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L. F. HOFFMAN

REGULATING MEANS

Filed May 15, 1922

2 Sheets-Sheet 1

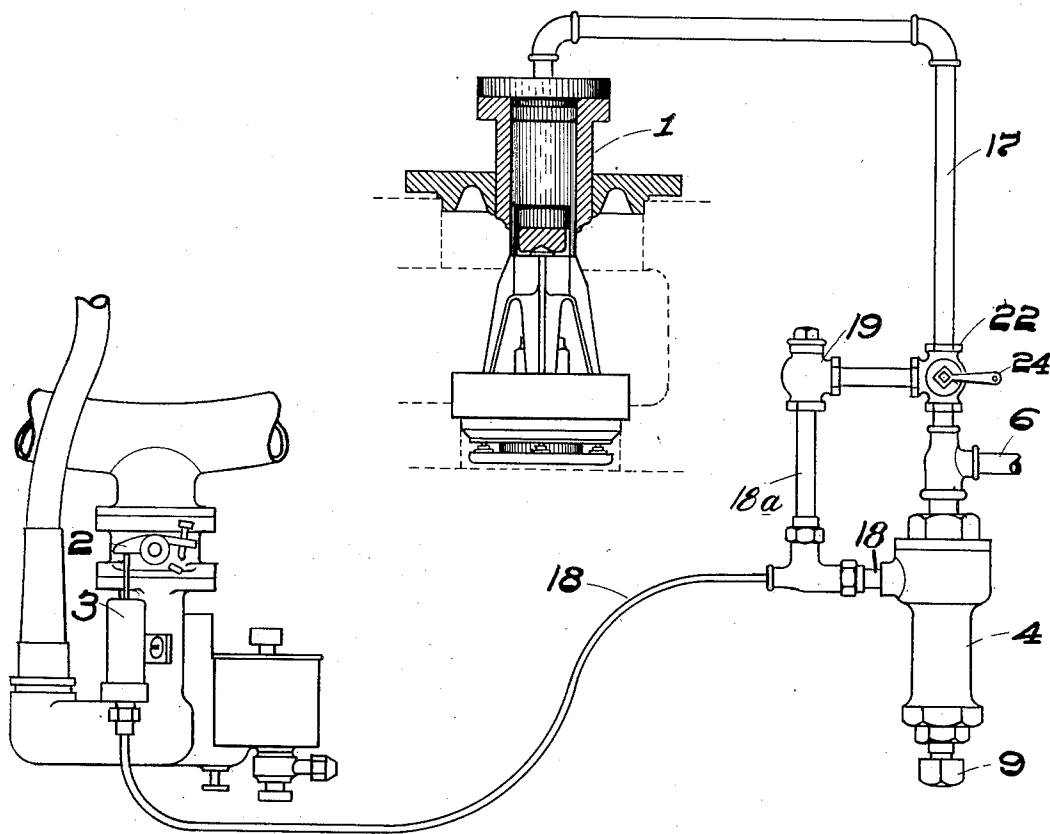


FIG. 1.

