

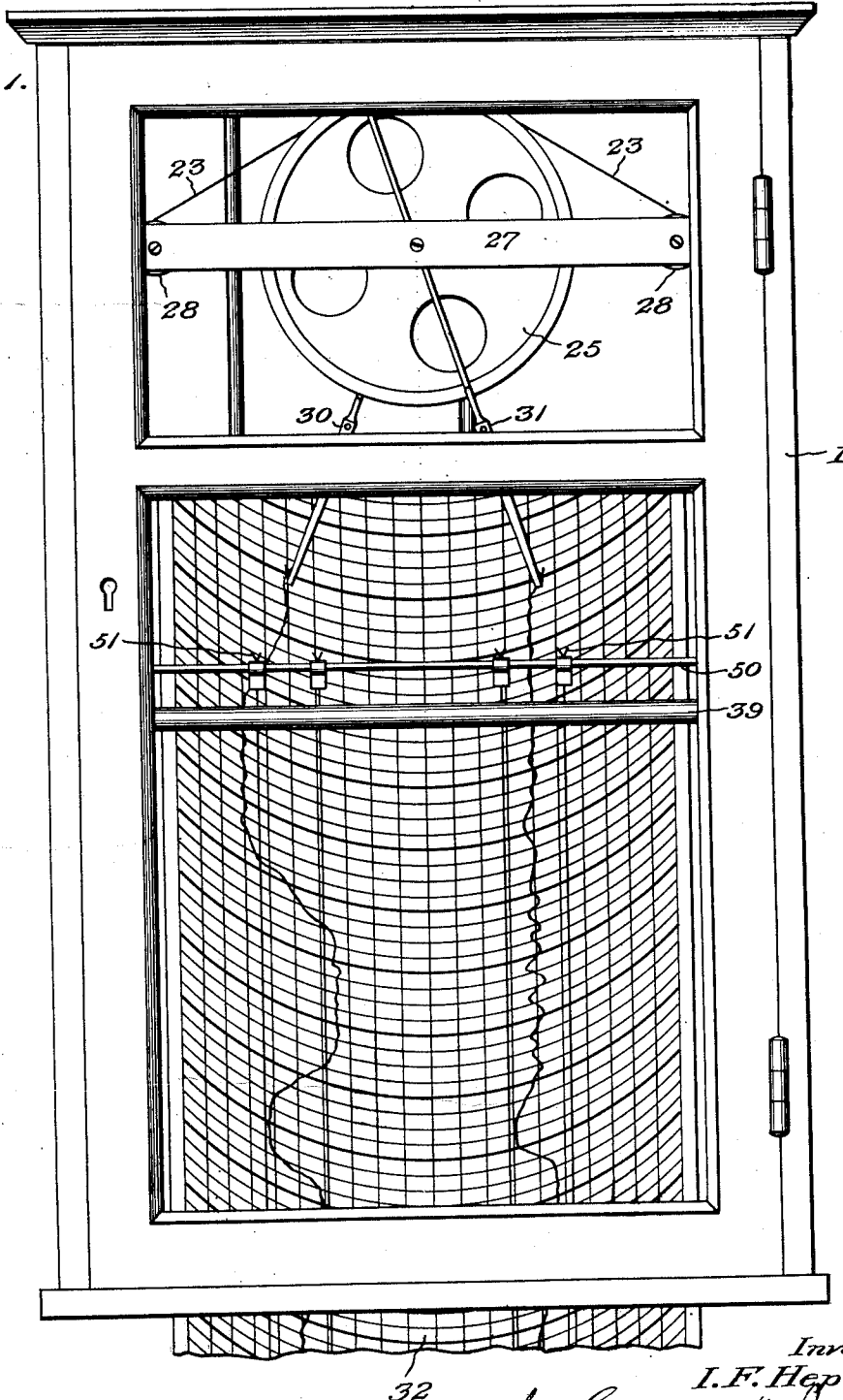
I. F. HEPLER.
RECORDING DEVICE.
APPLICATION FILED JULY 12, 1919.

Patented Apr. 4, 1922.

6 SHEETS—SHEET 1.

1,411,698.

Fig. 1.



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6 SHEETS—SHEET 3.

Fig. 3.

