

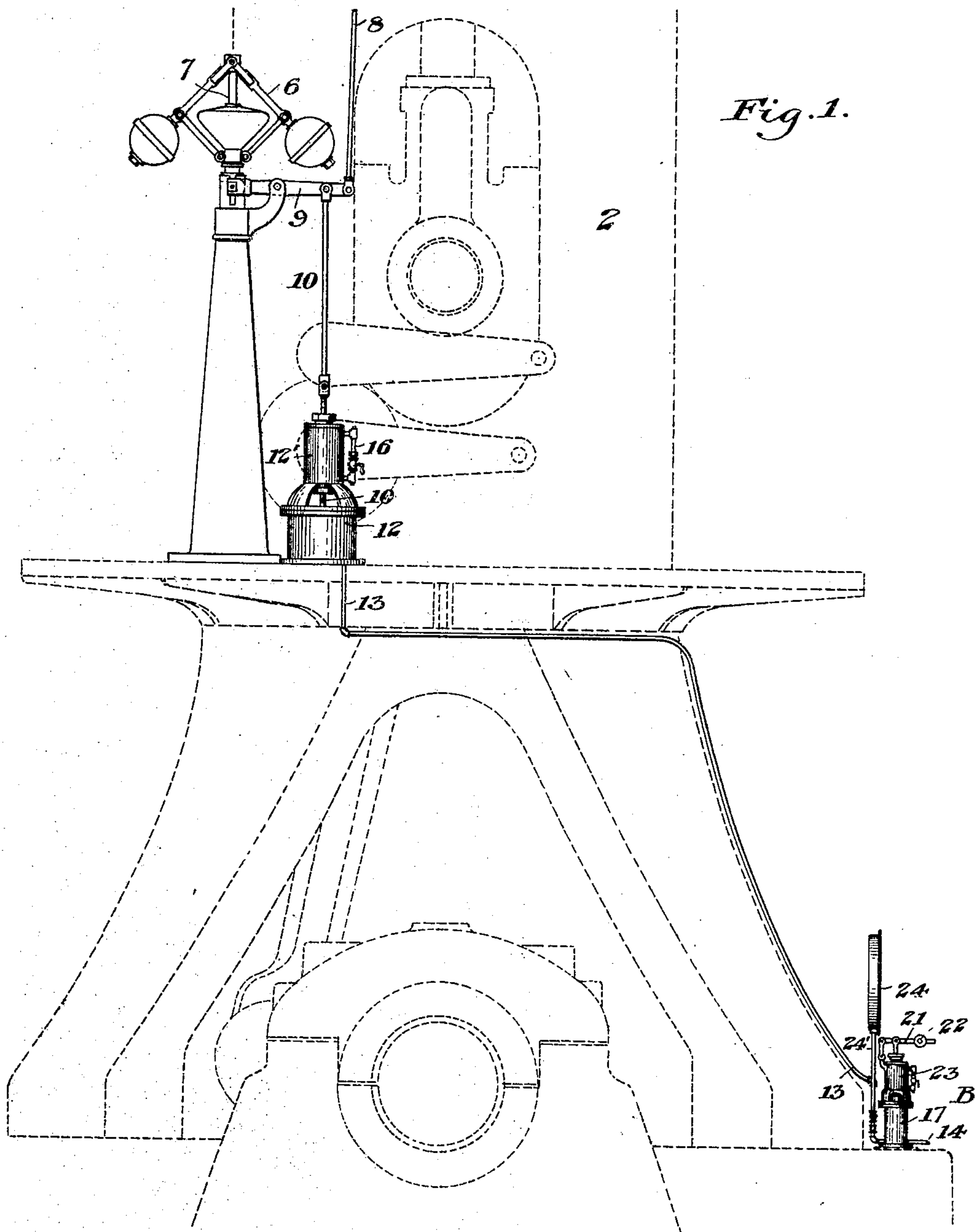
No. 814,433.

PATENTED MAR. 6, 1906.

C. E. CONKLING.
SPEED GOVERNOR.

APPLICATION FILED MAY 20, 1904.

2 SHEETS—SHEET 1.



WITNESSES

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INVENTOR

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2 SHEETS—SHEET 2.

