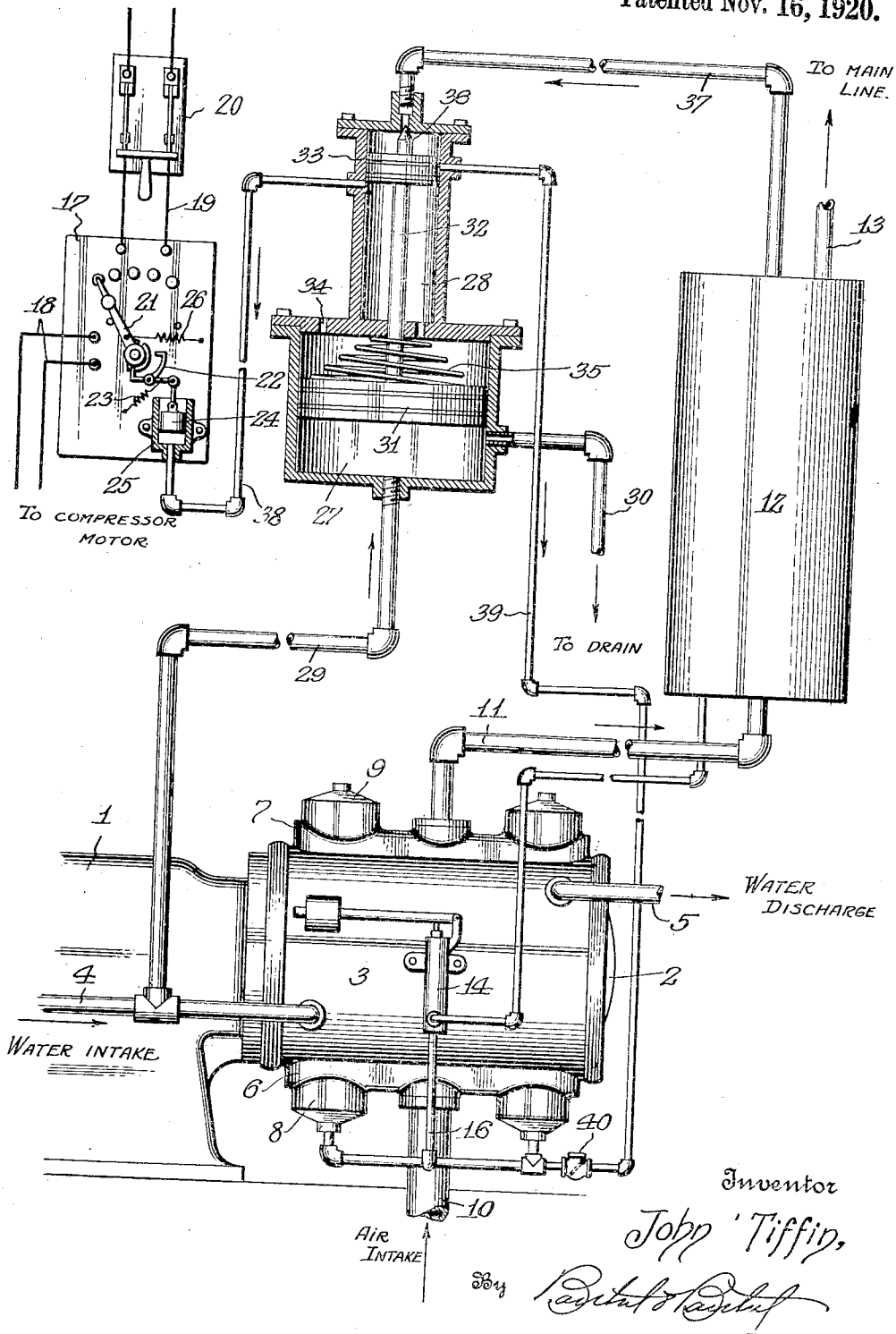
J. TIFFIN.

