

(No Model.)

C. W. JOHNSTON & P. BROWN.

HIGH PRESSURE ALARM FOR STEAM BOILERS.

No. 295,406.

Patented Mar. 18, 1884.

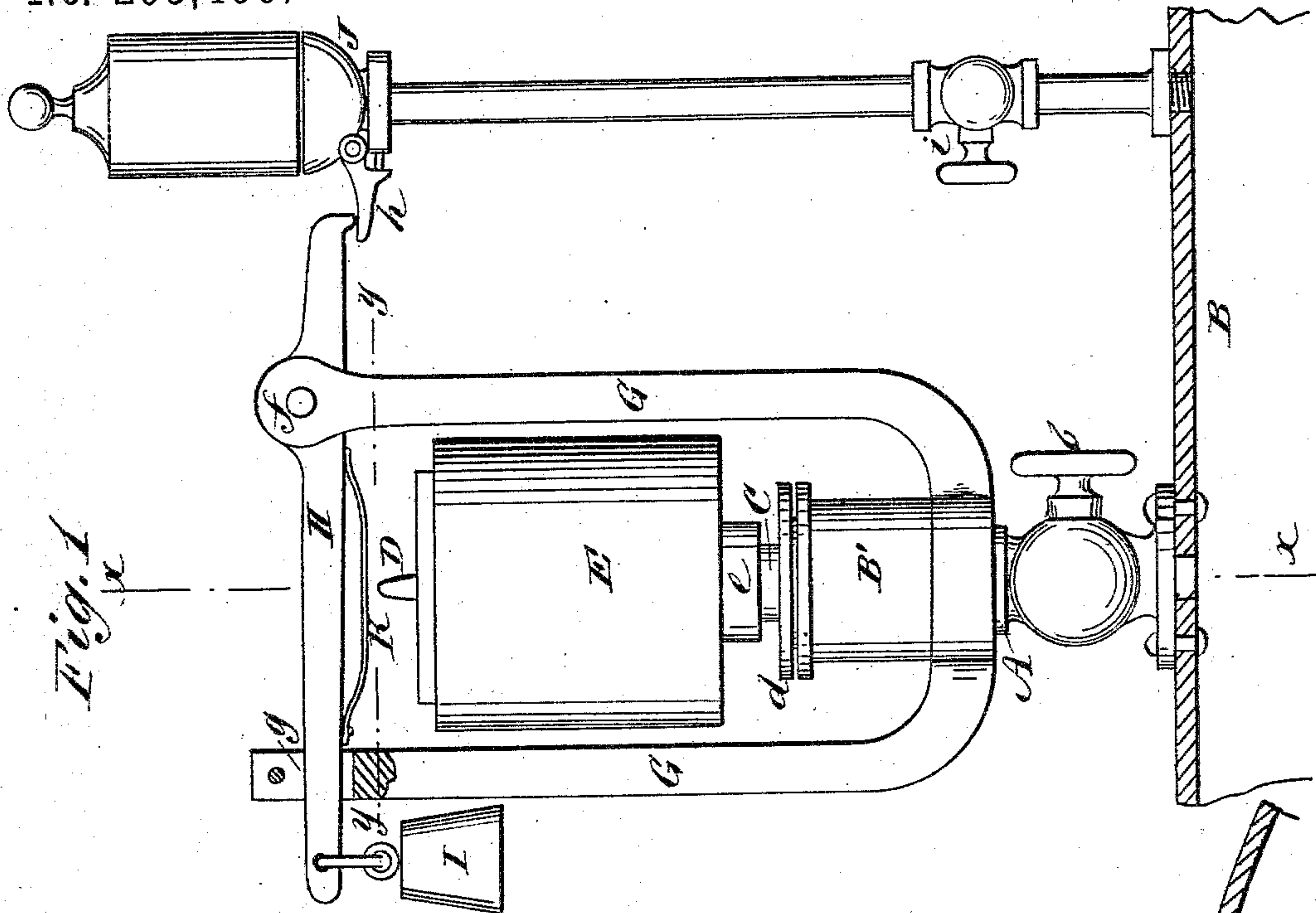


Fig. 1

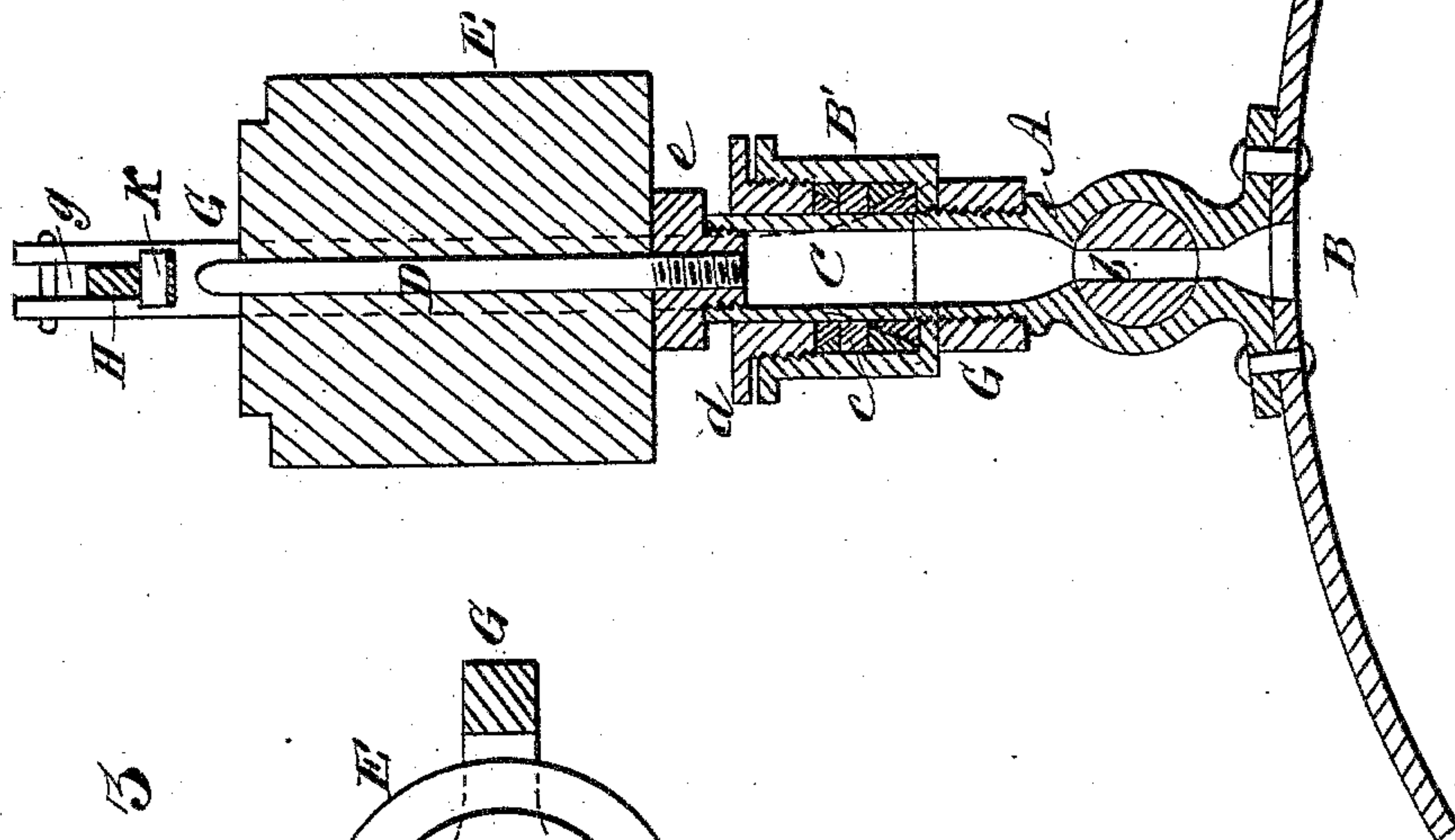


Fig. 2.

