

Sept. 23, 1924.

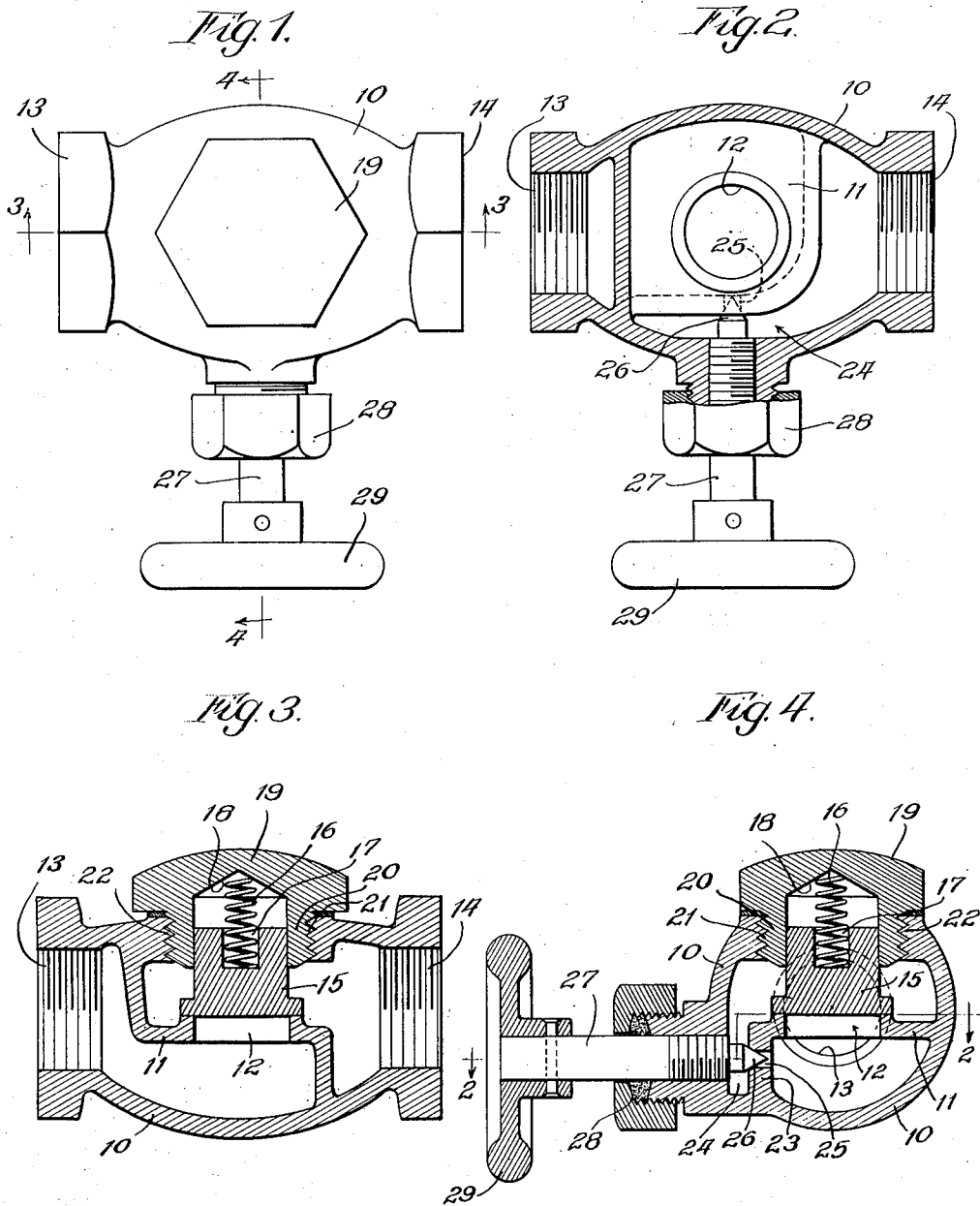
1,509,508

A. GRUNWALD ET AL

COMBINED CHECK, NEEDLE, AND SAFETY VALVE

Filed Jan. 10, 1921

2 Sheets-Sheet 1



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Fig. 5.