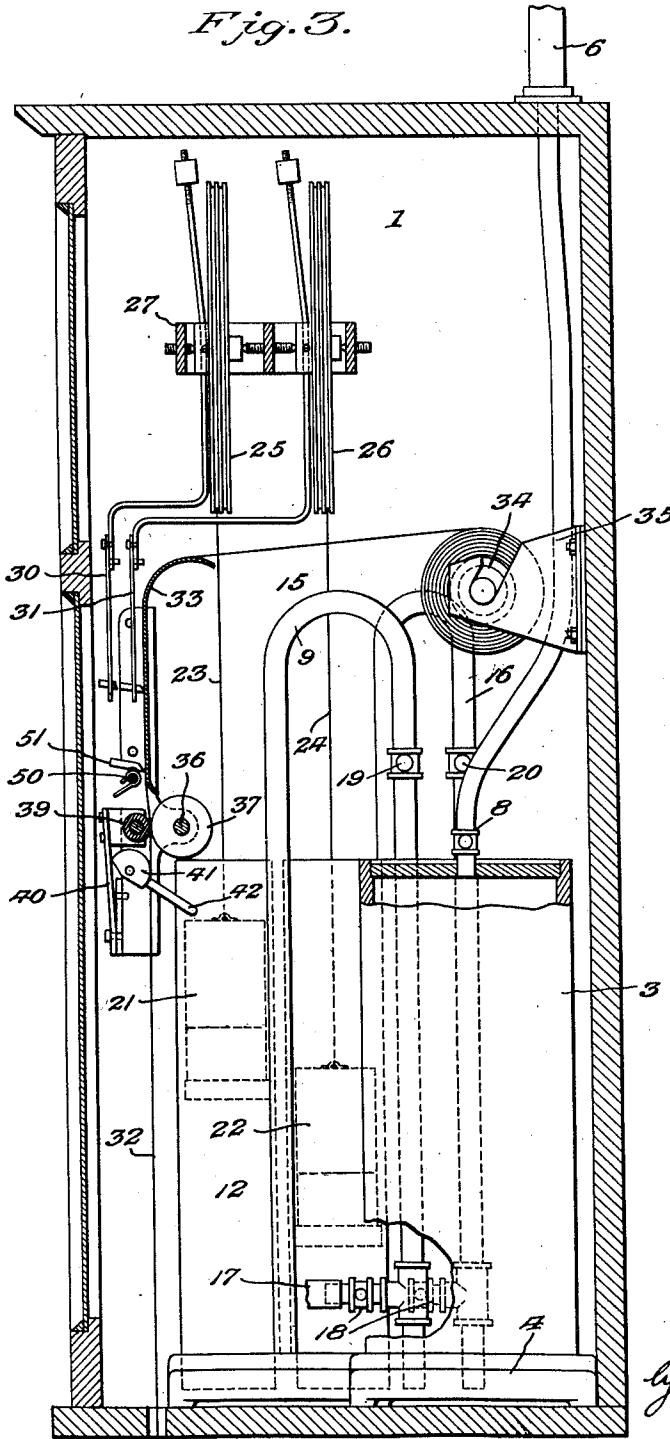


Fig. 12.

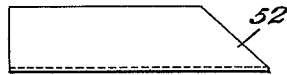


Fig. 13.



Fig. 14.

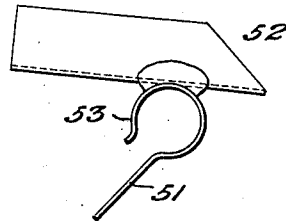
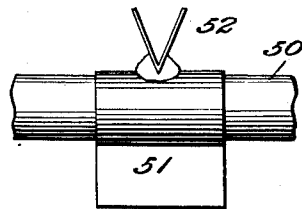


Fig. 15.



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6 SHEETS—SHEET 4.

Fig. 4.

