

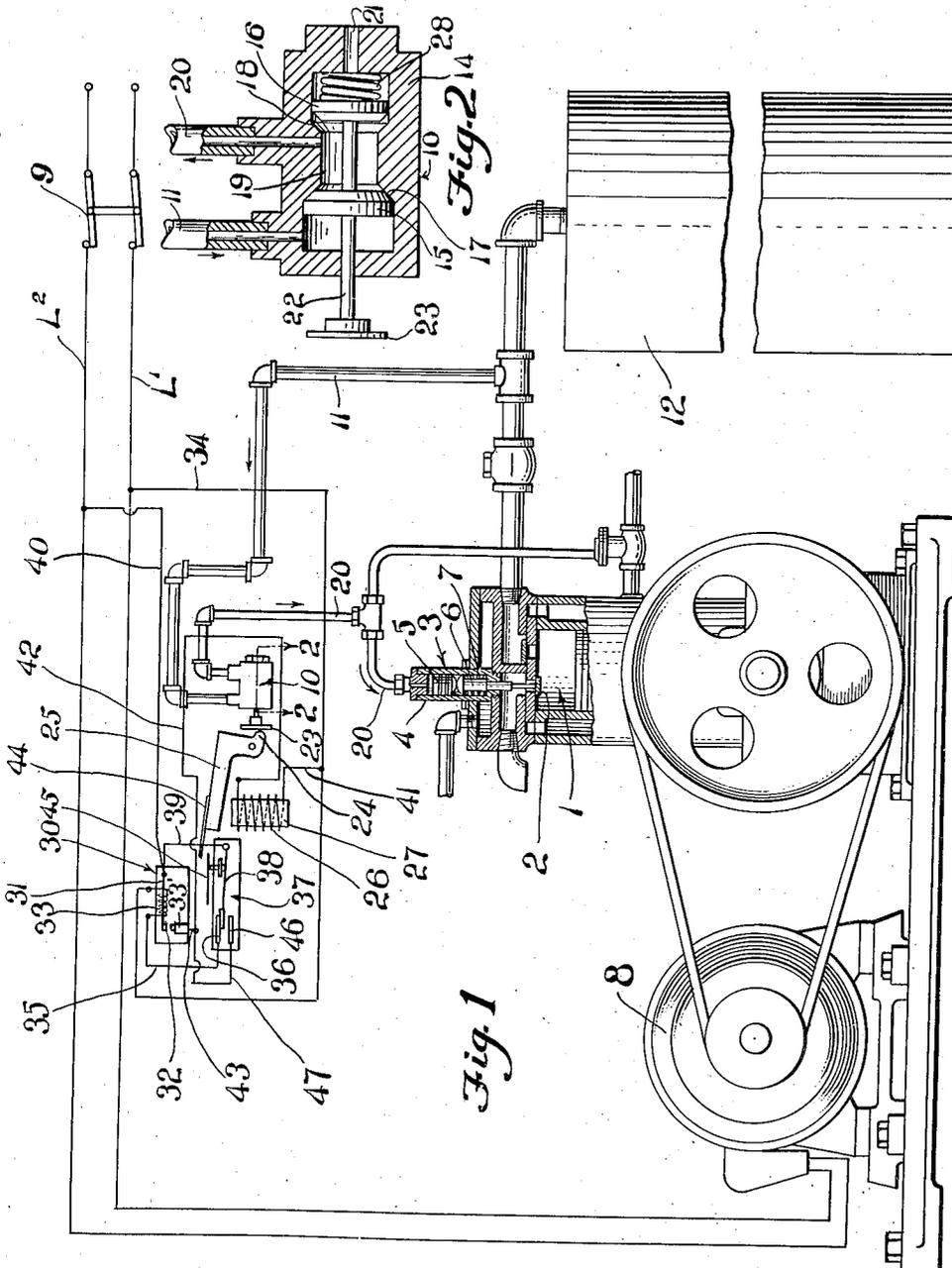
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COMPRESSOR UNLOADER

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COMPRESSOR UNLOADER

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1 Claim. (Cl. 230—31)

This invention relates to unloaders for com-
pressors and a general object of the present in-
vention is to provide a simple, practical, and posi-
tive loading and unloading mechanism for air
or gas compressors, which will be positive in
action and will unload the compressor upon the
cutting off of operating power thereto and will
load the compressor upon the cutting in of op-
erating power.

