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C. H. RICHWOOD.

REGULATING AND INDICATING DEVICE FOR COMPRESSED AIR.

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*Fig. 1.*

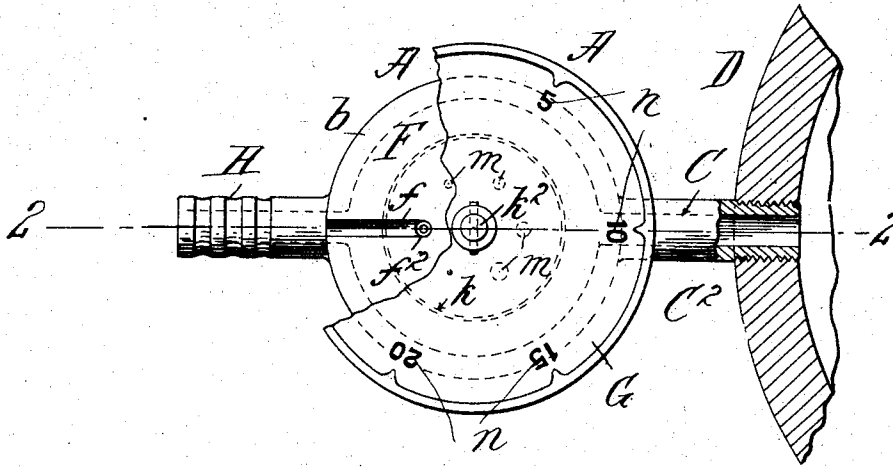


*Fig. 2.*

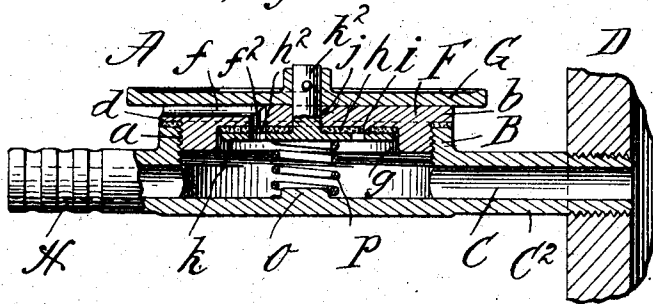
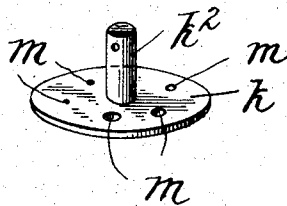


*Fig. 3.*



Witnesses:  
J. H. Garfield  
M. A. Crozier.

Inventor:  
Clarence H. Richwood,  
by J. A. Bellona  
Attorney.

# UNITED STATES PATENT OFFICE.

CLARENCE H. RICHWOOD, OF BOSTON, MASSACHUSETTS.

## REGULATING AND INDICATING DEVICE FOR COMPRESSED AIR.

SPECIFICATION forming part of Letters Patent No. 784,228, dated March 7, 1905.

Application filed May 17, 1904. Serial No. 208,440.

*To all whom it may concern:*

Be it known that I, CLARENCE H. RICHWOOD, a citizen of the United States of America, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Regulating and Indicating Devices for Compressed Air, of which the following is a full, clear, and exact description.

This invention relates to a device for regulating the maximum degree up to which air in any given reservoir or receiver may be compressed, the improved appliance being automatically operative to cause relief when maximum of compression is reached of the tendency to excess of compression of air. As an example of an advantageous utilization of a device of this character it may be used in conjunction with the reservoir of a suitably-driven air-compressing machine, also in conjunction with which reservoir is a conduit connected with a vibrator to be operated by the compressed air for massaging; and it will therefore become possible when the instrument is to be used on the face to have a low degree of compressed air uniformly maintained at the supply or reservoir or when the instrument is to be used on a less delicate part of the body by the adjustment of the regulator to have a much higher degree of air in compression at the receiver or supply-reservoir of the air-compressing apparatus.

The present invention embodies a casing having a chamber therein and provided with an inlet for compressed air and with an air-outlet duct, together with a valve-disk having a plurality of variably-sized apertures in circular arrangement and rotatably adjustable, whereby any of the valve-apertures may be brought to registry with the outlet or relief duct, and additional parts and structural features, all substantially as hereinafter fully described, and set forth in the claims.

In the drawings the improved regulator is illustrated.

Figure 1 is a plan view thereof shown as connected with a portion of a receiver for compressed air and a part of the rotatable top plate broken away for increased clearness of illustration. Fig. 2 is a central sectional view

as taken on the line 2 2, Fig. 1. Fig. 3 is a perspective view showing the valve having the circularly-arranged series of variably-sized holes.