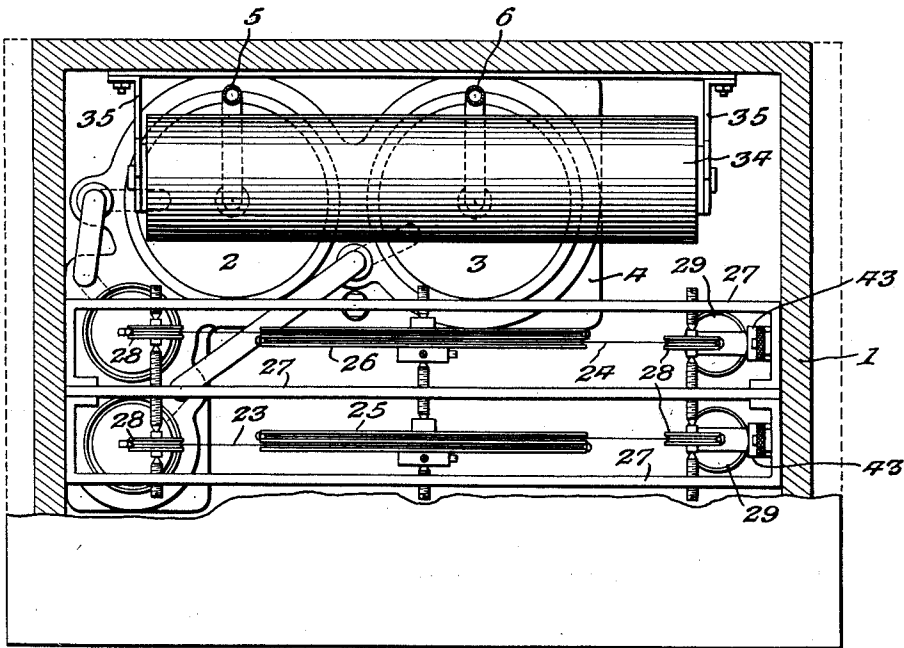
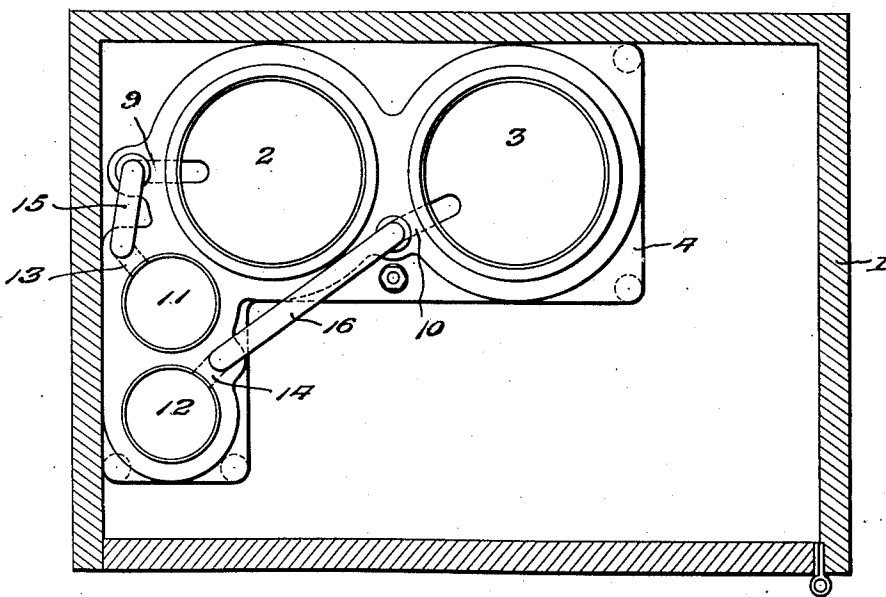


Fig. 5.



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6 SHEETS—SHEET 5.

Fig. 6.

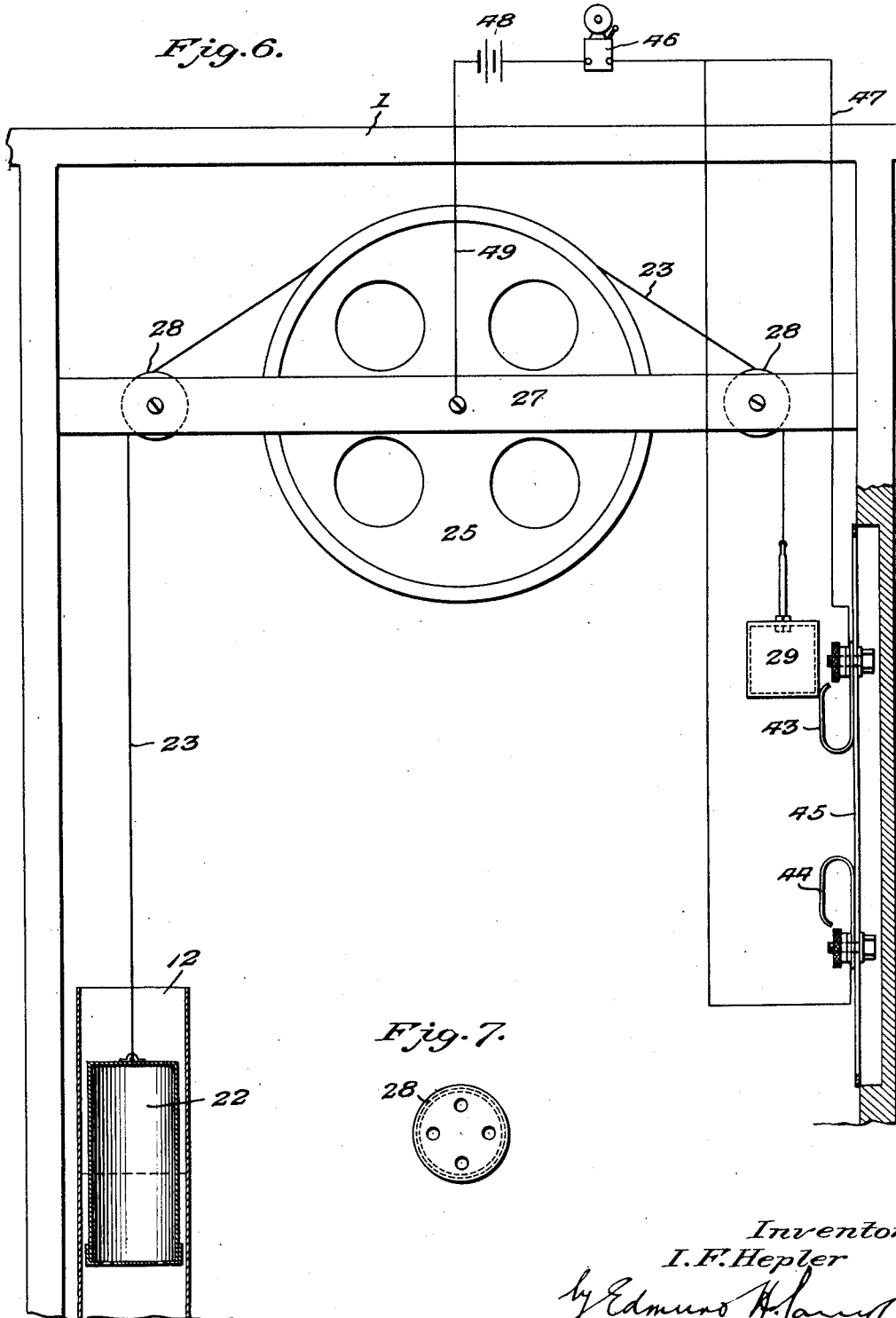
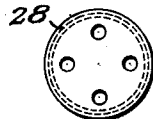


