

(No Model.)

E. L. SHARPNECK & G. F. KNOX.
FLUID PRESSURE REGULATOR.

No. 592,212.

Patented Oct. 19, 1897.

Fig. 2.

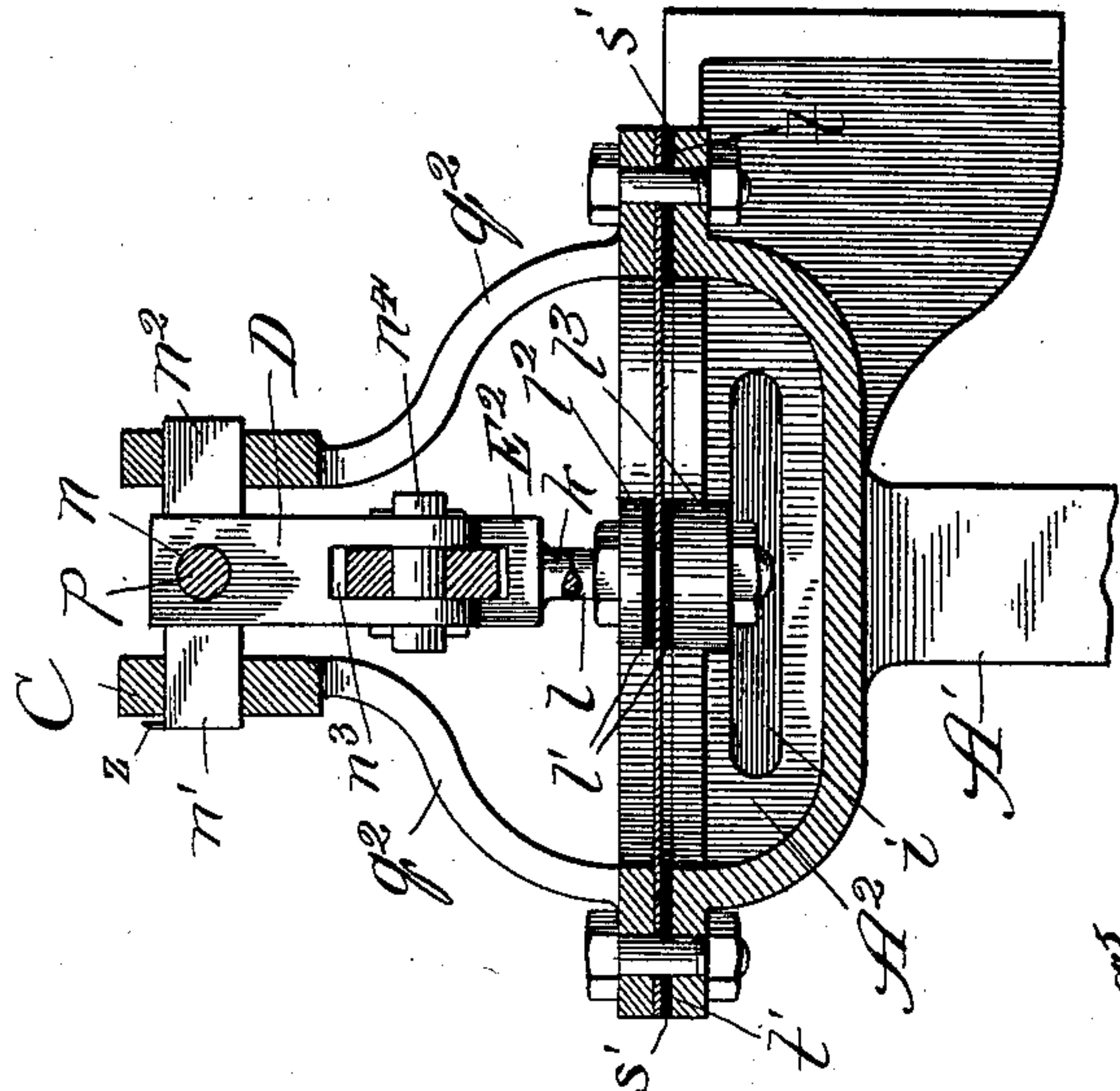


Fig. 3.