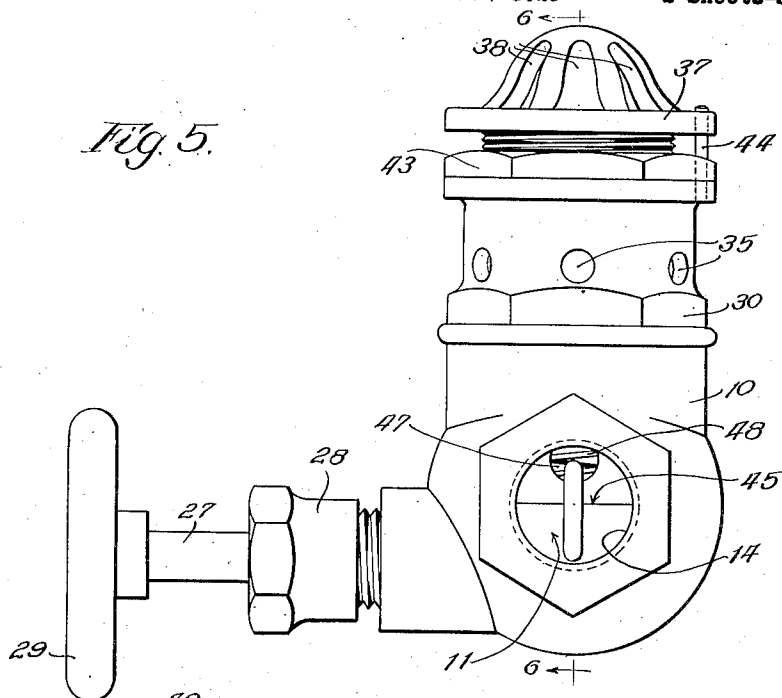


Fig. 6.

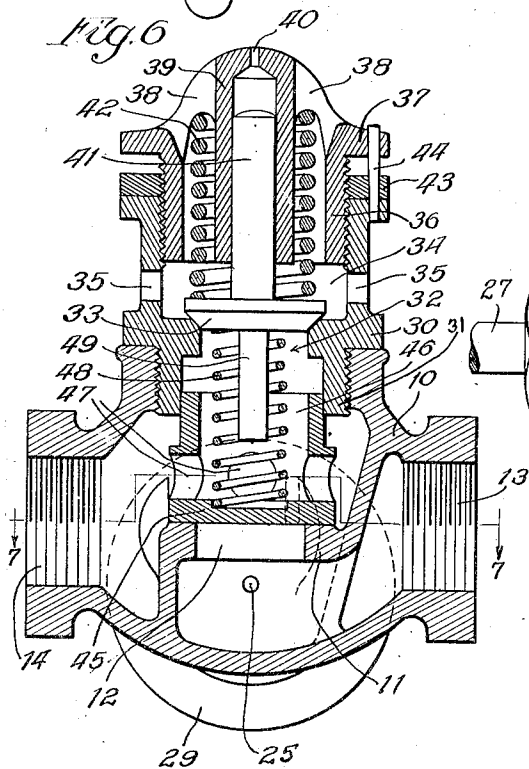
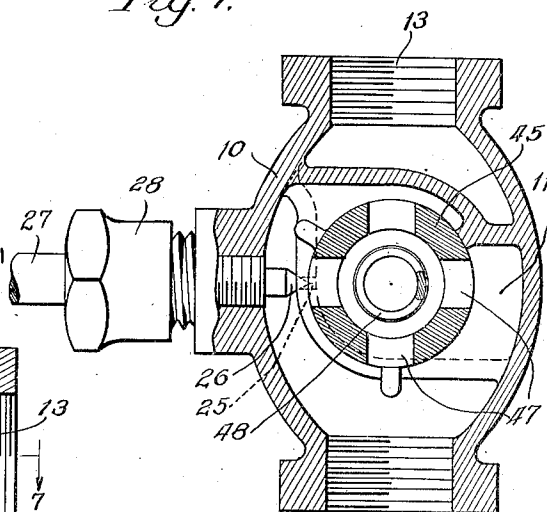


Fig. 7.



Inventors:
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By: *[Signature]* Atty.

UNITED STATES PATENT OFFICE.