Fig. 7.



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6 SHEETS—SHEET 6.

Fig. 8.

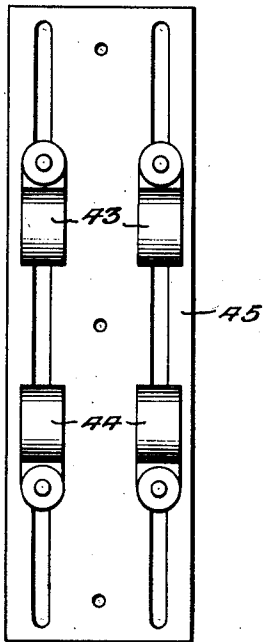


Fig. 9.

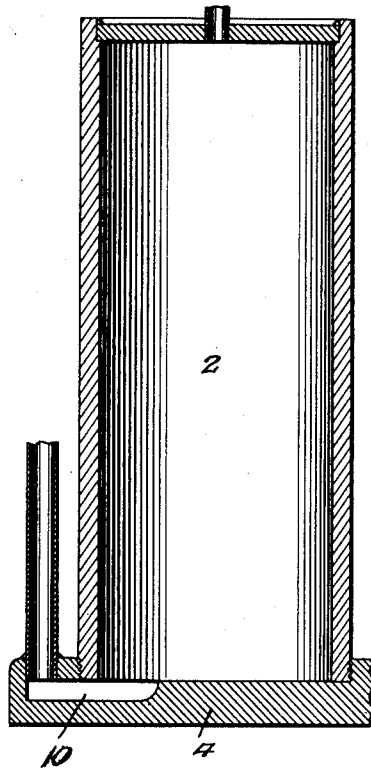


Fig. 10.

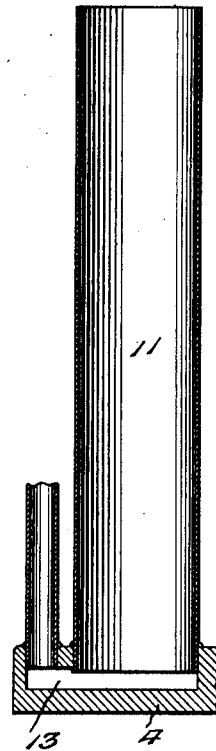
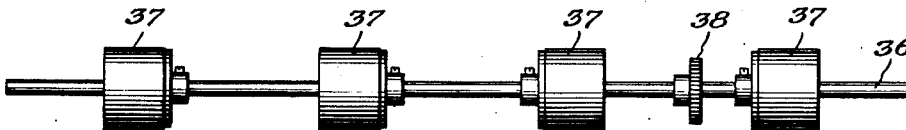


Fig. 11.



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UNITED STATES PATENT OFFICE.

IRVIN F. HEPLER, OF TYRONE, PENNSYLVANIA.

RECORDING DEVICE.

1,411,698.

Specification of Letters Patent.

Patented Apr. 4, 1922.

Application filed July 12, 1919. Serial No. 310,459.

