

(No Model.)

2 Sheets—Sheet 1.

J. B. KNICKERBOCKER.
NATURAL GAS MIXER.

No. 561,404.

Patented June 2, 1896.

FIG. 1.

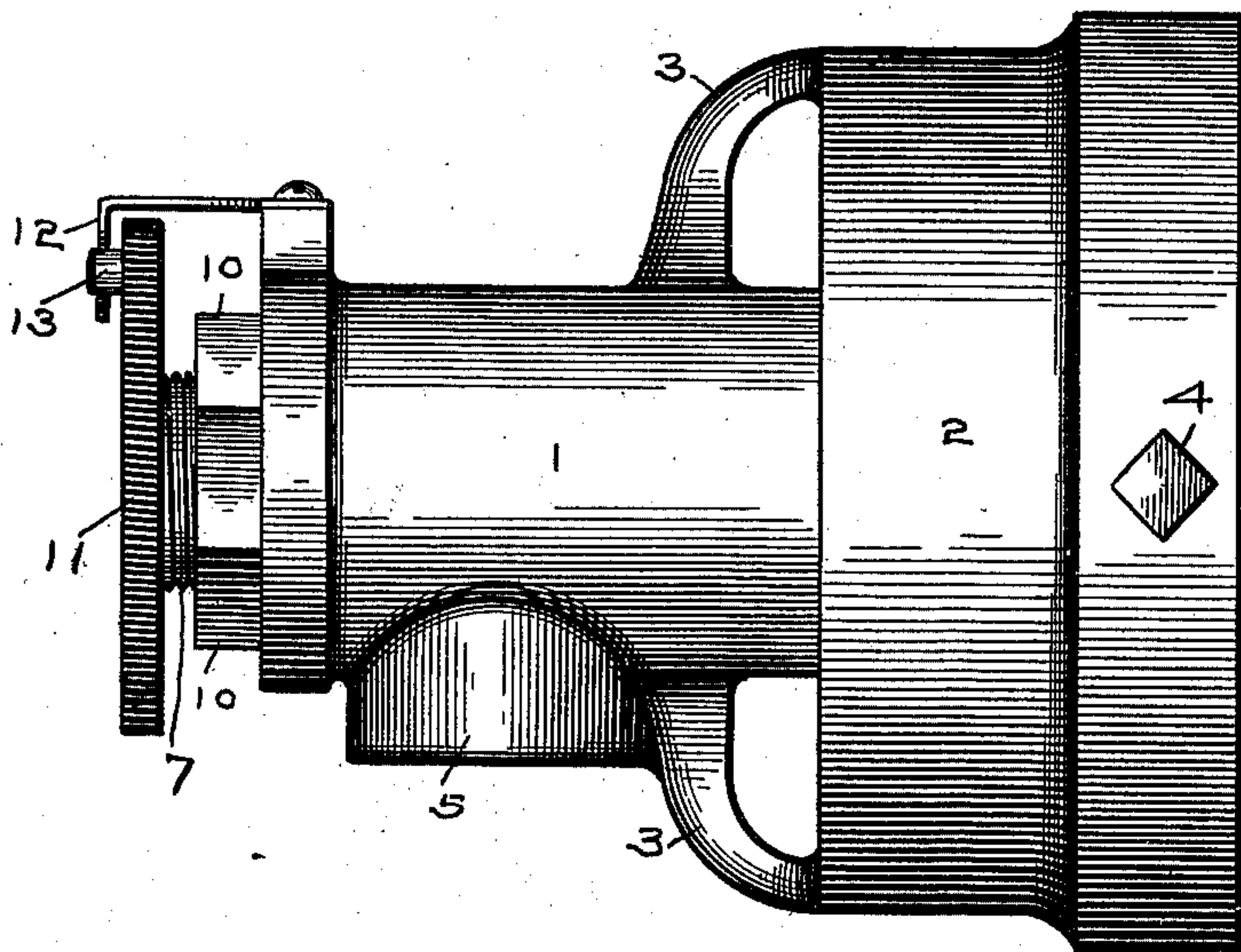