ALBERT GRUNWALD AND MARTIN BALCKER, OF CHICAGO, ILLINOIS, ASSIGNORS TO
MARQUETTE TOOL & MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A COR-
PORATION OF ILLINOIS.

COMBINED CHECK, NEEDLE, AND SAFETY VALVE.

Application filed January 10, 1921. Serial No. 436,041.

To all whom it may concern:

Be it known that we, ALBERT GRUNWALD and MARTIN BALCKER, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Combined Check, Needle, and Safety Valves, of which the following is a specification.

This invention relates to improved combined check and needle valve particularly adapted though not necessarily limited in its use with pneumatic die cushions.

In the use of pneumatic die cushions, the air or fluid is admitted to the cushion from a storage tank or from any suitable source, until the desired pressure is obtained in the cushion and during the operation of the press the cushion is actuated against this pressure until after the work has been performed. After this operation and when the press is returning the parts of the die cushion are suddenly subjected to considerable fluid pressure, causing the parts of the cushion to return to the normal position very rapidly, with the result that the parts become jarred and injured.

It is one of the objects of the present invention to overcome these difficulties and objections and to provide an improved device of this character which is adapted to permit the fluid to freely flow through the check valve in one direction during the time that work is being performed by the die, but which fluid is retarded or restricted in its return to the die cushion, thereby preventing the parts from returning too rapidly and this is accomplished by means of a port which is controlled by a needle valve adapted to be adjusted to permit the fluid to return fast or slow as desired, while the check valve allows the fluid to escape freely from the cushion.

A further object is to provide improved means for automatically relieving the fluid of excess pressure during the time that the fluid is flowing back to the cushion through the said port.

A further object is to provide an improved device of this character which will be simple, durable, cheap and compact in construction, and effective and efficient in operation.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists

in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawings illustrating this invention and in which—

Figure 1 is a top plan view.

Figure 2 is a horizontal sectional view as taken on line 2—2, Figure 4.

Figure 3 is a sectional view as taken on line 3—3, Figure 1.

Figure 4 is a sectional view as taken on the line 4—4, Figure 1.

Figure 5 is a side elevation of a modified form of the invention.

Figure 6 is a vertical sectional view on line 6—6, Figure 5.

Figure 7 is a horizontal sectional view on line 7—7, Figure 6.

Referring more particularly to the drawings the numeral 10, designates the valve casing which may be of any desired size and configuration having therein a partition 11, extending thereacross and through which partition is provided an opening 12.

The valve casing is provided with an inlet opening 13, and an outlet opening 14, one on each side of the partition 11, and these openings are out of communication with each other except through the opening 12. This opening 12, is controlled by a valve 15, of any suitable construction and the valve is in turn controlled by a spring 16, one end of which may be seated in a recess 17, in the valve and the other end of the spring is seated in a suitable recess 18, in a cap 19. This cap 19, is provided with a portion 20, having exterior threads 21, thereon adapted to engage threads 22, in an opening in the valve casing 10. By varying the number of washers between the cap 19 and casing 10, the cap may be adjusted so that the stress of the spring 16, upon the valve 15, may be varied to vary the degree of pressure necessary to unseat the valve 15.

The partition 11, is provided with a wall 23, which is spaced from the wall of the casing 10, to form a chamber 24, which extends preferably to a point adjacent the bottom of the casing 10, and which chamber 24, has communication with the chamber in the valve casing on the side of the partition 11, adjacent the opening 14, of the valve casing.

Within this partition 23, is provided an opening 25, of any desired size and by means of which opening 25, communication is formed between the openings 13—14, of the valve casing 10, independently of the communication formed by the opening 12, through the partition 11.

A needle valve 26, is provided for controlling the opening 25, and this needle valve is provided with a stem 27, which passes through a suitable packing 28, and is controlled by a suitable handle 29, whereby the needle valve 26, may be adjusted to open or close the port or passage 25, or vary the size thereof as is desired.

In use, the fluid will be permitted to flow into the valve casing 10, through the opening 13, through the passage 12, and out of the opening 14, when the pressure of the fluid is sufficient to unseat the valve 15, against the stress of the spring 16. When the fluid attempts to flow backwardly through the valve casing 10, that is through the port 14, into the valve chamber, the pressure of the fluid flowing in this direction will assist the spring 16, in seating the valve 15, thereby closing the passage 12, and shutting off communication with the opening 13, therethrough. The fluid thus directed into the valve casing will find an escape through the opening 13, by means of the passage 25, and the degree of rapidity of flow of the fluid through the passage 25, may be controlled at will by the adjustment of the needle valve 26.