Similar characters of reference indicate corresponding parts in all of the views.

The device will now be described in detail and as shown, it being stated at this time that various changes may be made in the forms particularly shown without departing from my invention.

In the drawings, A represents the regulator, which is also an indicator, and the same comprises a cup-shaped casing B, provided with an inlet-opening C, formed through a stem or limb C<sup>2</sup>, which may be tapped into the wall of a compressed-air receiver or a reservoir D. The annular wall of the cup-shaped casing is internally screw-threaded, as indicated at *a*, and a circular edgewise cover F screw-engages in said threaded opening, said cover having a marginal flange *b* overlying the top edge of the annular wall of the cup-shaped casing and confining between such flange and the edge of the casing-wall a ring *d*, of rubber or other suitable compressible packing material. The said cover is provided with a duct *f*, formed within its thickness, terminating inwardly in the port *f*<sup>2</sup> and preferably radially extended to the edge of the cover, as shown. The said cover is, moreover, formed at its inner or under side with a circular cavity or pocket *g*, having a disk *h*, of rubber or like compressible material, fitted therein, which disk is provided with an aperture *h*<sup>2</sup> therethrough registering with the said port *f*<sup>2</sup>, and a stud *i*, internally in the cover-engaging perforation in the disk, prevents the latter from turning or shifting and keeps it always with its aperture in registry with the port *f*. The said cover has a central hole *j* therethrough, through which is extended the round stem *k*<sup>2</sup> of the disk valve *h*, which is located within the pocket or cavity *g* in the cover and which has the series of variably-sized holes *m* in circular arrangement and adapted, according to the rotation of the disk, to register, one or another thereof, with the relief-duct constituted by the duct and port *f* *f*<sup>2</sup>, which is left unobstructed, so far as the

provision of the rubber disk  $h$  is concerned, by the aperture  $h^2$  in the latter.

To the upper end of the stem  $k$  a circular plate  $G$  is affixed, said plate resting against the outer or top face of the cover  $B$ , and said plate is provided with numbers or characters  $n$ , corresponding in plurality and arrangement thereof to the circular series of variably-sized holes  $m$  in the valve-disk, and an index or datum mark may be made at any suitable place on the device, with which the characters may register for indication of the adjustment of the regulator and of the consequent maximum of air compression which may be maintained.

At the bottom of the casing is a boss or short stud  $o$ , seated about which is the base of a spiral spring  $p$ , which is in compression and exerts a bearing against the valve-disk to place it under a desirable degree of friction against the rubber disk next thereto, so that accidental displacement of the valve-disk will not occur.

The tubular limb  $H$  may or may not be provided, according to the preference of the constructor; but when provided a flexible conduit may be joined thereto and extended to connection with the pneumatic vibrator or other instrument to be actuated by compressed air.

Clearly, by adjusting the disk  $k$  so that the largest hole  $m$  is in registry with the relief-duct only a low degree of compression can be acquired from an air-compressing machine of given capacity in the reservoir therewith connected; but adjustments of the valve-disk bringing the smaller holes into registry will insure the acquiring of a predetermined higher uniform compression in the reservoir, it being easy, for instance, to have pressures as called for of five, ten, fifteen, to thirty pounds, or by placing the disk so that no hole thereof is in registry with the relief-duct the degree of pressure in the receiver would be limited only by the capacity of the air-compressing machine used.

In practice the regulator may be a comparatively small device of less dimensions than those in the somewhat enlarged drawings presented; but it is entirely practicable to construct the casing with a chamber of large enough size to constitute the air-reservoir of the air-compressing machine.

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

1. In a device of the character described, a cup-shaped casing having a wall of the opening thereof internally screw-threaded, and having a circular screw-threaded cover engaging in said opening, and having a duct formed within the thickness of the cover and terminating in a port at the inner side thereof, a valve-disk having a series of variably-sized holes in circular arrangement, and adapted

ed according to the rotary adjustment of such disk to register with the aforesaid port, and means for turning the disk.

2. In a device of the character described, a cup-shaped casing having the annular wall thereof internally screw-threaded, and having a circular threaded cover, screw-engaging in said opening, and having a duct formed within the thickness of the cover and terminating in a port at the inner side thereof, a valve-disk located at the inner side of said cover, provided with a stem extending through a central opening which is formed therefor through the cover, and having means for turning it, and said disk, having a series of variably-sized holes in circular arrangement, any one of which, according to the rotary adjustment of the valve-disk, may be brought to register with the aforesaid port.