Fig. 2.

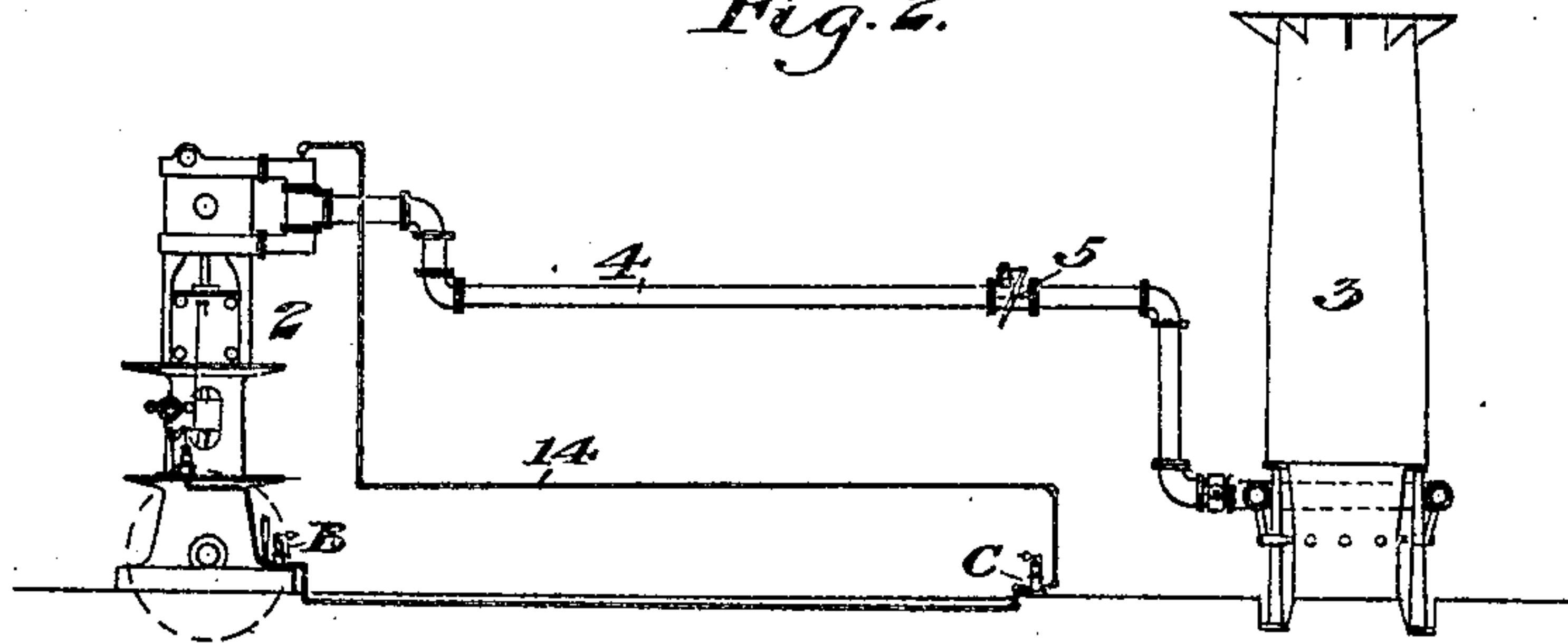