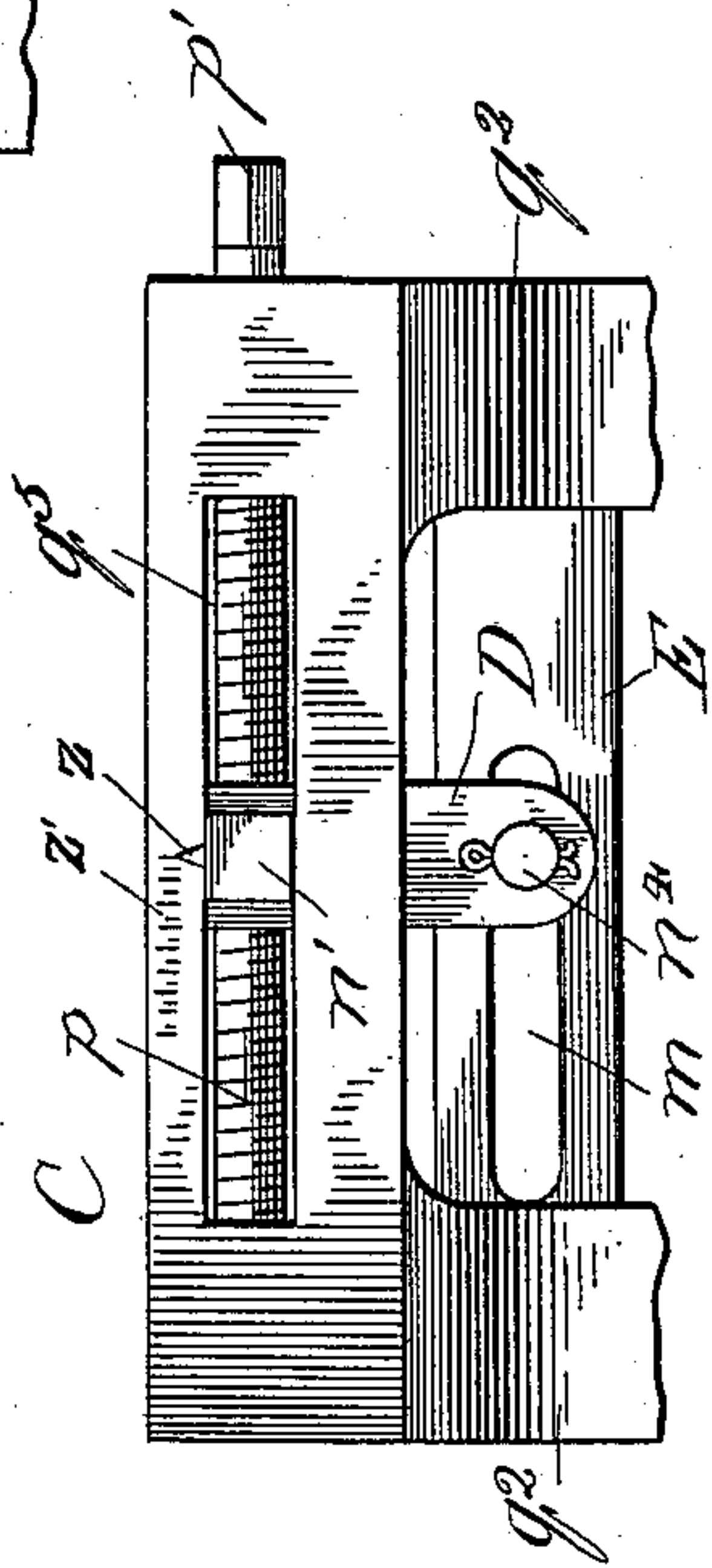
