Oct. 14, 1930. C. W. CLARKE 1,778,355

AIR BALANCING GAUGE

Filed May 26, 1928

Fig. 1.

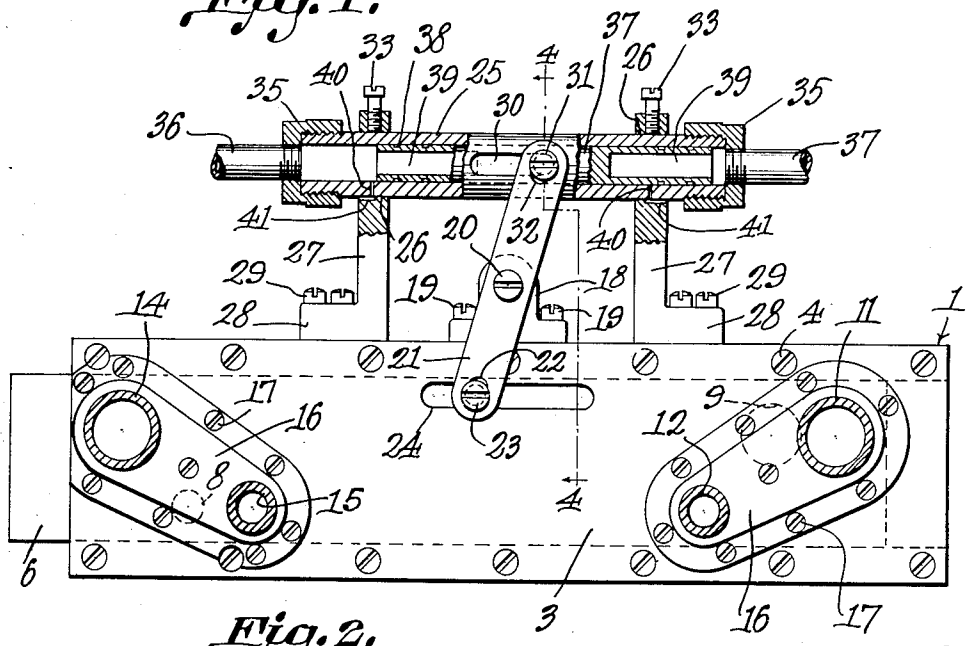


Fig. 2.

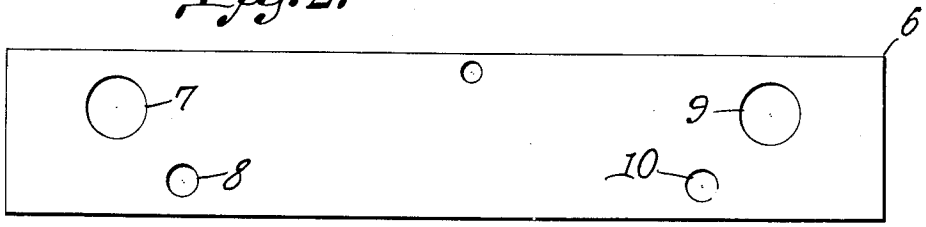


Fig. 3.

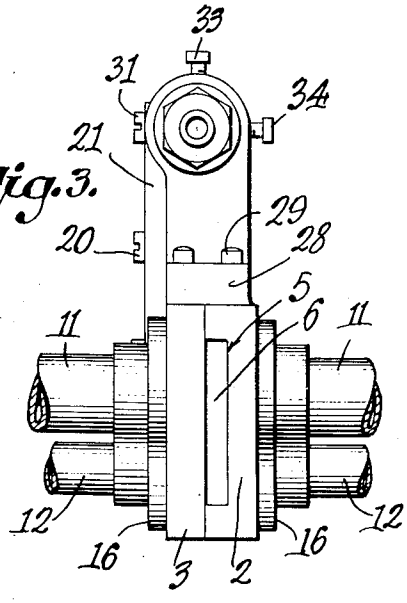
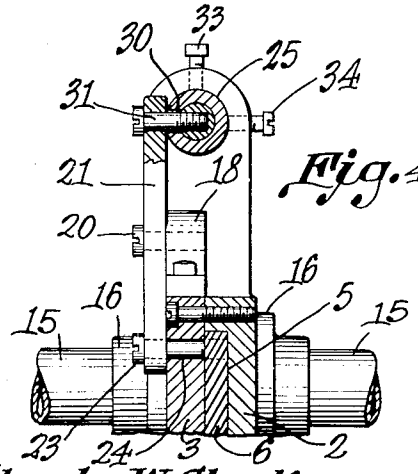


Fig. 4.