An object of the present invention is to provide
in an unloader mechanism for compressors ther-
mal time delay means which will provide a time
interval between the starting of the compressor
and its loading, thereby allowing the compressor
and its operating motor to reach full speed before
the load torque is imposed.

With these and other objects in view, as may
appear from the accompanying specification, the
invention consists of various features of construc-
tion and combination of parts, which will be first
described in connection with the accompanying
drawing, showing a compressor unloader embody-
ing the invention, and the features forming the
invention will be specifically pointed out in the
claims.

In the drawing:

Figure 1 is a diagrammatic view showing the
improved unloading and loading mechanism in
diagram and showing a part of the compressor
in section.

Figure 2 is a longitudinal section through the
valve which controls the loading and unloading
of the compressor and is taken at right angles
to the line 2—2 of Figure 1.

Referring more particularly to the drawing the
improved unloading mechanism is shown as used
in connection with a single cylinder compressor
1 which is unloaded by the holding open of the
suction valve 2 by the pressure operated mecha-
nism 3, all of which is standard construction in
present day commercial use. However it is to be
understood that the unloading mechanism may
be used in connection with any type of compressor
and any type of unloading means as desired with-
out departing from the spirit of the present in-
vention; the type of compressor shown in the
drawing is merely as an illustrating example.

The pressure operating mechanism 3 com-
prises a cylinder 4 in which is mounted a piston
5. The piston 5 acts on the plunger 6 so that
when pressure fluid is admitted to the cylinder
4 behind the piston 5 it will force the plunger 6
downwardly and hold the suction valve 2 open,
permitting the compressor 1 to operate in a com-
pletely unloaded condition. When the pressure

is relieved behind the piston 5 the spring 7 forces
the piston 5 and plunger 6 outwardly, relieving
the pressure on the suction valve 2 and permit-
ting the compressor to operate in normal loaded
condition.

The compressor 1 is operated by an electric
motor 8 which receives its energizing power
through the power lines L¹ and L². A switch 9
is interposed in the power line for controlling
the energizing and deenergizing of the motor 8.

The loading and unloading mechanism com-
prises a control valve structure 10 which is con-
nected through suitable piping 11 with the re-
ceiver 12 for providing air or gas under pressure
for operating the unloading mechanism 3. The
valve 10 comprises the valve housing 14, in which
is mounted the two valves 15 and 16, co-operat-
ing respectively with valve seats 17 and 18. The
pressure fluid supply pipe 11 opens into the bore
19 of the valve housing 14 near one end and out-
wardly of the valve 15, while the pipe 20 which
conducts the operating pressure fluid to the valve
actuating mechanism 3 opens into the bore 19
between the valves 15 and 16.

With the valves 15 and 16 in the positions
shown in Figure 2 of the drawing, the portion
of the bore 19 between the valves 15 and 16 is
opened to atmosphere through the exhaust pas-
sage 21 and the pressure fluid bleeds from the
valve actuating mechanism 3 back through the
pipe 20 and to atmosphere, permitting the spring
6 to act for relieving the pressure on the valve
strip 2 at which time the compressor is operating
in a loaded condition. When the valve 16 is
seated and the valve 15 is off its seat the pressure
fluid passes around the valve 15 through the bore
19 outwardly through the pipe 20 to the valve ac-
tuating mechanism 3 and holds this valve open.
The valves 15 and 16 are connected for movement
in unison by a stem 22 which has a contact disk
23 on its outer end. The contact disk 23 is en-
gaged by the button or knob 24 on the pivot lever
25. The pivot lever 25 is moved by the energiz-
ing of the electric coil 26, being attracted by the
magnetic action of the coil into engagement with
the core 27 and when it is so moved it actuates
the stem 22 to seat the valve 15 and move the
valve 16 off its seat. Thus when the coil 26 is
energized the compressor 1 operates in a loaded
condition. When the coil 26 is de-energized, the
lever 25 moves away from the core 27 of the coil
and the spring 28 moves the valve 15 off its seat
and the valve 16 on to its seat, thereby opening
receiver pressure to the valve actuating mecha-
nism 3 and unloading the compressor. It is to

be understood that in actual practice the lever 25 may be positioned so that it will move or fall away from the core 27 under its own weight and that the showing in Figure 1 of the drawing is merely diagrammatic.