3. In a device of the character described, a cup-shaped casing having the annular wall thereof internally screw-threaded, and having a circular threaded cover, screw-engaging in said opening, and having a duct formed within the thickness of the cover and terminating in a port at the inner side thereof, a valve-disk having a series of variably-sized holes in circular arrangement, and adapted, according to the rotary adjustment of such disk, to register with the aforesaid port, means for turning the disk and a spring in compression and reacting against said disk, for the purposes set forth.

4. In a device of the character described, a cup-shaped casing provided with an inlet-opening, having the annular wall thereof internally screw-threaded, and having a circular threaded cover screw-engaging in said opening, and having a duct formed within the thickness of the cover terminating inwardly in a port at the inner side of the casing, and outwardly terminating in a channel within the face, and leading to the edge, of the cover, a valve-disk located at the inner side of said cover, provided with a stem extending through a central opening which is formed therefor through the cover, and having a series of variably-sized holes in circular arrangement for registry with the aforesaid port, and a circular plate having indicating characters corresponding to the variably-sized and circularly-arranged holes, secured on the said stem, and bearing on the outer side of the cover.

5. In a regulating device for compressed air, the cup-shaped casing provided with an inlet-opening, having the annular wall thereof internally screw-threaded and having a circular threaded cover screw-engaging in said opening, provided with a duct formed within the thickness of the cover, terminating inwardly in a port at the inner side of the latter, and said cover being formed at its inner side with a circular cavity, a valve-disk located within said cavity provided with a stem extending through a central opening therefor, through the cover, and having a series of variably-sized

holes in circular arrangement for registry with the aforesaid port and a circular plate secured on the outer end of said stem and overlying the cover.

5 6. In a regulating device for compressed air, the cup-shaped casing provided with an inlet-opening, having the annular wall thereof internally screw-threaded, a circular edgewise-  
10 threaded cover screw-engaging in said opening, having a marginal flange overlying the top edge of the casing-wall, provided with a duct formed within the thickness of the cover, terminating inwardly in a port at the inner  
15 side of the latter, and said cover being formed at its inner side with a circular cavity, having a disk of rubber or like compressible material provided with an aperture registering with said port, and means for preventing the rubber disk from turning, a valve-disk located  
20 within said cavity, and against said rubber disk, provided with a stem extending through a central opening therefor, through the cover, and having a series of variably-sized holes in circular arrangement for registry with the aforesaid port, and a circular  
25 plate secured on the outer end of said stem and overlying the cover.

7. In a regulating device for compressed air, the cup-shaped casing provided with inlet and  
30 outlet conduits for compressed air, having the annular wall thereof internally screw-threaded, and having at its bottom a central upstanding stud or boss, a circular threaded cover screw-engaging in said opening, provided with a duct formed within the thickness  
35 of the cover terminating inwardly in a port at the inner side of the latter, and said cover being formed at its inner side with a circular cavity, a valve-disk located within said cavity provided  
40 with a stem extending through a central open-

ing therefor, through the cover, and having a series of variably-sized holes in circular arrangement for registry with the aforesaid port, a circular plate secured on the outer end of  
45 said stem and overlying the cover, and a spiral spring engaging and retained in place by said boss and having a bearing under compression against the valve-disk.

8. In a regulating device for compressed air, the cup-shaped casing provided with an inlet-  
50 opening, having the annular wall thereof internally screw-threaded, a circular edgewise-threaded cover screw-engaging in said opening, having a marginal flange overlying the top edge of the casing-wall, provided with a  
55 duct formed within the thickness of the cover, terminating inwardly in a port at the inner side of the latter, and said cover being formed at its inner side with a circular cavity, having a disk of rubber or like compressible material provided with an aperture registering  
60 with said port, and means for preventing the rubber disk from turning, and a ring of rubber between the edge of the cup-shaped casing and the cover-flange, a valve-disk located  
65 within said cavity and against said rubber disk, provided with a stem extending through a central opening therefor, in the cover, and having a series of variably-sized holes in circular arrangement for registry with the afore-  
70 said port, the spring between the bottom of the casing and the valve-disk, and a circular plate secured on the outer end of said stem and overlying the cover.

Signed by me at Boston, Massachusetts, in  
75 presence of two subscribing witnesses.

CLARENCE H. RICHWOOD.

Witnesses:

BERNARD PARK,  
HENRY I. GOLDSMITH.