To all whom it may concern:

Be it known that I, IRVIN F. HEPLER, a citizen of the United States of America, residing at Tyrone, in the county of Blair and State of Pennsylvania, have invented certain new and useful Improvements in Recording Devices, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention comprises a recording device. While its application is unrestricted, it is especially useful in connection with the recording of variations in pressure. The present embodiment has been designed with a view to make it especially applicable for use in connection with the regulation and control of furnaces, boilers and fuel consumers.

It is contemplated among the objects of the invention to provide pressure chambers which may be connected with any pressure medium. Associated with the pressure chambers are means for magnifying and regulating the variations of pressure so that these may be recorded. It is also contemplated, in the special application of this device to fuel consumers, to provide a connection with a draft inlet and a flue outlet, it being found that efficiency and economy in fuel consumption are to a great extent dependent upon proper draft regulation.

It is still a further object of the invention to place upon the recording medium lines indicating the maximum and minimum efficiency of a fuel consumer so that a permanent record may be kept of the conditions maintained in the fuel consumer during any given time. Provision is also made for varying the range and adjustment of these devices to accommodate different grades of fuel for instance, and means are provided in connection with the device for sounding an alarm when any predetermined limit in either direction is reached.

Still a further object is the production of a neat, compact, practical device which may be used in connection with either stationary or movable equipment, a feature which makes it especially useful in connection with fuel consumers on shipboard.

Other objects and advantages will in part be apparent and in part be brought out more clearly in the description which follows.

Drawings illustrating an embodiment of the invention are hereto annexed, the following views being shown:

Figure 1 is a view in front elevation showing a cabinet containing an embodiment of the device constituting the present invention;

Fig. 2 is a similar view, the door of the cabinet and a record sheet being removed;

Fig. 3 is a view in side elevation of the device, a portion of the cabinet being shown in section;

Fig. 4 is a view in top plan, a portion of the cover of the cabinet being removed;

Fig. 5 is a similar view showing an arrangement of pressure and float chambers;

Fig. 6 is a diagrammatic view illustrating a means for associating an alarm with the device;

Fig. 7 is a detail view of a part;

Fig. 8 is a view in front elevation showing a portion of the alarm instrumentality;

Figs. 9 and 10 are views in vertical section through a pressure chamber and float chamber, respectively;

Fig. 11 is a view in front elevation of a portion of a record sheet feeding device;

Figs. 12 and 13 are a side and end elevation of a pen forming a portion of a gage clip; and

Figs. 14 and 15 are similar views of the entire clip.

Referring specifically to the drawings, the numeral 1 designates generally a cabinet for containing the device and provided with a door through which access may be had thereto. Means are provided for connection with and to be acted upon by any source of pressure. To this end, pressure chambers 2 and 3 are mounted on a base 4 and may be connected as by pipes 5 and 6 with any instrumentality, the variations in the pressure of which it is desired to record. The pipe 5 is provided with a three-way cock 7 and the pipe 6 is provided with a three-way valve 8. The pressure chambers, as shown particularly in Figs. 9 and 10, have channels 9 and 10 extending through the base 4 and communicating with the interior of the chambers. Associated with these pressure chambers, there are float chambers 11 and 12, these likewise being provided with channels 13 and 14 disposed in the base and giving access to the interior of the float chamber. Pressure chamber 2 and float chamber

11 are in communication as by an upwardly-extending siphon pipe 15 connecting passages 10 and 13 and pressure chamber 3 and float chamber 12 are similarly connected, 5 through passages 9 and 14, by pipe 16. As shown particularly in Fig. 3, these pipes have means for connection with a flexible tube 17 as by a T and valve 18.

Oil is first introduced into the pressure 10 chamber or placed directly in the float chamber to minimize evaporation. Tube 17 is connected to a bottle of suitable liquid, such as water, and valve 18 opened. Three-way valve 8, or 7, as the case may be, is now 15 opened to the atmosphere. Water is introduced into the pressure chamber until oil shows at the opening in the three-way valve. This is now closed and enough water added until the flow is started over the bend in the 20 siphon tube. Valve 18 is next closed and the liquid seeks its level in the two chambers. The flow is regulatable as by valves 19 and 20, and this aids in minute adjustment of the apparatus, as will be later mentioned.

25 The float chamber in each instance is of smaller area than the pressure chamber, and in them are disposed floats 21 and 22. These are carried on wires or the like 23 and 24 passing over wheels or drums 25 and 26 on 30 supports 27. The wires are carried along over pulleys 28 and at their opposite ends carry counterweights 29. Penholders 30 and 31 are disposed on the drums 25 and 26 and normally bear on the surface of a record 35 sheet 32. This passes over a platen 33 fed from a drum 34, mounted in brackets 35.