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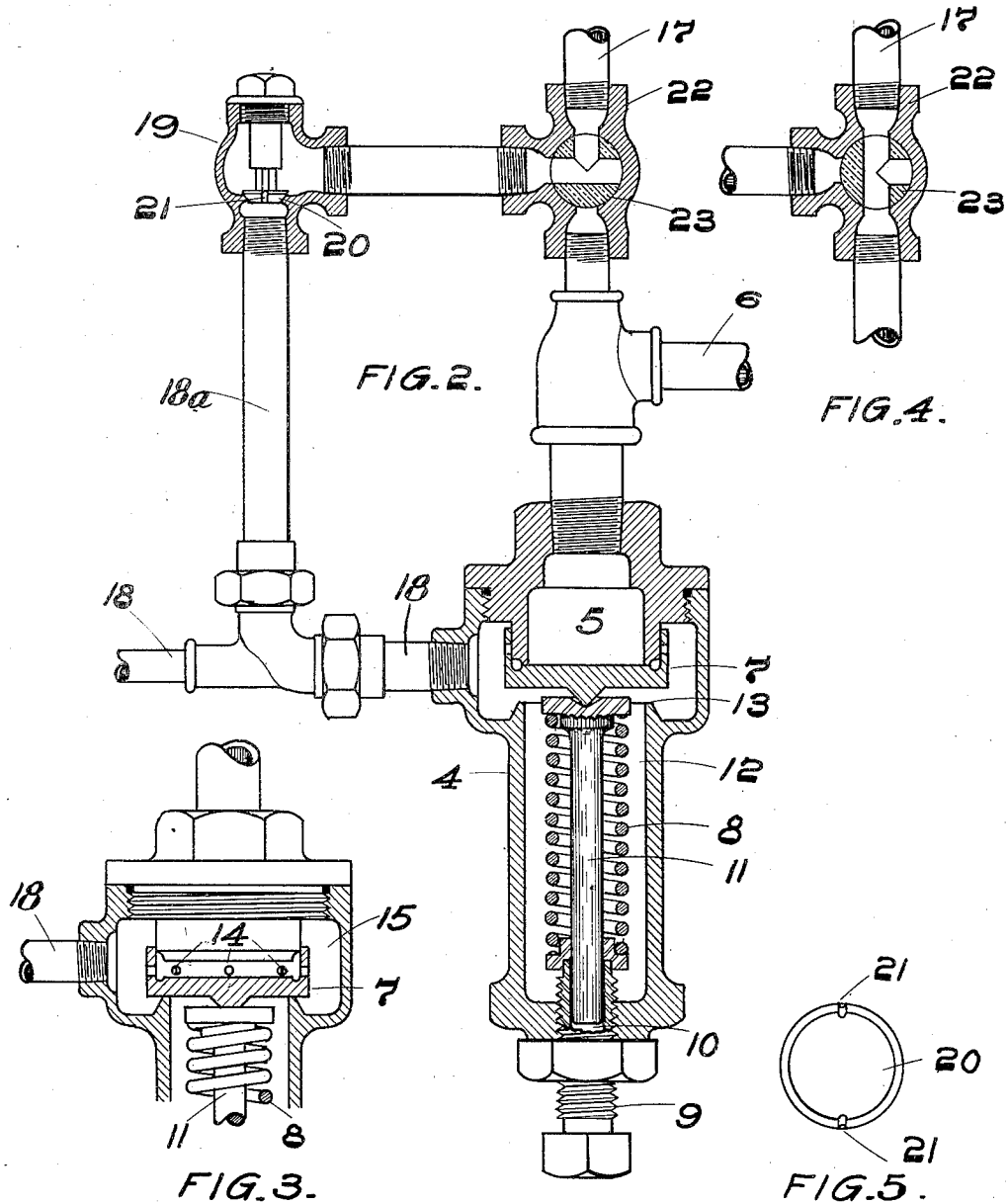
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UNITED STATES PATENT OFFICE.

LEON F. HOFFMAN, OF FRANKLIN, PENNSYLVANIA, ASSIGNOR TO CHICAGO PNEUMATIC TOOL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

REGULATING MEANS.

Application filed May 15, 1922. Serial No. 561,193.

To all whom it may concern:

Be it known that I, LEON F. HOFFMAN, a citizen of the United States, residing at Franklin, in the county of Venango and State of Pennsylvania, have invented certain new and useful Improvements in Regulating Means, of which the following is a specification.

The present invention relates to apparatus for supplying fluid under pressure, and more particularly to means for controlling the loading and unloading of the compressor and the throttling of its driving engine.

One of the objects of the invention is to provide control arrangement for apparatus of the type described having no complicated parts and few connections and adapted for selective operation. Another object is to control the compressor independently of its engine or alternatively to provide automatic control in response to receiver pressure for both compressor and engine with provision for speeding up the engine prior to the loading of the compressor. Other objects will be apparent from the detailed description which follows.

In the drawings which form a part hereof I have illustrated one way in which my inventive idea may be mechanically expressed, but said drawing is illustrative merely, and not restrictive.

In said drawing

Fig. 1 is a schematic view showing in a general way the arrangement and relation of the elements of my improved regulating device.

Fig. 2 is a side elevation, partly in section showing the main portion of my improved regulating means.

Fig. 3 is a section of the upper end of the air release valve.

Fig. 4 is a longitudinal section of the three way valve shown in Fig. 2, with its plug or stop turned to a different position.

Fig. 5 is an inverted view of the disc of a differential by-pass valve employed in my improved regulating device.

The construction shown in said drawings is substantially as follows:

The air compressor is supplied with any suitable form of unloader as 1. The throttle 2 of the engine is supplied with an actuating device 3. Air under pressure is supplied for the purpose of actuating said unloader 1 and said device 3 by separate conduits or

pipes 17 and 18 respectively from pipe 6 which communicates with the air in the receiver (not shown) into which said compressor is discharged. Suitable manual means such as a valve 22 is provided for controlling the passage of fluid under pressure to the unloader valve 1, while an automatic air release valve 4 controls the passage of fluid to the throttle actuating device 3.