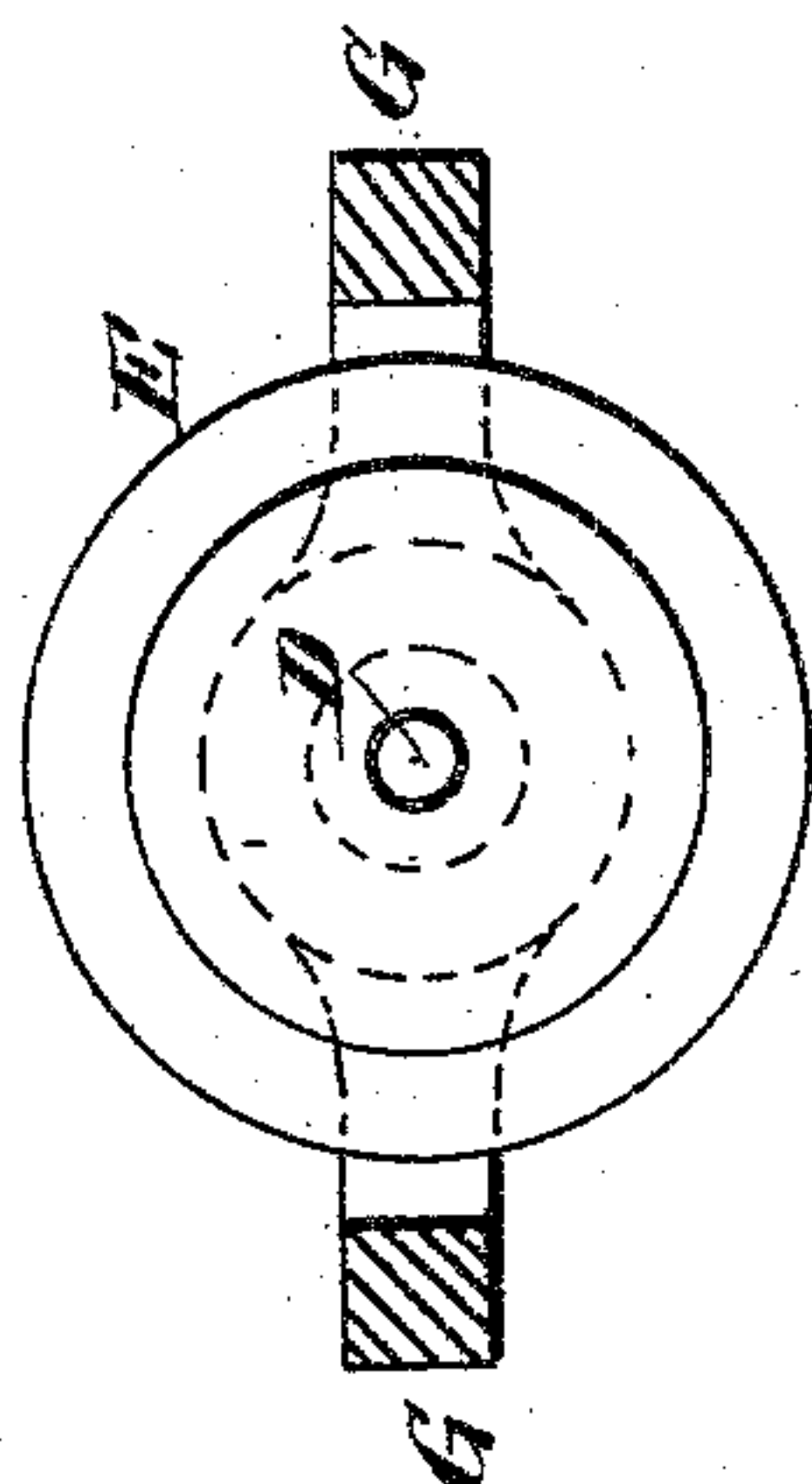


Fig. 3

WITNESSES:

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HIGH-PRESSURE ALARM FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 295,406, dated March 18, 1884.

Application filed July 30, 1883. (No model.)

To all whom it may concern:

Be it known that we, CHARLES W. JOHNSTON, of Germantown, in the city and county of Philadelphia and State of Pennsylvania, and PATRICK BROWN, of Chestnut Hill, in the city, county, and State aforesaid, have invented certain new and useful Improvements in High-Pressure Alarms for Steam-Boilers, of which the following is a full, clear, and exact description.

This invention consists in an improved safety-valve and alarm, or what may be more correctly termed an "improved high-pressure alarm," for steam-boilers, whereby the weight-lifting part or device exposed to the action of the steam is kept in continuous or frequent motion by the varying pressure of the steam in the boiler above a given limit, substantially as hereinafter described, and whereby the danger which so frequently arises from the sticking of the ordinary safety-valve is avoided.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 represents a partly sectional side view of our improved apparatus or alarm, as applied to a steam-boiler. Fig. 2 is a transverse vertical section of the same on the line $x x$ in Fig. 1. Fig. 3 is a horizontal section, in part, on the line $y y$ in Fig. 1.

A is a pipe secured on or in the top of a steam-boiler, B, or otherwise connecting with the steam-space of the boiler, and which may be fitted with a cock or valve, b , for shutting off connection of the apparatus with the boiler when required. The outer or upper end of this pipe-connection A screws into or connects with the lower end of a stuffing-box, B', which is fitted with a suitable packing, c , and gland d . Arranged to pass down within the packing of this stuffing-box B' is a plunger, C, which may be of tubular construction, closed on top by a screw-cap, e , and which, when fully down, may rest upon the bottom of the stuffing-box or upper end of the pipe A. Said plunger may have its body formed of a piece of pipe of the same diameter as the pipe A, or said plunger might be made solid.

D is a rod fitted to screw at its lower end into the top or cap e of the plunger C, and arranged to pass upward through a weight, E,

which rests on top of the cap, and is slipped over said rod. This rod projects slightly above the top of the weight E, for a purpose that will be hereinafter described; or the weight itself may be suitably constructed to produce directly the same result.

G is a frame consisting of front and rear upright arms arranged to project above the weight E, on opposite sides of it, and secured below in any convenient way to the pipe A or stuffing-box B'—as, for instance, by screwing a lower part, which connects the two arms, onto the upper portion of said pipe.