When the liquid has sought its level in the float and pressure chambers as above described, the three-way cocks connecting the 40 pressure chamber with the points under observation are opened to the atmosphere and the pens adjusted properly at zero between two points on the record sheet established by means later to be described. When so ad- 45 justed, the valves are operated to establish communication with the points to be observed, and any fluctuations of pressure in pipes 5 and 6 leading to these points will be communicated in magnified amplitude to the 50 record pens.

This magnification of the record is partly in proportion to the difference in area between the pressure and float chambers, and partly assisted and controlled by the 55 siphon tubes and the valves therein, the tubes acting in the nature of manometer tubes connecting the float and pressure chambers.

Means are provided for feeding this sheet 60 continuously and as here shown comprise a shaft 36 carrying friction rolls 37 across which the record sheet is adapted to pass. This shaft is normally driven as by a sprocket 38 by any suitable gearing from a 65 motor or clock-works, not shown. Associ-

ated with the friction instrumentality, there is a pressure roll 39 normally held in engagement therewith as by a spring 40.

Means are provided for effecting disengagement of the feed, and as here shown 70 such means include a cam 41 actuatable through a handle 42 to act against the pressure of spring 40 to disengage the pressure roll from the feed rolls.

Associated with the device there is an 75 alarm mechanism which may be set to sound at predetermined extremes of movement of the floats. As here shown contact terminals 43 and 44 are slidably and adjustably mounted on a plate 45 as best seen in Figs. 6 and 80 8. This plate is in circuit with an alarm device 46 through wiring 47, battery 48 and wiring 49 connected with the drums 25 and 26. When counterweights 29, which are of 85 metal, contact with either of the terminals 43 or 44, a circuit is closed through the wires 23 or 24, as the case may be, and the alarm is sounded.

Means are also provided for setting up on the record-sheet lines of maximum efficiency 90 within which fires, burners, drafts or the like with which the device is associated, should be maintained. To this end, there is provided a transversely arranged gage pen support 50 upon which there is mounted 95 gage clip pens 51. These, as best seen in Figs. 12 to 15, comprise a pen portion 52 and a clip portion 53 adapted to be mounted on the rod 50.

In using the device in connection with a 100 furnace or boiler for instance, pipe 5 will be connected with the furnace draft while pipe 6 will be in communication with the stack draft. The pressure and float chambers will contain liquid which has been introduced as 105 previously described and this will be subjected to variation in the pressure in either the furnace or stack as communicated to these chambers through pipes 5 and 6. The 110 speed with which the pressure in these pipes may act upon the float chambers is regulable through valves 19 and 20. The position on the record chart around which the pens, carried by pen holders 30 and 31, may operate, is regulable by the amount of liquid in- 115 troduced into the chambers, and this is effected by a flexible tube 17, through which the liquid is introduced through the cock 18. It is desirable, when the normal conditions 120 accompanying maximum efficiency are attained, that the two pens occupy a position on the chart, one pen on each side of the center line of the chart, and equidistant therefrom. The location of the pen is con- 125 trollable by the amount of liquid introduced in the float chamber through valve 18 and the siphon tubes. The location of the pen having been established or regulated, the gauge clips 51 are set to establish the range 130 between which the respective pens may move 13

and record conditions conducive to the greatest efficiency. A departure from this desirable condition is recorded when the pens pass from between the parallel lines scored by the gauge pens. The location of the clips 51 will vary, this variation being dependent on quality of fuel to be used at different plants, or other local working conditions. The pens on holders 30 and 31 will score record lines between these limits, if maximum efficiency is being maintained. Any departure from the standard condition will be made visible as shown in the record in Fig. 1 by the left hand pen.

From the foregoing, it will be apparent that the present invention provides means for recording variations in pressure, magnifying these variations, regulating their effect upon the recording instrumentalities, establishing a permanent boundary between which the record should be kept for highest efficiency, and associating an alarm with these devices. It will be seen that it is capable of a large variety of uses, and while it has been shown in the embodiment herein described, it will be understood that many changes in the construction and arrangement and variations to permit its application in other connections are permissible and within the spirit and scope of the invention as set forth in the claims.

What I claim is:—

1. A device for recording variations of pressure, comprising a pressure-chamber; means for connecting it to a source of pressure medium; a float-chamber; a float associated therewith; a siphon connecting the float-chamber and pressure-chamber; an oscillating member disposed in operative relation to the float-chamber; an instrumentality connecting the oscillating member and the float; and a recording instrumentality associated with said oscillating member.

2. A device for recording variations of pressure, comprising a pressure-chamber; means for connecting it to a source of pressure medium; a second pressure-chamber; means for connecting it to another source of pressure medium; a float-chamber and float associated with each pressure-chamber; a siphon instrumentality connecting each float-chamber with its respective pressure-chamber; an oscillating member disposed in relation to each float-chamber; an instrumentality connecting each oscillating member and its respective float; and a recording instrumentality operable by each oscillating member.