The automatic control valve 4 has a chamber 5 in constant communication with supply pipe 6, the lower end of said chamber being closed by means of a yieldable air releasing valve 7, which normally prevents the escape of air from said chamber. Said valve 7 is yieldably retained in its closed position by means of a compression spring 8, the degree of compression of which may be regulated by the screw 9; said screw is tubular and provided throughout its full length with a hole 10 for the reception of the plunger or stem 11; the plunger is free to move longitudinally and its lower end fits loosely within said hole 10, and any air which enters the spring chamber 12 may escape around said stem through hole. When air in the receiver aforesaid reaches a certain predetermined degree of pressure, said valve 7 is forced downward to the position shown in Fig. 3 and its lower face seats upon the seat 13, thus permitting the release of air through the small ports 14 into the annular chamber 15; the air thus released passes into the pipe 18 and to said throttle actuator 3. When receiver pressure has become reduced, valve 7 is returned by said spring 8 to its seat, as in Fig. 2, and the air which has served to actuate said actuator 3 returns through the pipe 16 and vents to atmosphere through the hole 10.

Coordinated regulation of both the throttle actuating device 3 and the unloader 1 in response to pressure fluid admitted and exhausted by automatic control valve 4 is effected by the provision of a by-pass connection 18^a extending from conduit 18 at a point beyond automatic control valve 4 to conduit 17, joining the latter preferably through its manual control valve 22. This arrangement permits manual control of fluid into and out of conduit 17, for which purpose valve 22 has a plug 23 with a three way opening, as illustrated in Figs. 2 and 4, operated by a handle 24. With valve 22 disposed as shown in Fig. 2, control of both

the engine throttle 2 and the compressor unloader 1 is entirely automatic in response to the operation of the air release valve 4 which is in turn responsive to receiver pressure.

During automatic control of throttle and unloader simultaneous return of both to normal operative positions would place an excessive load upon the engine which might cause the latter to stall. To avoid such a result suitable means are provided for causing a differential passage of fluid in by-pass 18^a in opposite directions. Such means may take the form of an ordinary check valve 19, which is modified by providing the seating face of its disc 20—see Fig. 5—with small grooves 21 (or in any other way modifying said seating face) so that it will not wholly check the passage of air in the return direction, as the normal check valve would do, but will permit air to return very slowly therethrough. With the pipe 17, which communicates with said unloader, thus equipped, it will be readily understood that air passes freely to the unloader but vents back and out of the same very slowly thus causing said unloader to lag in its retraction from its unloading position. At the same time air vents back from the actuator 3 freely and permits the fuel throttle to open immediately so that the engine will resume its normal speed before the load is taken up.

From the above it will be clear that the manual control valve 22 in the conduit 17 extending to the unloader valve provides for selective control of the compressor either coordinately with the throttle device of the engine by receiver air automatically released by valve 4 (the engine being arranged to speed up before the load is applied) when valve 22 is positioned as shown in Fig. 2, or independently of the throttle device by air admitted directly from the receiver when valve 22 is positioned as shown in Fig. 4. Thus is provided a simple and convenient control arrangement whereby the engine may be operated without load whenever desired, as to permit it to warm up before work is started.

I claim the following:

1. In combination, an air compressor having an unloader valve, a driving engine for said compressor having a throttling device, separate conduits leading to said unloader

and to said device from the motive fluid supply for actuating the same, an automatic control device in said throttle conduit responsive to variation in the pressure of the motive fluid supply, a by-pass from said throttle conduit at a point beyond said control device to said unloader conduit, and means selectively to connect said unloader conduit with the motive fluid supply or with said by-pass.

2. In combination, an air compressor having an unloader valve, a driving engine for said compressor having a throttling device, separate conduits leading to said unloader and to said device from the motive fluid supply for actuating the same, an automatic control device in said throttle conduit responsive to variation in the pressure of the motive fluid supply, a by-pass from said throttle conduit at a point beyond said control device to said unloader conduit, said by-pass being constructed and arranged to pass motive fluid freely toward said unloader but to resist its passage in the opposite direction, and manually controlled means for selectively connecting said unloader conduit directly with the motive fluid supply or indirectly with the latter through said by-pass and automatic control device.

3. In combination, an air compressor having an unloader valve, a driving engine for said compressor having a throttling device, separate conduits leading to said unloader and to said device from the motive fluid supply for actuating the same, an automatic control device in said throttle conduit responsive to variation in the pressure of the motive fluid supply, a by-pass from said throttle conduit at a point beyond said control device to said unloader conduit, an imperfectly seated check valve in said by-pass permitting free passage of motive fluid toward said unloader, and a manual control valve for selectively connecting said unloader conduit directly with the motive fluid supply or indirectly with the latter through said by-pass and automatic control device.

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

LEON F. HOFFMAN.

Witnesses:

R. D. DORWORTH,
R. P. COWIN.