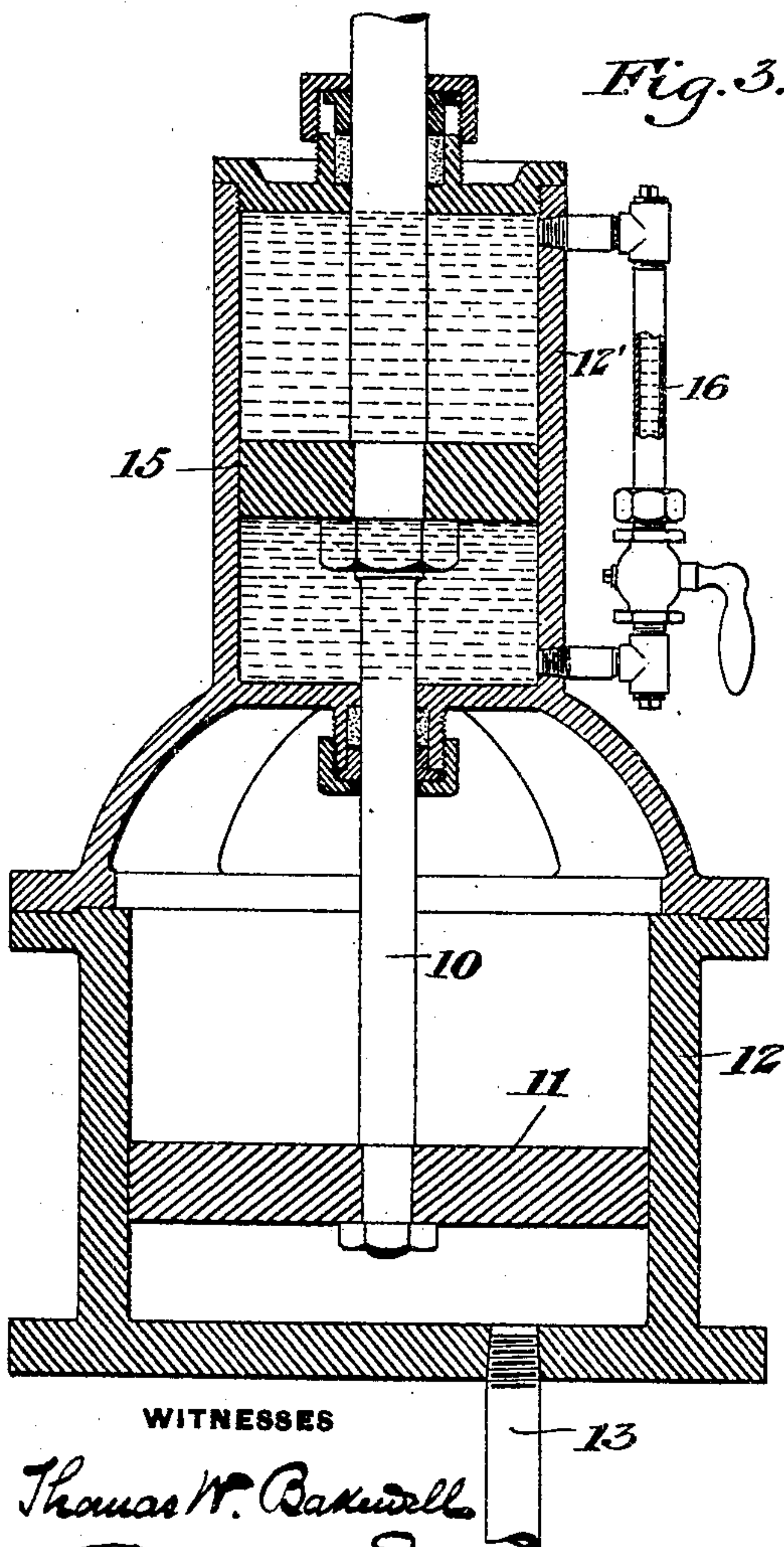