3. A device for recording variations of pressure, comprising a pressure-chamber; means for connecting it to a source of pressure medium; a float-chamber; a float associated therewith; a siphon connecting the float-chamber and pressure-chamber; an oscillating member disposed in operative relation to the float-chamber; an instrumentality connecting the oscillating member and the float; and a recording instrumentality associated with said oscillating member.

4. A recording device comprising a closed pressure chamber; means for connecting the pressure chamber to a source of pressure; a float chamber containing a float disposed upon a flotation medium housed within the float chamber; a siphon connecting the float chamber and pressure chamber and through which changes of pressure in the pressure chamber are communicated to the float chamber; means for regulating the degree to which pressure changes in the pressure chamber will be communicated to the float chamber; an oscillating member disposed in proximity to the float chamber; a connecting instrumentality between said float and oscillating member; a recording device actuated by said oscillating member; an alarm circuit associated with the oscillating member; and means, controlled by the float, for opening and closing said alarm circuit.

5. A recording device comprising a closed pressure chamber; means for connecting the pressure chamber to a source of pressure; a float chamber containing a float disposed upon a flotation medium housed within the float chamber; a siphon connecting the float chamber and pressure chamber and through which changes of pressure in the pressure chamber are communicated to the float chamber; means for regulating the degree to which pressure changes in the pressure chamber will be communicated to the float chamber; an oscillating member disposed in proximity to the float chamber; a connecting instrumentality between said float and oscillating member; a recording device actuated by said oscillating member; an alarm circuit associated with the oscillating member; and means, controlled by the float, for opening and closing said alarm circuit; said means comprising a counterweight disposed upon the instrumentality connecting the float and oscillating member and adapted to contact with a terminal of the alarm circuit.

6. A device for recording variations of pressure, comprising a pressure chamber; means for connecting it to a source of pressure medium; a second pressure chamber; means for connecting it to another source of pressure medium; a float chamber containing a flotation medium and float associated with each pressure chamber; a siphon instrumentality connecting each float chamber with its respective pressure chamber; an oscillating member disposed in relation to each float chamber; an instrumentality connecting each oscillating member and its respective float; a recording instrumentality

operable by each oscillating member; and means for feeding a record sheet into operative relation to the recording instrumentality.

5 7. A device for recording variations of pressure, comprising a pressure chamber; means for connecting it to a source of pressure medium; a second pressure chamber; means for connecting it to another source of
10 pressure medium; a float chamber containing a flotation medium and float associated with each pressure chamber; a siphon instrumentality connecting each float chamber with its respective pressure chamber; an oscillating
15 member disposed in relation to each float chamber; an instrumentality connecting each oscillating member and its respective float; a recording instrumentality operable by each oscillating member; and means for feeding
20 a record sheet into operative relation to the recording instrumentality; said recording instrumentality being arranged to place a record of variations of pressure from one source upon the record sheet in proximity to a like
25 record from the other source of pressure.

8. A device for recording variations of pressure, comprising a pressure chamber; means for connecting it to a source of pressure medium; a second pressure chamber; means for connecting it to another source of
30 pressure medium; a float chamber containing a flotation medium and float associated with each pressure chamber; a siphon instrumentality connecting each float chamber with its respective pressure chamber; an oscillating
35 member disposed in relation to each float chamber; an instrumentality connecting each oscillating member and its respective float; a recording instrumentality operable by each oscillating member; and means for feeding
40 a record sheet into operative relation to the recording instrumentality; said recording instrumentality being arranged to place a record of variations of pressure from one source
45 upon the record sheet in proximity to a like record from the other source of pressure; and said record sheet carrying medial designations with which variations are comparable.

9. A device for recording variations of
50 pressure, comprising a pressure chamber; means for connecting it to a source of pressure medium; a second pressure chamber; means for connecting it to another source of pressure medium; a float chamber containing
55 a flotation medium and float associated with each pressure chamber; a siphon instrumentality connecting each float chamber with its respective pressure chamber; an oscillating member disposed in relation to each float
60 chamber; an instrumentality connecting each oscillating member and its respective float; a recording instrumentality operable by each oscillating member; means for feeding a record sheet into operative relation to the
65 recording instrumentality; an alarm circuit

associated with each oscillating member; and means, operable by each oscillating member, for opening and closing said alarm circuit.