H is a lever having arms of unequal length, and arranged above the weight E, said lever being pivoted at f to the upper portion of the rear arm of the frame G, and passing through a slot, g , in the front arm thereof, of sufficient depth to allow of the lever moving up and down therein when the alarm is in action, but restricting the portion of the lever passing through it from being lifted above a certain height, to prevent the plunger C from passing out of its stuffing-box B'. This lever carries a weight, I, on its longer arm, and its shorter arm connects with or rests on a short valve lever or arm, h , of a steam-whistle, J, so that when the longer arm of the lever H is lifted its shorter arm acts upon the arm h to open the whistle for the purpose of sounding the alarm. Said whistle may be fitted with a cock or valve, i , for shutting off communication with the boiler when required.

K is a spring arranged beneath the longer arm of the lever H, for the weight E or upper end of the rod D to act against and compress when said weight is raised; or said spring might be arranged on top of the weight E to have the same effect. The weights E I and spring K are all proportioned to resist certain pressures which are arbitrary.

The operation is as follows: The valves $b i$ being opened, supposing it is desired to carry eighty (80) pounds of steam in the boiler, and that it might be considered dangerous to subject it to ninety (90) pounds pressure on the square inch, then the weight E, plus the friction of the plunger C in the stuffing-box, should exert a dead-weight of eighty (80) pounds. This will just counterbalance the safe or desired working-pressure of the steam in the boiler, and there will be no tendency to lift

said weight and plunger from their lowermost positions shown in the drawings. Upon any increase of pressure, however, of the steam in the boiler above eighty (80) pounds, the plunger C and weight E will be raised, and said weight or upper end of the rod D will press against the spring K and cause it to yield, and as the steam-pressure still further increases will continue to so compress the spring until the steam reaches ninety (90) pounds pressure, when the spring will have reached its utmost tension, and the long arm of the beam or lever H will then be raised and its short arm caused to act upon the lever h, to open the valve of the whistle J and sound the alarm. Upon the steam lowering again in the boiler to the desired eighty (80) pounds pressure, the several working parts of the apparatus will resume their normal positions, and any fluctuations of pressure between eighty (80) and ninety (90) pounds, supposing these to be the safety and danger limits, will keep the plunger C in constant or corresponding up-and-down motion without blowing off or wasting steam, and so will avoid all liability of the plunger to stick, as ordinary safety-valves, when allowed to stand closed for any length of time, endangering explosion of the boiler, are liable to do.

Instead of the steam-whistle, any other alarm device might be used, or the same might be in the form of a mere indicator, and springs might be used as equivalents for the weights E and I. Various other changes may be made, which in no wise alter the distinguishing character or principle of the invention. Thus, a piston, which would be equivalent of the plunger C, may be used instead of it. The weight-rod D may be extended upward to pass through an oblong guide-hole in the beam or lever H, for the purpose of steadying the weight E and keeping the plunger or piston in line with the tube or stuffing-box in which it works, and so relieving the packing of strain.

It is generally proposed to use the apparatus in connection with a blow-off safety-valve; but in this case it should be so weighted that it will operate to lift its direct weight E when the pressure is several points below that which is required to raise the blow-off safety-valve,

and will raise the weighted beam or lever H, to give the alarm, when the pressure slightly exceeds that at which said safety-valve should operate, so that in case of the safety-valve sticking the alarm will be given.

In some cases the spring K might be dispensed with and the weighted rod D, after being raised a given distance, be made to act directly, by means of side ears or otherwise, upon the loaded beam or lever H, to in due course lift said lever, should the pressure in the boiler be sufficiently increased.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. A high-pressure alarm apparatus for steam-boilers, provided with a loaded steam-plunger and with a supplementary resistance device arranged for actuation by said plunger to give or sound the alarm, whereby the plunger is kept in motion by fluctuations in pressure of the steam in the boiler, essentially as specified.

2. In high-pressure alarms for steam-boilers, the combination of the plunger C and stuffing-box B', for connection with a pipe leading from the steam-space of the boiler, the weight E, the superposed weighted lever H, and an alarm device operated by said lever H, substantially as specified.

3. In high-pressure alarms for steam-boilers, the combination of the spring K, with the weighted lever H, and an alarm device operated by said lever, the weight E, the plunger C, and the stuffing-box B', for connection with the steam-space of the boiler, essentially as and for the purposes herein set forth.

4. The combination of the steam pipe or connection A, the stuffing-box B', the plunger C, the rod D, the weight E, fitted to slip over said rod, the frame G, the weighted lever H, the spring K, and the steam-whistle J, for operation by the lever H, substantially as shown and described.

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Witnesses:

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