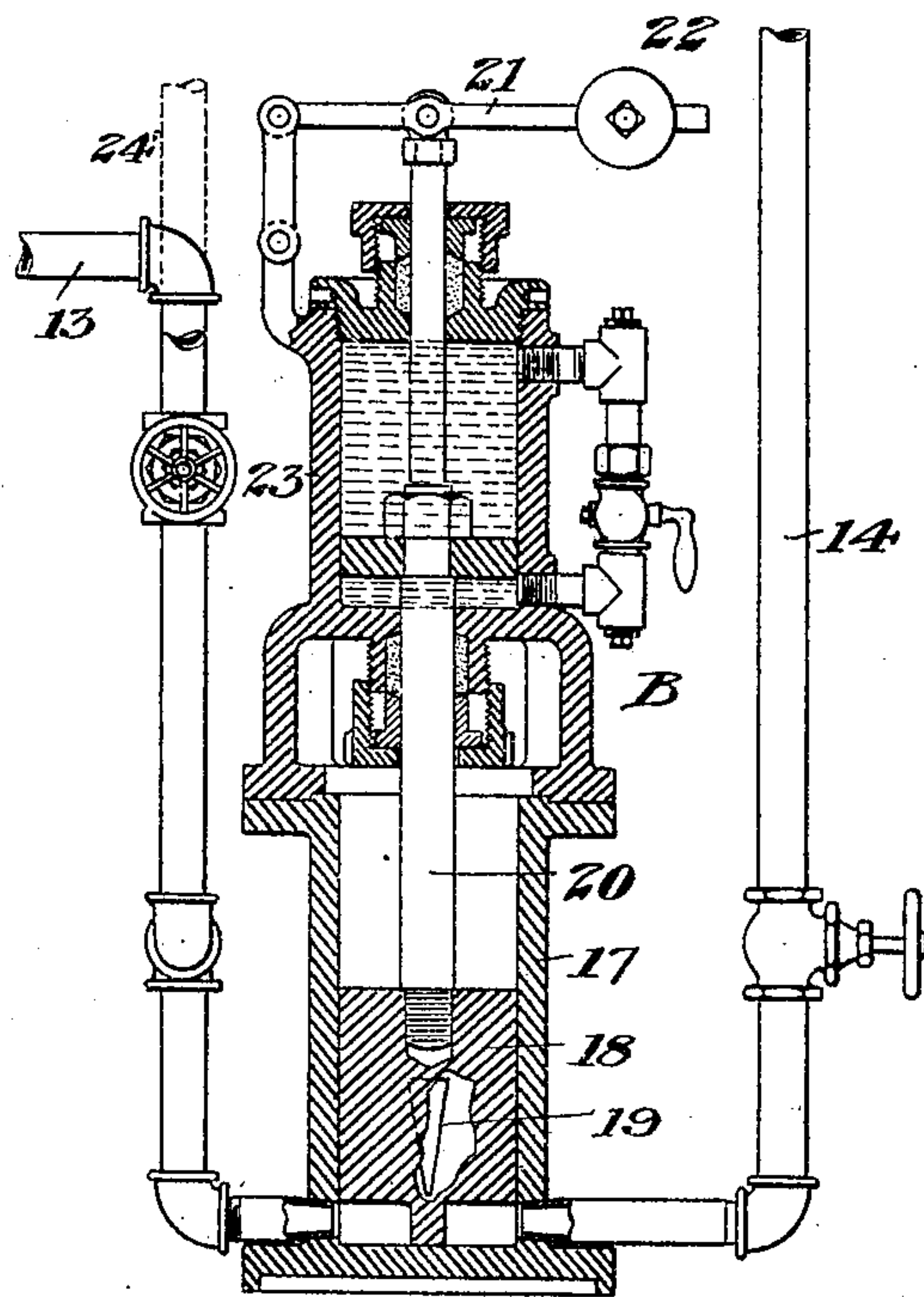
Fig. 3.