Upon the initial starting of a compressor it is always desirable to relieve the motor 3 and the compressor 1 of the load torque until both the motor and the compressor reach full operating speed and to permit of this action, thermal means are provided to cause a time interval delay between the energizing of the motor 3 and the loading of the compressor.

It has heretofore been the practice to provide various types of means for providing this time interval delay such as dash pots, and other similar mechanical devices, but the present invention embraces the provision of a thermostatic switch in the form of a bimetal contact carrying member which controls the operation of the valve 10 thereby providing a simple, inexpensive, readily replaced and accurate time delay means which is much simpler in construction and cheaper to manufacture than the time delay means heretofore employed.

The time delay means 30 includes a bimetal plate 31 of approved usual construction which acts under temperature differences to move the contact 32, carried thereby into engagement with the stationary contact 33' to close a circuit through the coil 26 which circuit is broken at predetermined times as hereinafter referred to. The bimetal blade 31 of the thermostatic switch 30 is electrically heated by an electric heating coil 33 which is in circuit with one of the power lines to the motor.

In operation, when the compressor 1 is first started by the closing of the switch 9, the bimetal blade 31 of the thermostatic switch 30 will be cold and consequently the contacts 32 and 33' will be out of engagement. With the closing of the switch 9 the circuit is through the wire 34, around through the heating coil 33, through the wire 35 to the contact 36 of the double pole switch 37, out through the blade 38 of the switch 37, the wire 39 and back to the other wire L² of the power line through the wire 40. This heats the coil 33 causing the blade 31 of the thermostatic switch 30 to move and move the contact 32 into engagement with the contact 33'. The electrical circuit is then from the power line L¹ through the wire 34, wire 41 through the coil 26, the wire 42, wire 43, contacts 33' and 32, back through the wire 40 to the power line L². Thus the coil 26 is energized and acts on the lever 25 to move it into engagement with the core 27. The movement of the lever 25 actuates the valve structure 10 as heretofore described to cut off the

supply of operating pressure fluid to the valve actuating mechanism 3 and permits the loading of the compressor. The lever 25 has an extension 44 thereon which, when the lever 25 moves towards the core 27, engages the spring member 45 of the switch 37 and operates the switch blade 38, moving it out of engagement with the contact 36 and into engagement with the contact 46, thus cutting off the electric circuit through the coil 33 and maintaining the circuit through the coil 26 to hold the lever 25 and valve 10 in compressor loading position, the circuit through the coil 26 being maintained by the connection 47 with the contact 46. The heating coil 33 cools when the circuit is broken therethrough, which allows the blade 31 of the thermostatic switch 30 to cool and move out of engagement with the contact 33', thus positioning the thermostatic switch for reoperation the next time the compressor is started.

While a particular construction of valve 10 and compressor unloading mechanism is shown in the drawing and hereinbefore described, it is to be understood that the present invention of utilizing a thermal means or a thermostatic switch for controlling the loading and unloading of the compressor may be employed in connection with various other practical types of valves and unloading systems now generally known to the trade, without departing from the spirit of the present invention.

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown but that they may be widely modified within the invention defined by the claim.

What is claimed is:

In a compressor unloading mechanism, the combination, of an air or gas compressor, an electric motor for operating said compressor, means controlling energizing of said motor, pressure operated means for unloading said compressor, a valve for controlling the delivery of operating pressure to said pressure operated means, electrically operated means for operating said valve, a thermostatic switch for controlling energizing of said electrically operated means, and a switch in circuit with said thermostatic switch, and said electrically operated means for cutting the thermostatic switch out of the circuit at predetermined times and maintaining the circuit through said electrically operated means, said electrically operated valve operating means including a magnetic coil, a lever actuated by said coil for operating said valve said lever operating said switch upon movement of the lever under action of said magnetic coil.

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