AUTOMATIC SAFETY DEVICE FOR AIR COMPRESSORS.

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1,358,798.

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AUTOMATIC SAFETY DEVICE FOR AIR-COMPRESSORS.

1,358,798. Specification of Letters Patent. Patented Nov. 16, 1920.

Application filed October 10, 1919. Serial No. 329,741.

To all whom it may concern:

Be it known that I, JOHN TIFFIN, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Automatic Safety Devices for Air-Compressors, of which the following is a specification, reference being had therein to the accompanying drawings.

Many air compressors are operated by electric motors controlled by switches and the air compressors cooled by the circulation of water or a cooling agent in jackets of the air compressors. Large plants require a great many air compressors which are often distributed about the plant and consequently there is considerable piping and a large number of valves so that the air compressors may be individually operated and controlled. Sometimes the bursting of water mains or pipes cuts off the supply of water to the compressor, then again, valves may be tampered with and the supply of water shut off. Whenever the supply of water is shut off to an air compressor whether the same be electrically or steam driven, the air compressing cylinder soon becomes overheated, burns out gaskets, liners, and other parts of the cylinder or valves associated therewith, and should there be any combustible matter on or adjacent the overheated cylinder fires are liable to occur.

The object of my invention is to provide a novel safety device for an air compressor embodying positive and reliable means, in a manner as hereinafter set forth, for placing an air compressor out of operation should the water supply to the jackets of the compressor be accidentally or intentionally shut off, and with such a device or valvular means associated with each air compressor or the main supply of water to a number of air compressors it is practically impossible for the air compressors to become overheated and cause trouble.

The above and other objects are attained by a mechanical construction that will be hereinafter specifically described and then claimed, and reference will now be had to the drawing showing the safety device, partly broken away and partly in section, as installed in connection with a portion of an air compressor.

In the drawing the reference numeral 1 denotes a portion of an air compressor having a cylinder 2 surrounded by a water jacket 3 and connected to said water jacket is a water supply pipe 4 and a water discharge pipe 5, these pipes permitting of water or similar cooling agent being circulated through the jacket 3 to prevent overheating of the cylinder 2. The cylinder 2 has manifolds 6 and 7 provided with valve housings 8 and 9 respectively, the valves within the housings 8 controlling the supply or intake of air from a pipe 10 to the cylinder 2, and the valves within the housings 9 controlling the outlet or discharge of air to a pipe 11 which is connected to a reservoir 12 having a main line pipe 13 to the various devices which utilize air under compression.

On the side of the water jacket 3 of the cylinder 2 is a pressure controlling or unloading device 14 connected by a pipe 15 to the reservoir 12 and by pipes 16 to the valve housings 8. The device 14 is set so as to prevent an excessive pressure of air in the reservoir 12 and should the pressure exceed the normal then the device 14 is actuated to establish communication between the pipes 15 and 16 and allow air from a reservoir 12 to exhaust into the manifold 6 where it may reach the atmosphere through the air supply or intake pipe 10.

All of the above elements are to be found in connection with the conventional form of air compressors, whether the same be operated by an electric motor or from a steam engine. Assuming, however, that the air compressor is driven by a motor there is a switch board 17 connected by wires 18 to the compressor motor and by wires 19 to a main manually actuated switch 20 in circuit with a suitable source of electrical energy. On the switch board 17 is a switch lever 21 that may be locked in an "on" or "off" position by a pivoted escapement or locking device 22 actuated in one direction by a spring 23 and in an opposite direction by air or steam pressure against a small piston 24 in a cylinder 25 mounted on the switch board 17. When the piston 24 is actuated and the switch lever 21 released from an "on" position, a spring 26 connected to the switch lever swings the same to an "off" position.