Charles W. Clarke Inventor

By Cachow & Co.

Attorneys

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UNITED STATES PATENT OFFICE

CHARLES WESLEY CLARKE, OF HUNTINGTON, WEST VIRGINIA

AIR BALANCING GAUGE

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Considered in its broadest aspect, the object of this invention is to provide a novel means whereby a valve may be operated by a change in pressure. The invention aims, moreover, to supply a novel construction whereby the operation broadly outlined above, may be carried out. A further object of the invention is to provide a device of the class described which will be simple in construction, not likely to get out of order, facile in operation, and capable of being manufactured at small cost.

It is within the province of the disclosure to improve generally, and to enhance the utility of, devices of that type to which the invention appertains.

With the above and other objects in view, the invention consists in the novel construction and arrangement of parts hereinafter described, delineated in the accompanying drawings which form a part of this application, and particularly pointed out in the appended claims, it being understood that, within the scope of what is claimed, a mechanic, instructed by the present disclosure, may make such changes as his skill may suggest, without departing from the spirit of the invention, or placing the utility of the invention in jeopardy.

In the accompanying drawings, a preferred but by no means mandatory form of the invention has been depicted, and in those drawings:—

Figure 1 shows in elevation, an air valve mechanism constructed in accordance with the invention, some portions of the device having been shown in section;

Figure 2 is an elevation of the reciprocatory valve per se;

Figure 3 is an end elevation of the device as shown in Figure 1 of the drawings;

Figure 4 is a transverse section taken approximately on the line 4—4 of Figure 1, parts having been broken away at the bottom of the figure, in order that it may be drawn upon an enlarged scale, like Figure 3.

The device forming the subject matter of this application includes a box-like casing, 1 comprising a trough-shaped body 2, and a cover plate 3 attached by securing elements 4 to the body 2, there being within the body a longitudinal passage 5, in which a valve plate 6 fits closely but slidably.

At a point near to one end, the valve 6 is provided with a port 7 and with a port 8. Near to its opposite end, the valve is provided with a port 9 and with a port 10. The ports 7, 8, 9, and 10, may be of various relative sizes, depending upon the particular use to which the invention is put, but as shown, the ports 7 and 9 are slightly larger than the ports 8 and 10, the ports 7 and 9 being spaced apart more widely than are the ports 8 and 10.

The passages or ports for compressed air or other pressure fluid are in the form of pipes 11—11 located, respectively, at the front and at the back of the casing, and other pipes similarly located, namely, the pipes 12—12, 14—14, and 15—15. The pipes 11, 12, 14, and 15, are mounted in reinforcing members 16 attached by securing elements 17 to the cover plate 3 and to the body 2. The port 7 of the valve 6 is so located that it can move into and out of registration with the ports 14 of the casing 1, and the port 9 in the valve 6 bears the same relation to the ports 11 of the casing 1.

The valve port 10 is adapted to register with the ports 12 of the casing 1, and the port 8 in the valve can register with the ports 15 in the casing. The ports 7 and 9 are spaced less widely apart than are the ports 14 and 11, and the ports 8 and 10 are spaced more widely apart than are the ports 12 and 15. The result is that the ports 7 and 9 register one at a time with the ports 14 and 11, respectively, and the ports 8 and 10 register one at a time with the ports 15 and 12, respectively, all of which will be understood readily when Figure 2 (which shows the valve) is compared with the dash-line showing of the valve ports in Figure 1 of the drawings.

A fulcrum member 18 is attached 18 to the cover plate 3, by screws 19, or the like. The fulcrum member 18 carries a pivot element 20, and upon the pivot element 20, a lever 21 is fulcrumed intermediate its ends.