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Fig. 4.



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CHARLES E. CONKLING, OF McKEESPORT, PENNSYLVANIA, ASSIGNOR TO
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SPEED-GOVERNOR.

No. 814,433.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed May 20, 1904. Serial No. 208,950.

To all whom it may concern:

Be it known that I, CHARLES E. CONKLING, of McKeesport, Allegheny county, Pennsylvania, have invented a new and useful Speed-Governor for Blowing-Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 shows in elevation apparatus constructed in accordance with my invention, the blowing-engine with which it is connected being indicated by dotted lines. Fig. 2 is a view on a smaller scale, showing the blowing-engine connected with a blast-furnace. Fig. 3 is a vertical section on a larger scale, showing the cylinder 12 and its gag-pot. Fig. 4 is a vertical section showing the regulating device B.

Heretofore great difficulty has been experienced in the governing of the speed of blowing-engines for supplying air to blast-furnaces, converters, and the like. Variations of load to which these engines are subjected impose unusual conditions which heretofore have been extremely hard to meet, so that in very many cases it has been the custom to operate the engines manually without using the speed-governor, and in all cases, so far as I am aware, it has been necessary to employ a man stationed at the throttle of the engine to vary its speed in response to signals which he received from the converter or furnace, and it has not been possible for the furnaceman to do this work, although he is the one who is first aware of the change of conditions which require change of speed, and the need of change is often urgent and immediate. Moreover, in the devices heretofore employed for operating governors, which have usually consisted merely of an ordinary spring opposing the action of the governor, it has not been possible to vary the speed of the blowing-engine without interfering with the percentage of regulation, and thus largely detracting from the efficiency of the engine. My device entirely overcomes this difficulty and enables the engine to be governed at all speeds with the same percentage of regulation, and, if desired, enables the governing to be effected with the throttle wide open.

I oppose the action of the governor by a device which is operated by the pressure of

the air delivered by the blowing-engine. This is a novel feature in itself. I also vary this pressure, and thus vary the opposition to the governor, by means of an adjustable device which enables the governing mechanism to be set for any desired speed and to maintain that speed substantially under all ordinary conditions.

In the drawings which illustrate the preferable form of my invention, 2 is the blowing-engine, the parts of which are indicated in Fig. 1 by dotted lines.

3 is the blast-furnace, to which the air is delivered from the blowing-engine.

4 is the blast-pipe, and 5 is the ordinary relief-valve or snort-valve which is employed in the pipe 4 for the purpose of at once relieving the pressure from the furnace when it is desired to tap the metal therefrom or for any other reason.

6 is the speed-governor, the shaft 7 of which is rotated by suitable connection with the blowing-engine.

The motion of the governor caused by the centrifugal action of the balls operates the usual connecting-rod 8, which extends to the knock-off cams of the valve mechanism or is otherwise connected to the valve-mechanism, as desired. A lever 9 is shown for connecting the governor to the rod 8. This lever is also connected by a rod 10 to a piston 11, Fig. 3, operating in a cylinder 12, which is open to the atmosphere at the upper end and at the lower end is connected by a pipe 13 14 with the blast-pipe 4 or with some portion of the blowing-engine affording communication with the air-pressure. A suitable gag-pot 12', consisting of an oil-cylinder having a piston 15 on the rod 10 and having a by-pass 16 connecting the two ends of the cylinder, is preferably employed for preventing too sudden motion of the rod 10. I thus make the governing action of the device more regular. The pressure of the air on the under side of the piston 11 acts in opposition to the centrifugal action of the governor, which tends to force the rod down while the air-pressure tends to force it upwardly.

At a suitable point, preferably near the engine, I place the automatic regulating device (marked B in Fig. 2) and interpose it in the line of pipes 13 14. This comprises a cylinder 17, into which the pipes 13 and 14 enter, and

which affords uninterrupted communication between said pipes, the piston-valve 18, which operates in the cylinder, being cut away at the bottom so as not to interfere with this connection. This valve is preferably retarded in its motion by a gag-pot 23 and controls a port 19, which extends through the side of the cylinder to the atmosphere and is opened gradually as the valve rises. The valve is connected by a stem 20 with a weighted lever 21, having an adjustable weight 22, or other means may be employed for imparting a variable downpressure to the stem, and thus varying the degree of air-pressure required to lift the valve.

In operation the air-pressure from the pipe 14 acting on the bottom of the piston-valve 18 will raise this valve so as to uncover the port 19, and the position at which the weight 22 is set will determine the maximum pressure of air which can accumulate in the cylinder 17, for if the air-pressure should tend to increase the further opening of the port 19 would relieve it. The air-pressure is thus preserved at a constant point in the cylinder 17, determined by the setting of the weight 22, and the same pressure is exerted upon the under side of the piston 11, and acting in opposition to the governor, as above explained, determines the maximum speed at which the engine will run. If it is desired to increase this speed, it is done by lessening the air-pressure acting against the governor, and this is effected by decreasing the weight upon the stem 20, so that by shifting the position of the weight 22 the operator at the engine is enabled to vary the speed of the engine to any extent required, and in doing so the percentage of regulation at which the engine operates is in no wise affected.