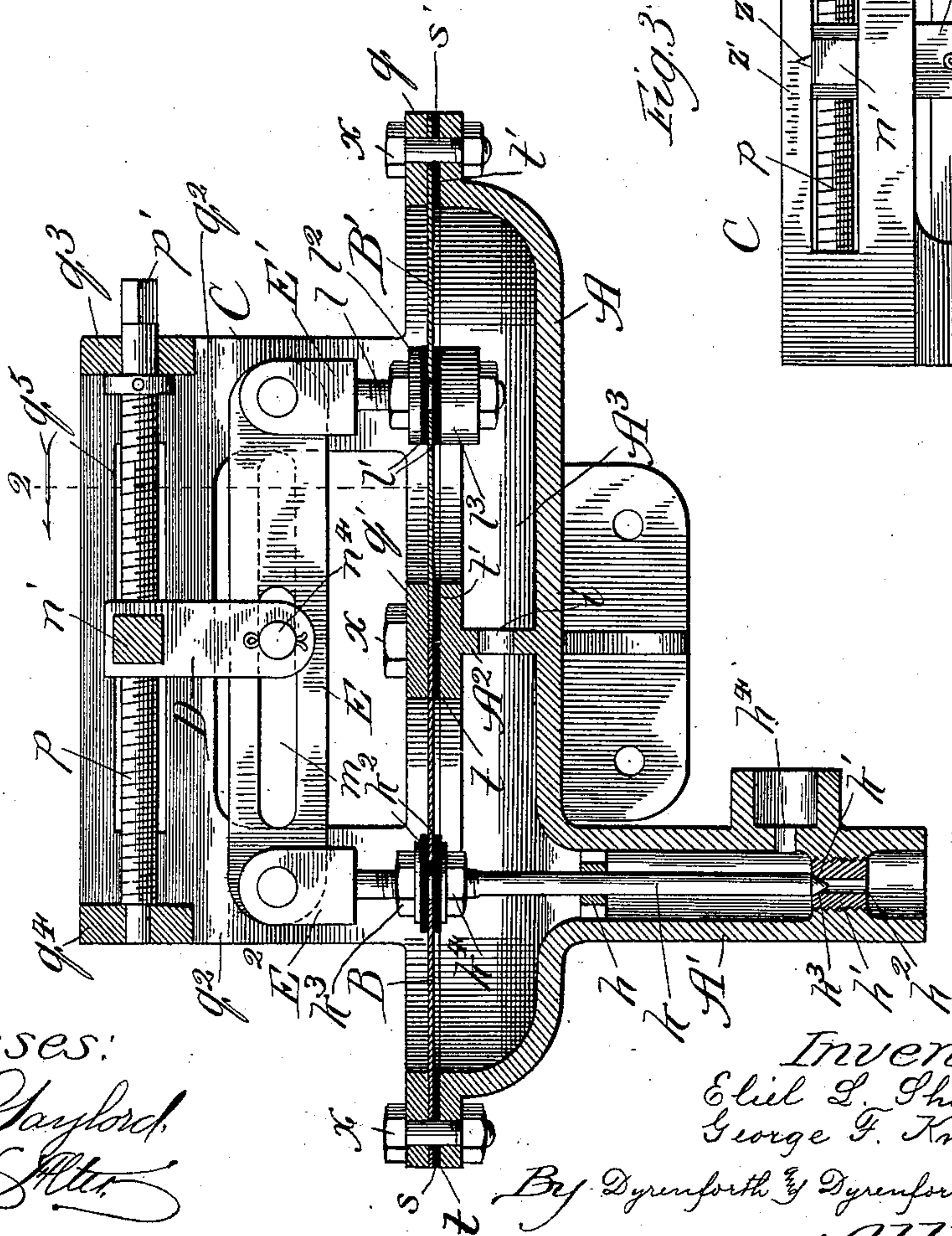