In the form of the invention shown in Figures 5 and 6, and in lieu of the cap 19, there is provided a supplemental casing 30, which has a reduced extremity 31, provided with external screw threads to engage the threads 22, in the casing 10. This supplemental casing 30, may be of any desired configuration and is provided with an opening 32, communicating with the interior of the valve casing, the opening 32, being controlled by a valve 33. The casing 30, is shaped to form a chamber 34, having outlet openings 35, any number of which may be provided, for a purpose to be hereinafter set forth. The chamber 34, is open at its upper end and is provided with internal screw threads adjacent said opening adapted to receive the threaded end 36, of a cap 37, which latter is preferably provided with openings 38, at the top thereof also for a purpose to be hereinafter set forth. The cap 37, is provided with a tubular portion 39, having its lower end open and its upper end closed, with the exception of a vent opening 40.

Connected with the valve 33, is a stem 41, which is adapted to move within the tubular portion 39, of the cap 37, and a coil spring 42, encompasses the tubular portion 39, one end of the spring resting against

the cap 37, and the other end against the valve 33. This spring serves as a means for normally holding the valve 33, against its seat and the stress of the spring may be varied by adjusting the cap 37, with respect to the supplemental casing 30. A lock nut 43, may be provided for the cap 37, and if desired an additional locking pin 44, may also be provided.

In this form of the invention the valve 45, corresponding to the valve 15, in the form shown in Figures 1 to 4, is hollow and is preferably provided with an opening 46, extending through the top thereof and any desired number of lateral openings 47, so as to permit the fluid to freely flow through the valve 45. This valve 45, is held normally against its seat to close the opening 12, by means of a spring 48, one end of which rests within and against the valve 45, and the other end of the spring contacts with the valve 33, and encompasses a depending stem 49, which is connected with the valve 33.

In use, and with this form of the invention when the fluid flows through the valve casing 10, in a direction to unseat the valve 45, this valve will be raised against the stress of the spring 48, by the pressure of the fluid. When the direction of flow of the fluid is reversed so that the fluid will flow through the casing in a direction in which it will tend to assist in closing the valve 45, it will find an outlet through the valve casing by means of the port 25, the needle valve 27, having been adjusted to vary the size of the opening 25, and to regulate the rapidity of flow of the fluid through the casing. During this portion of the operation or flow of the fluid, and in the event that there should be an excessive pressure upon the fluid it will be manifest that unless this excess pressure is relieved, considerable damage will be caused. To that end, the safety valve 33, is provided and when the degree of pressure upon the fluid increases beyond the point to which the spring 42, has been set, the fluid will operate upon the valve 33, and cause it to unseat against the stress of the spring 42, thereby opening the port or passage 32, to permit the fluid to escape therethrough and the escaping fluid will also find its way through the openings 35 and 38. The vent 40, is provided in the tubular portion 39, of the cap so as to permit the free escape of air from such portion of the cap, so that the free operation of the valve 33, under the influence of the fluid pressure will not be interfered with.

Obviously, and when desired, the supplemental casing 30, with the co-operating parts, as well as the valve 45, may be readily removed and the cap 19, and valve 15, shown in Figures 1 to 4, may be substituted therefor, or vice versa.

While the preferred forms of the invention have herein been shown and described, it is to be understood that various changes may be made in the details of construction, and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:—

1. As a unitary structure a valve casing having an inlet and an outlet, a partition between the inlet and outlet and having an opening therethrough, an automatically operating valve for controlling the said opening, there being an additional opening through the partition and forming communication between the said inlet and outlet, means adapted to be set to vary the size of the last recited opening, and an automatically actuated pressure relief valve connected with the casing.

2. As a unitary structure a valve casing having an inlet and an outlet, a partition between the inlet and outlet and having an opening therethrough, an automatically operating valve for controlling the said opening, there being an additional opening through the partition and forming communication between the said inlet and outlet, means adapted to be set to vary the size of the last recited opening, and a spring controlled pressure relief valve for relieving excess pressure of the fluid.

