of the fire acts upon the apparatus, the latter may first indicate an increase in pressure or temperature by actuating a whistle, a siren, or by closing the circuit of electric lamps or bells.

It may then discharge upon the cause of the fire, even before a warning thereof is given, an extinguishing liquid or powder such as those at present usually employed for such purposes.

Simultaneously the apparatus may also control all the apparatus or safety devices.

On an aeroplane or dirigible the apparatus may cut off the ignition by earthing the magneto, close the supply of petrol from the tank, and close the gas valves; the engines are thus stopped in three ways at the same time that the extinguishing substance is projected.

On a ship, having powder magazines, the apparatus may also give a signal in the case of abnormal temperatures, increase or reduce the circulation of refrigerants, close watertight doors, open sluice gates and so forth.

It may fulfil the same functions in storing chambers for coal or petroleum and in closed compartments containing substances which it is desired to protect from an increase in temperature no matter from what cause.

In magazines, warehouses, apartments and so forth the apparatus is employed very efficiently as a signalling device and as an extinguisher.

The apparatus is very easily adjustable between 45° and 200° C.

In order to operate at an increase of temperature, the apparatus utilizes the expansion of liquids or the pressure which is produced by the vapour of these latter when they are heated at a constant volume; the pressure which is produced drives off a portion of the liquid which, by passing through a tube, increases the volume of a resilient receptacle acting as a receiver.

This receiver may be a thermostatic element a coiled gauge tube, or a piston.

In order to operate on an increase in pressure the receiver will be the same but the collector is also a resilient enclosure which contracts under the action of pressure or shock, this contraction produces the expansion of the receiver.

The temperature collectors are of different shapes according to the position in which they are adapted to be placed.

On a pipe for gas or liquid the collector may be in the form of two concentric tubes, the expansible liquid being between these two tubes.

In tanks or enclosures it will be in the form of a cylinder.

In upholstery tapestry, magazines, substances subjected to heating or fermentation, in the vicinity of electric fuses, air intakes for carburetors, in apartments, it may be in the form of a grid or a lattice-work of tubes.

The invention also has for its object a modification of the device above described and according to this modification two thermostatic elements are combined in such a manner as to form a device for compensating the variation of pressure or temperature.

In the accompanying drawings are illustrated diagrammatically and by way of example only various forms of construction according to the invention and modifications thereof. In these drawings

Fig. 1 illustrates an installation of a suitable type for use on aeroplanes.

Fig. 2 shows the device for compensating the temperature or pressure.

In the form of construction of the invention shown diagrammatically in Fig. 1, the member 1 is a receiver which consists of two thermostatic elements; the number of elements depends upon the result to be obtained, the extensions being added away from the fixed point 2.

The member 3 is a cylindrical temperature collector which may be placed in the petrol tank, in the crank case or in the radiator.

The member 4 is a pressure collector which collapses when there is an increase in pressure in the enclosure 5, which may be the crank case of the engine or the petrol tank, for the purpose of avoiding explosions.

The member 6 is a collector in the form of a grid which may be placed around the air intake or the float chamber of the carburettor.

The gauge 7, graduated in degrees and in kilograms indicates at any instant to the pilot whether everything is safe of whether there is an abnormal pressure or heating.

The pipe 8 connects the collectors to the controlling apparatus and the pipe 8′ joins the pipe 8 to the receiver 1.

The tank 9 is filled with air or carbonic acid adapted to operate the signalling, extinguishing and safety appliances. The tank is so constructed that should the atmospheric pressure be reduced to zero, the pressure in the tank will be insufficient to exceed the limit of safety and the tank will not burst.

The gauge 10 indicates at any instant the contents of the tank 9.

The valve 11 serves to place the tank 9 into communication with the signalling, extinguishing and safety appliances.

This valve is operated by a spring 12 bearing upon the stationary point 13, when the bell crank lever 14, operated by the receiver 1 releases the bell crank lever 15.

The member 16 indicates a signalling whistle.