Fig. 1.



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UNITED STATES PATENT OFFICE.

ELIEL L. SHARPNECK AND GEORGE F. KNOX, OF CHICAGO, ILLINOIS.

FLUID-PRESSURE REGULATOR.

SPECIFICATION forming part of Letters Patent No. 592,212, dated October 19, 1897.

Application filed January 28, 1896. Serial No. 577,123. (No model.)

To all whom it may concern:

Be it known that we, ELIEL L. SHARPNECK and GEORGE F. KNOX, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Fluid-Pressure Regulators for Refrigerating-Machines, of which the following is a specification.

This invention relates to improvements in fluid-pressure regulators generally, though more especially to a regulator of the class adapted for use in refrigerating-machines which employ anhydrous ammonia as a cooling agent, the regulator operating automatically to control the inflow of ammonia to the refrigerating coil or chamber, and being governed in its action by the pressure of ammonia-gas in the refrigerating coil or chamber, whereby the said pressure is maintained practically uniform.

The object is to provide a regulator of an improved, simple, and durable construction, which may be set to limit the pressure in the refrigerating coil or chamber to any desired degree, and which will be exceedingly sensitive and positive in its operation.

To the above ends the invention consists in the general construction of the improved regulating device; and it further consists in details of construction and combinations of parts, all as hereinafter set forth and claimed.

In the drawings, Figure 1 is a longitudinal central section of the device; Fig. 2, a section taken on line 2 of Fig. 1 and viewed in the direction of the arrow, and Fig. 3 a broken elevation of the upper end portion of the device.

A is an oblong shell or casing provided in its under side with a tubular extension A'. In the shell is a partition A², and the upper surface of the partition and edge portions of the shell form two annular seats t t'. Fitting upon the seat t is an annular, preferably rubber, gasket s, and fitting upon the seat t' is an annular, preferably rubber, gasket s'. Fitting upon the seat formed by the gasket s is a movable abutment or flexible diaphragm B, and fitting upon the seat afforded by the gasket s' is a movable abutment or flexible diaphragm B'.

C is a frame or casting having a circumferential base portion q, which fits upon the rim

of the shell A, and a cross-plate q', which fits upon and conforms to the upper edge portion or bearing-surface of the partition A². On the base or rim q, at opposite sides of the longitudinal center, are yokes q² q², connected together at opposite ends at their tops by vertically-disposed cross-plates q³ q⁴. Journaled at opposite ends in the cross-plates q³ q⁴, and extending longitudinally and centrally between the yokes q², is a screw p, provided beyond the plate q³ with a squared end p' to receive a suitable crank. (Not shown.)

D is a block or hanger provided in its upper end portion with a threaded opening n to receive the screw p. At opposite sides of the upper end portion of the hanger are lugs or wings n' n², which pass through and slide in longitudinally-extending guide-slots q⁵ in the yoke-frames q². The lower end portion of the hanger D is bifurcated and affords a recess n³, across which extends a roller n⁴, which is journaled in the forks of the hanger.

E is a beam or lever provided with a longitudinally-extending slot m, at which it is mounted between its ends upon the roller n⁴. Pivotally suspended from one end of the lever E is a link E', having a threaded stem portion l, which passes through an opening in the center of the diaphragm B'. Surrounding the stem l at the diaphragm are preferably rubber washers l', and upon the stem and bearing against the said washers are nuts l² l³, which clamp the washers and diaphragm between them and fasten them to the stem l. Pivotally connected to the opposite end of the lever E is a link E², having a long stem portion k, tapered at its free end to afford a valve k'. The upper portion of the stem k is threaded and passes through an opening in the center of the diaphragm B. Surrounding the stem at opposite sides of the diaphragm are, preferably rubber, washers k² and upon the stem are nuts k³ k⁴, which clamp the washers and diaphragm between them and fasten them to the stem k. The diaphragms B B' are clamped at their circumferential edges upon the gaskets s s' by the rim q and cross-plate q' of the frame C by means of bolts x or other fastening means, which secure them rigidly to the shell. The diaphragms B B' form a gas-tight cover for the open end portion of the shell A, and the partition A² is

provided with one or more openings i through it, so that the interior of the shell A forms practically one continuous chamber A^3 . The stem k passes through a winged guide or spider h in the tubular extension A' , and in the lower part of the said tubular extension is a bushing h' , provided with a small inlet port or passage h^2 , shaped at its upper end to afford a valve-seat h^3 for the valve k' . Above the valve-seat h^3 is an outlet-port h^4 . The lever E is fulcrumed upon the roller n^4 and the fulcrum may be changed at will by turning the screw p to move the hanger D longitudinally of the yoke-frame.