The lower end of the lever 21 is provided with a slot 22 which receives a pivot element

23, mounted in the valve 6. The cover plate 3 is supplied with a slot 24 that accommodates the pivot element 23, as the valve 6 slides when the lever 21 is tilted.

A cylinder 25 is received in openings 26 in parallel standards 27 having feet 28 attached by securing devices 29 to the body 2. The cylinder 25 has an elongated slot 30 in its side, the slot accommodating a pivot element 31 mounted in an elongated slot 32 in one end of the lever 21. Set screws 33 are threaded into the upper end of the standards 27 and bear on the cylinder 25. Other set screws 34 are threaded into the standards 27 and bear on the cylinder 25.

The set screws 33 and 34 form a means for securing the cylinder 25 firmly in the standards 27, and it is highly important that the cylinder be so held, because if it were permitted to rotate, the pivot element 31 in the end of the lever 21 might bind in the elongated slot 30 of the cylinder. Caps or heads 35 are threaded or secured otherwise on the ends of the cylinder 25 and carry pipes 36 and 37.

In the cylinder 25, a piston 37 is mounted for right-line reciprocation. The inner end of the pivot element 31 is mounted in the piston 37. The piston 37 may be provided with any desired number of circumferential packings 38, if desired, and in the ends of the piston 37, there are chambers 39. The cylinder 25 is provided at points near to its ends with minute bleed ports 40, communicating with outlet ducts 41 formed in the standards 27.

When, due to a change in pressure in the pipes 36—37, longitudinal sliding movement is imparted to the piston 37, the lever 21 will be tilted on its fulcrum 20, and right line reciprocation will be imparted to the valve 6, the port 7 in the valve being brought into registration with the ports 14—14 of the casing 1, and the port 10 of the valve being brought into registration with the ports 12—12 of the casing, when the valve 6 is moved to the left, as shown in Figure 1. At that time, the port 9 in the valve 6 does not register with the ports 11—11 of the casing 1, nor does the port 8 of the valve register with the ports 15—15. The ports 12 and 15, therefore, are closed, but when the valve 6 is moved to the right in Figure 1, the port 8 in the valve will register with the ports 15—15, and the port 9 in the valve will register with the ports 11—11, the ports 12—12 and 14—14 being closed.

When the piston 37 is at the right hand end of its travel, as shown in Figure 1, the fluid pressure in the left hand end of the cylinder 25 will leak away through the bleed port 40 and the duct 41 at the left hand end of the cylinder, and there will be no appreciable back pressure to interfere with the movement of the piston 37 to the left.

The function of the bleed 40 and the duct 41 at the right hand end of the cylinder 25 will be understood readily from what has been stated last above.

I claim:—

1. In a device of the class described, a casing having large ports and small ports, a valve mounted for right-line reciprocation in the casing and having large ports and small ports, each of the large ports of the valve being movable into and out of registration with one of the large ports of the casing, each of the small ports of the valve being movable into and out of registration with one of the small ports of the casing, the large ports of the valve being spaced more widely apart than are the small ports of the valve, the large ports of the casing being spaced apart more widely than are the small ports of the casing, the large ports of the valve being spaced less widely apart than are the large ports of the casing, the small ports of the valve being spaced apart more widely than are the small ports of the casing, and mechanism actuated by difference in pressure for operating the valve.

2. In a device of the class described, a casing, a valve movably mounted in the casing, an operating member connected to the valve, standards mounted on the casing, the standards having openings and being provided with outlet ducts communicating with the openings, a cylinder in the openings and having bleed ports communicating with the ducts, the cylinder being provided with a slot, a piston slidable in the cylinder, means for admitting fluid pressure to the cylinder at opposite ends of the piston, a pivot element mounted in the operating member and in the piston, the pivot element being movable in the slot, and means carried by the standards for holding the cylinder against movement in the standards, thereby to keep the bleed ports in registration with the ducts, and to prevent the pivot element from binding in the slot.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

CHARLES W. CLARKE.