The member 17 represents the magneto which is earthed at 18 by the contacts 19 and the rod 20 when compressed air or carbonic acid from the tank 9 acts upon the piston 21.

22 indicates the piston and cylinder for operating the valve 23 for the extinguishing substance; this may be driven from the tank 24 by the contents of the tank 9 passing through the non-return valve 25.

The extinguishing substance is distributed at suitable points through nozzles, spraying devices or roses 26 suitably disposed as may be required.

27 indicates the apparatus for operating the valve 28 for the petrol contained in the supply tank 29, said valve which is normally open operating to shut off the supply to the motor in case of fire.

30 indicates the apparatus for operating the gas slide valve 31 which may be utilized to shut off the supply of combustible mixture from the carburetor to the motor and thus stop the operation thereof.

Springs 32 serve to return the various apparatus to their position for normal operation.

The screw 33 permits of adjusting the point or the temperature at which the apparatus is adapted to operate.

Between the receiver and the screw 33 a small amount of play 34 is left for variations which occur during normal operation.

If for example the apparatus is adjusted at 75° the receiver 1 may expand or contract without actuating the apparatus at temperatures below 75°.

Operation.—If there is an increase of temperature reaching the point to which the apparatus is adjusted in the members 3 and 6 or 6, or an increase in pressure in 5, or all simultaneously, the receiver expands and after passing through the distance 34 bears upon the lever 14 through the medium of the screw 33; the lever 14, by turning on its pivot, releases the bell crank lever 15 which is thus turned under the action of the spring 12 and opens the valve 11.

Air or other gas or liquid under pressure contained in the tank 9 flows through the pipes 35, earths the magneto by means of the members 19 and 20, opens the valve 23 of the extinguisher, shuts off the supply of petrol by means of the valve 28, shuts off the gas by means of the valve 31 and actuates the signal 16.

Each particular case of supervision or protection requires a separate arrangement but the principle of operation remains the same; the temperature or pressure of operation, the actuating liquid, air, carbonic acid, water or other bodies under pressure are the only parts which are varied.

Moreover by placing a stop-cock beyond the valve 11 the apparatus may be tested without interfering with the system.

The device for compensating ambient temperatures or pressures, which is shown diagrammatically in Fig. 2, enables the signalling and extinguishing apparatus to operate as a differential apparatus or even to annul the resultant effects of the variation of the atmospheric pressure with the altitude when the apparatus is mounted on an aerostat.

As shown in Fig. 2 this device comprises two sets of thermostatic elements 36 and 37; the elements 36 communicate with the temperature or pressure devices through the pipe 8; when they are varied under the action of an increase in temperature or pressure, for example are expanded, they raise the lever 38 pivoted at 39 on the support 40 and the projection 41 formed on an extension of the lever 38 releases the lever 42; the latter, under the action of a spring 43, turns on its pivot 44 and by this movement operates the valve 11 (Fig. 1).

The thermostatic elements 37, which are identical with the elements 36, are placed on the opposite side of the lever 38 in opposition to the elements 36. The element 37 can be filled with air at atmospheric pressure, at which time it acts simply as an altimetric corrector. This element 37 can

also be filled with the same liquid as the indicators if it is to act as a thermic corrector.

This device may operate in two different ways;

1. For altimetric correction or for correction of low atmospheric pressure. Under a constant external pressure, the boxes 36 expand as the internal pressure therein increases but the lowering of the external pressure equivalent to an increase of the internal pressure may cause the apparatus to operate at a certain altitude although there is no fire to extinguish; in all cases the reduction of the barometric pressure will have the effect of lowering the point of operation of the apparatus relatively to the adjustment made on the ground.

The device shown in Fig. 2 remedies this drawback; the elements 36 and 37 being placed in opposition, these two elements will expand to the same extent but in opposite directions; the forces produced by the action of the elements 36 and 37 will thus have a zero resultant so that the elements 36, which communicate with a temperature device or with the pressure receivers will always operate at the same pressure or temperature irrespective of the pressure or temperature of the surrounding medium.