10. A device for recording variations of pressure, comprising a pressure chamber; means for connecting it to a source of pressure medium; a second pressure chamber; means for connecting it to another source of
70 pressure medium; a float chamber containing a flotation medium and float associated with
75 each pressure chamber; a siphon instrumentality connecting each float chamber with its respective pressure chamber; an oscillating member disposed in relation to each float
80 chamber; an instrumentality connecting each oscillating member and its respective float; a recording instrumentality operable by each oscillating member; means for feeding a
85 record sheet into operative relation to the recording instrumentality; and means disposed in operative relation to the record sheet for imposing thereon designations of normal working conditions, with which said pressure-variation-records are comparable.

11. A device for recording variations of pressure, comprising a pressure chamber; means for connecting it to a source of pressure medium; a second pressure chamber; means for connecting it to another source of
95 pressure medium; a float chamber containing a flotation medium and float associated with each pressure chamber; a siphon instrumentality connecting each float chamber with its respective pressure chamber; an oscillating
100 member disposed in relation to each float chamber; an instrumentality connecting each oscillating member and its respective float; a recording instrumentality operable by each oscillating member; means for feeding a
105 record sheet into operative relation to the recording instrumentality; means disposed in operative relation to the record sheet for imposing thereon designations of normal working conditions, with which said pressure-variation-records are comparable; and means for adjusting the position of said means.

12. A device for recording variations of pressure, comprising a pressure chamber; means for connecting it to a source of pressure medium; a second pressure chamber; means for connecting it to another source of pressure medium; a float chamber containing a flotation medium and float
120 associated with each pressure chamber; a siphon instrumentality connecting each float chamber with its respective pressure chamber; an oscillating member disposed in relation to each float chamber; an instrumentality connecting each oscillating
125 member and its respective float; a recording instrumentality operable by each oscillating member; means for feeding a record sheet into operative relation to the re-

cording instrumentality; and a valve disposed in the means connecting each pressure chamber with its respective source of pressure.

13. A recording instrumentality comprising a base, separate draft chambers and float chambers mounted on said base, siphon members connecting said draft and float chambers, means for varying the pressure in said draft chambers, valves associated with said siphon members for regulating the velocity of the action of the pressure in the pressure chambers upon said float chambers, a float disposed within each float chamber, a drum rotatably mounted in proximity to each float chamber, a member passing around said drum and connected at one end to a float, a counterweight on the other end of each member, recording mechanism carried and actuable by said drum, and means for feeding a record sheet into association with said recording instrumentality.

14. A recording instrumentality comprising a base, separate draft chambers and float chambers mounted on said base, siphon members connecting said draft and float chambers, means for varying the pressure in said draft chambers, valves disposed in said siphon members for regulating the velocity of the action of the pressure in the pressure chambers upon said float chambers, a float disposed within each float chamber, a drum rotatably mounted in proximity to each float chamber, a member passing around said drum and connected at one end to a float, a counterweight on the other end of each member, recording mechanism carried and actuable by said drum, means for feeding a record sheet into association with said recording instrumentality, said means comprising a platen over which the record sheet travels, a feed roll, means for driving the feed roll, and a pressure roll associated with the feed roll and between which rolls the record sheet is adapted to pass.

15. A recording instrumentality comprising a base, separate draft chambers and float chambers mounted on said base, siphon members connecting said draft and float chambers, means for varying the pressure in said draft chambers, valves disposed in said siphon members for regulating the velocity of the action of the pressure in the pressure

chambers upon said float chambers, a float disposed within each float chamber, a drum rotatably mounted in proximity to each float chamber, a member passing around said drum and connected at one end to a float, a counterweight on the other end of each member, recording mechanism carried and actuable by said drum, means for feeding a record sheet into association with said recording instrumentality, said means comprising a platen over which the record sheet travels, a feed roll, means for driving the feed roll, a pressure roll associated with the feed roll and between which rolls the record sheet is adapted to pass, and means for disengaging the pressure and feed rolls.

16. A recording instrumentality comprising a base, separate draft chambers and float chambers mounted on said base, siphon members connecting said draft and float chambers, means for varying the pressure in said draft chambers, valves disposed in said siphon members for regulating the velocity of the action of the pressure in the pressure chambers upon said float chambers, a float disposed within each float chamber, a drum rotatably mounted in proximity to each float chamber, a member passing around said drum and connected at one end to a float, a counterweight on the other end of each member, recording mechanism carried and actuable by said drum, means for feeding a record sheet into association with said recording instrumentality, said means comprising a platen over which the record sheet travels, a feed roll, means for driving the feed roll, a pressure roll associated with the feed roll and between which rolls the record sheet is adapted to pass, means for disengaging the pressure and feed rolls, said means comprising a spring member upon which said pressure roll is mounted and normally holding the pressure roll in engagement with the feed roll, and a cam mechanism for forcing the pressure roll out of engagement with the feed roll.

In testimony whereof I affix my signature in presence of two witnesses.

IRVIN F. HEPLER.

Witnesses:

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MARGARET A. PIPER.