In the device shown the diaphragms B B' are of the same size and present the same area to the chamber A^3 . When the roller or fulcrum n^4 is midway between the ends of the lever, the diaphragms will afford equal resistance against pressure of gas in the chamber A^3 . Movement of the fulcrum to the left in Fig. 1 will increase the relative leverage at the diaphragm B' and diminish that at the diaphragm B , whereby gas-pressure in the chamber A^3 exerted against the diaphragm B' will overcome the resistance against the diaphragm B , so that the tendency will be to swing the lever E to raise the link E' and lower the link E'' , causing the valve k' to be pressed against the seat h^3 and close the inlet-port h^2 .

In practice, in a refrigerating apparatus, the port h^2 will communicate with a liquid-ammonia-supply pipe, and the port h^4 will communicate with a pipe leading to the refrigerating coil or chamber. Presuming, for example, that the liquid ammonia is supplied under a pressure of, say, one hundred and fifty pounds to the inch, and it is desired to maintain a pressure of, say, forty pounds in the refrigerating conduit or coil, the fulcrum of the lever is so adjusted that pressure against the diaphragm B' will overcome the same pressure against the diaphragm B , supplemented by the pressure at the port h^2 against the valve k' , whenever the pressure in the chamber A^3 exceeds forty pounds to the square inch. Thus whenever the pressure in the chamber A^3 and refrigerating coil or conduit (which are in open communication through the port h^4) is below forty pounds to the square inch the pressure against the diaphragm B , supplemented by that against the valve k' , will overcome the resistance of the diaphragm B' , whereby the lever will be swung to open the valve k' . On the wing or lug n' of the hanger D a pointer z may be provided to move upon a scale z' to indicate the adjustment. The scale may, if desired, indicate the number of pounds of pressure

which are required in the refrigerating coil or conduit to shut off the supply through the port h^2 .

The construction shown and described is particularly simple and inexpensive. It employs no springs and is not likely to get out of order. It is desirable in refrigerating apparatus, particularly of the smaller or domestic type, to provide for the most perfect regulation of pressure in the refrigerating coil or chamber, and for maintaining the said pressure practically constant and uniform. In the present device the adjustment by change of fulcrum, as described, affords regulating means which is not only as sensitive and positive in its action as could be desired, but which is easy to adjust and when once adjusted requires no attention whatever. It is not necessary that the diaphragms should be of the same area, though this construction is preferred. Any other form of diaphragms, whether flexible, which is the form preferred, or inflexible, as in the case of pistons or other movable abutments, may be substituted for the form described without departure from the invention.

While it is preferred to provide the device throughout as shown and described, it may be modified in the matter of details of construction without departing from the spirit of the invention as defined by the claim.

What we claim as new, and desire to secure by Letters Patent, is—

In a fluid-pressure regulator, the combination of a chamber having a depending tubular portion provided with an inlet-port having a valve-seat, and with an outlet, separate diaphragms at said chamber movable under accumulated pressure therein, a valve-stem connected with one of the diaphragms and carrying a valve for the seat at the inlet-port, a lever pivotally connected at opposite end portions with the respective diaphragms, and slotted between said end portions, a frame provided with longitudinally-disposed yokes having guide-slots, a transverse sliding block having lugs or wings movable in said slots and recessed to receive the lever, a roller on the block engaging the slot in the lever to afford a fulcrum for the latter and a screw mounted in the frame and engaging a threaded opening in the block to move the latter, substantially as and for the purpose set forth.

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In presence of—
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