The lever 38 can only oscillate at the moment when the difference between the pressures or the temperatures attains a value determined by the tension of the spring 45.

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

1. An apparatus for use on flying machines including a reservoir consisting of a plurality of expansible elements, devices capable of being placed in the crank case of the motor of the machine and in the gasoline tank thereof and adapted to be acted upon, respectively, by variations in temperature and pressure, means establishing communication between said devices and said reservoir, a tank for containing fluid under pressure, a valve controlling the outflow of the fluid from said tank, means operated by the expansion of the elements of said reservoir for actuating said valve, and fire extinguishing mechanism operated by the release of fluid from said tank.

2. An apparatus for use on flying machines including a reservoir consisting of a plurality of expansible elements, devices capable of being placed in the crank case of the motor of the machine and in the gasoline tank thereof and adapted to be acted upon, respectively, by variations in temperature and pressure, means establishing communication between said devices and said reservoir, a tank for containing fluid under pressure, a valve controlling the outflow of the fluid from said tank, means operated by the expansion of the elements of said reservoir for actuating said valve, and fire extinguishing and magneto grounding mechanisms both operated by a release of the fluid from said tank.

3. An apparatus for use on flying machines including a reservoir consisting of a plurality of expansible elements, devices capable of being placed in the crank case of the motor of the machine and in the gasoline tank thereof and adapted to be acted upon, respectively, by variations in temperature and pressure, means establishing communication between said devices and said reservoir, a tank for containing fluid under pressure, a valve controlling the outflow of the fluid from said tank, means operated by the expansion of the elements of said reservoir for actuating said valve, fire extinguishing and magneto grounding mechanisms both operated by a release of the fluid from said tank, and a signalling mechanism also controlled by said release.

4. An apparatus for use on flying machines including a reservoir consisting of a plurality of expansible elements, devices capable of being placed in the crank case of the motor of the machine and in the gasoline tank thereof and adapted to be acted upon, respectively, by variations in temperature and pressure, means establishing communication between said devices and said reservoir, a tank for containing fluid under pressure, a valve controlling the outflow of the elements of said reservoir for actuating said valve, and fire extinguishing mechanism, magneto grounding mechanism, signalling mechanism, and mechanism for controlling the supply of fuel from said gasoline tank, all of which mechanisms are actuated by the release of fluid from said pressure tank.

5. An apparatus for use on flying machines including a reservoir consisting of a plurality of expansible elements, devices capable of being placed in various parts of a machine and each exposed to and controlled, respectively, by variations of temperature and pressure, means containing an incompressible fluid for establishing communication between said reservoir and devices, a tank for containing fluid under pressure, a valve for controlling the flow of fluid from said tank, means normally holding said valve in closed position and actuated by the expansion of the elements of said reservoir to release said valve, and means for opening the valve when released.

6. An apparatus for use on flying machines including a reservoir consisting of a plurality of expansible elements, devices capable of being placed in various parts of a machine and each exposed to and controlled, respectively, by variations of temperature and pressure, means containing an incom-

pressible fluid for establishing communication between said reservoir and devices, a tank for containing fluid under pressure, a valve for controlling the flow of fluid from said tank, means normally holding said valve in closed position and actuated by the expansion of the elements of said reservoir to release said valve, means associated with said expansible elements for regulating the time of release of said valve, and means for opening said valve when released.

7. Apparatus of the character described comprising a receiver consisting of a number of collapsible and expansible chambers, devices exposed to variations of temperature pressure and fire, means of communication between said devices and said receiver, said means containing an incompressible fluid, a tank containing fluid under pressure, a valve for controlling the outflow of fluid from said tank, means normally holding said valve in the closed position, said means being adapted to be released on the expansion of the receiver, a compensating device including expansible and collapsible members, said expansible and collapsible members being adapted to counteract the expansion and contraction of the expansible and collapsible members constituting the receiver, and spring means for opening said valve when released.

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