Contiguous to the air compressor of the reservoir 12 is a controlling device comprising a large cylinder 27 and a small cylinder 28, preferably constructed as a compound

cylinder or unitary structure. The large cylinder 27 is connected by a pipe 29 to the water supply or intake pipe 4 so that water will be admitted to one end of the cylinder 27 and may circulate therethrough by reason of an outlet pipe 30 connected to the same end of said cylinder. The water pressure within the cylinder 27 acts against a piston 31 therein and said piston has a rod 32 extending into the cylinder 28 and provided with a piston 33. That end of the cylinder 27 adjacent the cylinder 28 has air vents 34 and in the cylinder 27, about the piston rod 32, is a coiled expansion spring 35 adapted to shift the piston 31 when the water pressure against said piston is reduced or completely shut off.

The small piston 33 has a needle valve 36 controlling the communication between the cylinder 28 and an air pipe 37 connected to the reservoir 12 and the cylinder 28, intermediate the ends thereof, is connected by a pipe 38 to the cylinder 25 and by a pipe 39 to the pipes 16, the pipe 39 having an ordinary check valve 40.

Considering the operation of the controlling device, a cessation in the circulation of water through the large cylinder 27 permits the spring 35 to shift the piston 31 and the valve piston 33, so that the piston 33 opens the pipes 37, 38 and 39 to the cylinder 28. The pipe 37 is first opened admitting air to the cylinder 28 and when communication is established with the pipe 39 the air from the reservoir 12 passes through the check valve 40 and escapes through the manifold 6 and the air intake pipe 10, thus allowing the air compressor to idle, just as though the controlling device 14 had been actuated by an excessive pressure of air. Next, the piston 33 permits of the cylinder 28 communicating with the pipe 38 and air enters the cylinder 25, actuates the piston 24, releases the switch lever 21 from an "on" position, permits it to shift to an "off" position where it is locked. The current being cut off to the compressor motor causes the compressor to cease operating.

From the foregoing it is apparent that when the water supply to the air compressor is cut off that my device first causes the air compressor to idle and then shuts off the power to the air compressor. There is no sudden shut down and consequently parts of the compressor cannot be injured by a sudden action, and with the switch lever 21 locked in an "off" position there is no danger of the compressor motor being accidentally started. In other words, the attendant or inspector of air compressors will allow sufficient time to elapse so that an overheated air compressor may cool off and thus prevent an inrush of cold water to the jacket 3 of the cylinder 2 from fracturing the cylinder or causing an explosion. Many other advantages are gained by installing my device in connection with an air compressor, and it is obvious that the device may be used with other apparatus where a liquid or fluid supply is used. For this reason I do not care to confine my invention to the precise construction and arrangement of parts other than defined by the appended claims.

What I claim is:—

1. Means for preventing the overheating of an air compressor or apparatus utilizing a cooling agent, comprising means released by the absence of the cooling agent to release motive fluid from the compresssor or apparatus, and means controlling the power to the air compressor or apparatus and affected by released motive fluid from the air compressor or apparatus adapted to cause a cessation in the operation thereof.

2. Means as set forth in claim 1 wherein the first mentioned means causes the air compressor or apparatus to idle in advance of the cessation in the operation of the air compressor or apparatus.

3. Means as set forth in claim 1 wherein said controlling means is in the form of a piston released by the absence of the cooling agent, and a switch affected by the motive power of the air compressor or apparatus.

4. The combination of an air compressor, means controlling the operation of said air compressor, a reservoir to receive air therefrom, water supplying means to said air compressor for cooling purposes, pressure unloading means for the air compressor adapted to allow the air compressor to idle, and valvular means under constant pressure of the water supply means adapted when released by withdrawal of the water pressure to cause air from said reservoir to actuate said pressure unloading means and air from said reservoir to affect an operation of the controlling means of said air compressor to cause a shut-down thereof.

5. The combination set forth in claim 4 wherein the controlling means includes an automatically closed electric switch, locking means therefor to maintain the switch open, and a piston actuated by the air from said reservoir to release the switch locking means so that said switch may close and cause a cessation in the operation of said air compressor.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN TIFFIN.

Witnesses:
ANNA M. DORR,
KARL H. BUTLER.