3. A valve casing having an inlet and an outlet, a partition therebetween and having an opening therethrough, a valve for controlling said opening, a vent opening, an automatically operating valve for controlling said vent opening, yielding means between the valves for causing one of the valves to be held against its seat, there being an additional opening through the said partition and forming communication between the said inlet and outlet whereby the fluid may flow around the first recited valve, and a manually controlled valve for controlling the said additional opening.

4. As a unitary structure a valve casing having an inlet and an outlet, a partition therebetween having an opening therethrough, an automatically actuated valve for controlling said opening, a by pass embodying a restricted opening whereby the fluid may flow around the said valve, a needle valve for controlling the said by pass, and means operating automatically to relieve the excess pressure upon the fluid while the fluid is flowing through the said by pass.

5. As a unitary structure a valve casing having an inlet and an outlet, a partition therebetween having an opening therethrough, an automatically actuated valve for controlling said opening, a by pass embodying a restricted opening whereby the fluid may flow around the said valve, a needle

valve for controlling the said by pass, and means operating automatically to relieve the excess pressure upon the fluid while the fluid is flowing through the said by pass, the said means embodying a vent outlet and a spring controlled valve for controlling the said vent outlet.

6. As a unitary structure a valve casing having an inlet and an outlet, a partition therebetween, there being an opening through the partition, an automatically operating valve for controlling said opening, a by-pass in the casing for the fluid and around said valve, a needle valve adapted to be set for varying the size of said by-pass, an excess pressure outlet from the casing, an automatically actuating and spring controlled valve for the last recited outlet, and means whereby the stress of the said spring may be varied at will.

7. A valve casing having an inlet and an outlet, a partition therebetween, there being an opening through the partition, an automatically operating valve for controlling said opening, a by-pass in the casing for the fluid and around said valve, a needle valve adapted to be set for varying the size of said by-pass, an excess pressure outlet from the casing, an automatically actuating and spring controlled valve for the last recited outlet, means whereby the stress of the said spring may be varied at will, and an elastic element interposed between the said valves.

8. A valve casing having an inlet and an outlet, a partition therebetween, there being an opening through the partition, an automatically operating valve for controlling said opening, a by-pass in the casing for the fluid and around said valve, a needle valve adapted to be set for varying the size of said by-pass, an excess pressure outlet from the casing, an automatically actuating and spring controlled valve for the last recited outlet, means whereby the stress of the said spring may be varied at will, and an elastic element interposed between the said valves and operating directly upon both of said valves.

9. A valve casing having an inlet and an outlet, a partition therebetween and having an opening therethrough, a valve for controlling said opening, said casing having an excess pressure outlet, a valve for controlling said pressure outlet, said valves being in alinement, a spring element interposed between the valves and operating upon both of the valves, an additional spring for normally maintaining the second recited valve upon its seat, the said additional spring being of a greater strength than the first recited spring, a by-pass for the fluid around the first recited valve, and means for varying at will the size of the said by-pass.

10. A valve casing having an inlet and an outlet, a partition therebetween and having an opening therethrough, a valve for controlling said opening, said casing having an excess pressure outlet, a valve for controlling said pressure outlet, said valves being in alinement and operating in the same direction, a spring element interposed between the valves and operating upon both of the valves, an additional spring for normally maintaining the second recited valve upon its seat, the said additional spring being of a greater strength than the first recited spring, means for varying at will the stress of the said additional spring, a by-pass for the fluid around the first recited valve, and means for varying at will the size of the said by-pass.
11. A valve casing having an inlet and an outlet, a partition therebetween and having an opening therethrough, a valve for controlling said opening, said casing having an excess pressure outlet, a valve for controlling said pressure outlet, said valves being in alinement and operating in the same direction, a spring element interposed between the valves and operating upon both of the valves, an additional spring for normally maintaining the second recited valve upon its seat, the said additional spring being of a greater strength than the first recited spring, a by-pass for the fluid around the first recited valve, and means for varying at will the size of the said by-pass.
- In testimony whereof we have signed our names to this specification, on this 20th day of December, A. D. 1920.
- ALBERT GRUNWALD,
MARTIN BALCKER.