For the purpose of enabling the speed of the engine to be regulated from the furnace, I set in the pipe 14 a second regulating device C, which may be constructed in the same way as the regulating device B, above explained and shown in Fig. 4. By moving the weight 22 to its extreme inward position the speed of the engine is at once reduced to the lowest limit at which the governor is set. The furnaceman is not, however, able to increase the speed above the point at which the regulating device B at the engine is set, so that by employing two of these devices one will act as a check upon the other, and the furnaceman is not able by incautious or imprudent operating of his device to exceed the proper limit of speed of the engine.

If desired, either of the devices B C may be employed without the other; but, as above explained, I prefer to use both of them. I prefer also to employ a pressure-gage 24 between the regulating device B and the cylinder 12, which by indicating the pressure in the pipe 13 will show the number of revolutions at which the engine is running. The gage

is graduated suitably for this purpose and is connected with the pipe 13 by a branch pipe 24'.

My mechanism also affords means for automatically and immediately reducing the speed of the engine when the relief-valve or snort-valve 5 is opened. Heretofore it has been necessary before opening the relief-valve to first slow down the engine, and serious accidents have resulted from the sudden release of load from the engine in case of neglect of the operator to first close his throttle. Such accidents are prevented entirely by my device, because as soon as the snort-valve is opened it immediately reduces the pressure in the pipe 14 and in the cylinder or cylinders 17 of the regulating devices B or C and also in the cylinder 12, so that the governor being relieved of the opposition of the air-pressure in said cylinder will operate immediately to slow down the engine. In like manner when the snort-valve is closed, thus reestablishing the pressure in the pipes 13 14 and cylinder 12, the air-pressure will again be opposed to the governor, which will permit the engine to resume its normal speed. In this way the engine is controlled automatically, and it is rendered unnecessary to operate the throttle before opening or closing the relief-valve.

Those skilled in the art will be enabled from the foregoing description to modify my apparatus in many ways, since I believe I am the first to oppose the action of the governor by the air-pressure supplied by the engine, the first to control the governor by varying the pressure thus opposed to the governor, and the first to control the governor from the blast-furnace or place at which the compressed air is utilized.

I claim—

1. In combination with an engine delivering fluid under pressure, a speed-governor, means for opposing to the governor the pressure of the fluid, and means for varying the applied pressure and maintaining it at determined degree for governing the engine and keeping its speed at the rate desired; substantially as described.

2. In combination with an air-blowing engine and speed-governor, a cylinder opposing air-pressure to the governor, a regulating-valve adapted to regulate the pressure in said cylinder, and adjustable means for varying the point at which such pressure is maintained; substantially as described.

3. In combination with an air-blowing engine and speed-governor, an air-pipe extending to a furnace, means for applying variable pressure to the governor, and means at the furnace for varying such pressure; substantially as described.

4. In combination with an air-blowing engine and speed-governor, means for opposing the governor with the pressure of the air, and means for automatically restraining the rise

of such pressure above a determined point, whereby on sudden removal of the air-pressure the pressure is relieved from the governor and the speed of the engine is reduced automatically to the minimum limit of the governor; substantially as described.

5 5. In combination with an air-blowing engine and governor, a governor-controlling device at the engine and a second governor-controlling device at a distant point connected with the first, each being adapted to control the governor only within the limit at which the other is set; substantially as described.

10 6. In combination with an air-blowing engine and speed-governor, a cylinder opposing the governor, an air-supply passage therefor, a regulating-valve in said passage having a relief-opening, and an adjustable resistance to the regulating-valve; substantially as described.

20 7. In combination with an air-blowing en-

gine and governor, an air-pipe extending to a furnace, means for applying variable pressure to the governor, means at the furnace for varying such pressure, and a snort-valve 25 in the air-pipe; substantially as described.

8. In combination with an air-blowing engine and governor, a cylinder opposing air-pressure to the governor, a regulating-valve adapted to regulate the pressure in said cylinder, adjustable means for varying the point 30 at which such pressure is maintained, and a second regulating-valve also in the air-supply passage to said cylinder; substantially as described.

35 In testimony whereof I have hereunto set my hand May 18, 1904.

C. E. CONKLING.

Witnesses:

THOMAS W. BAKEWELL,
G. K. WRIGHT.