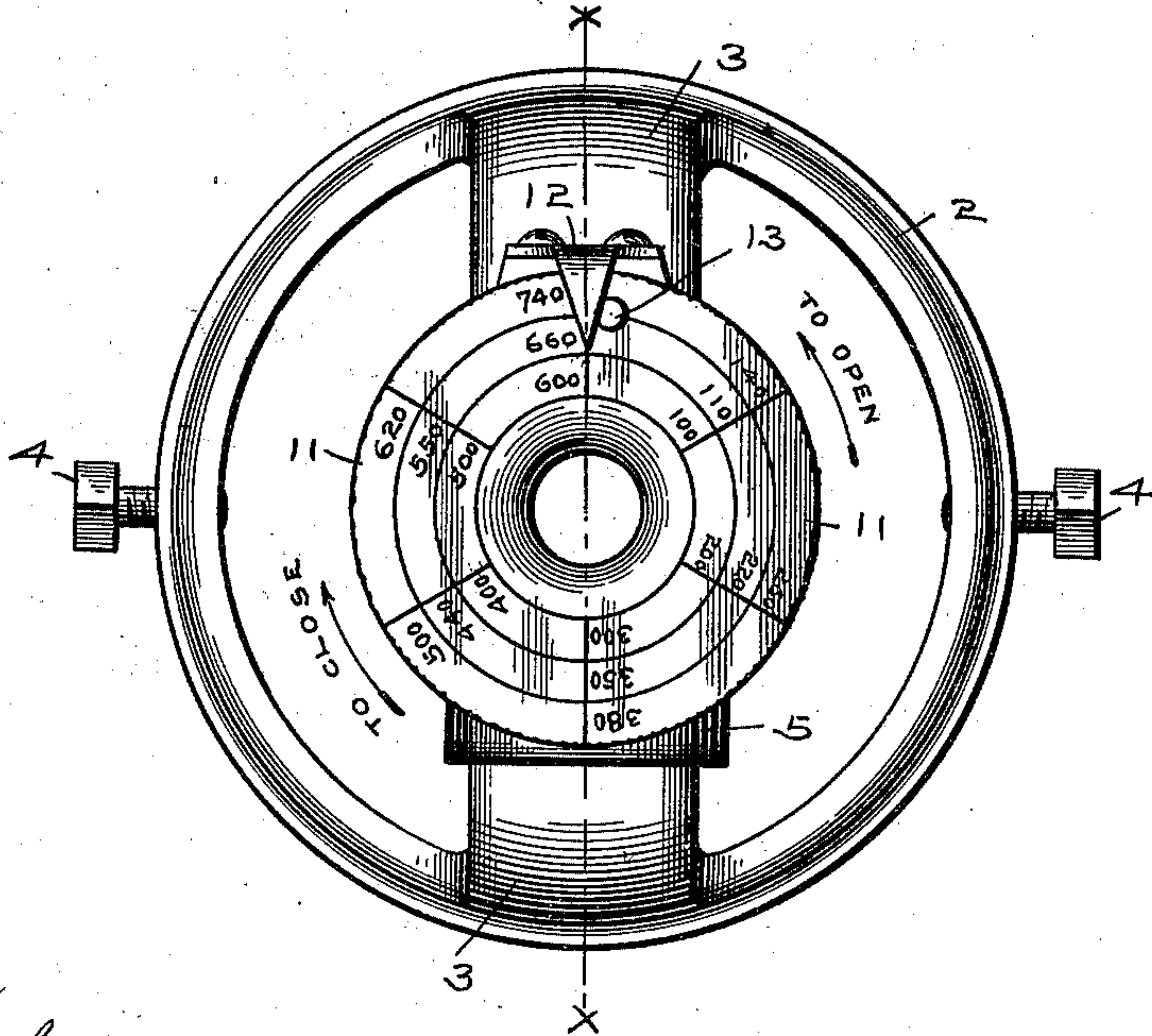


FIG. 2.



Witnesses
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(No Model.)

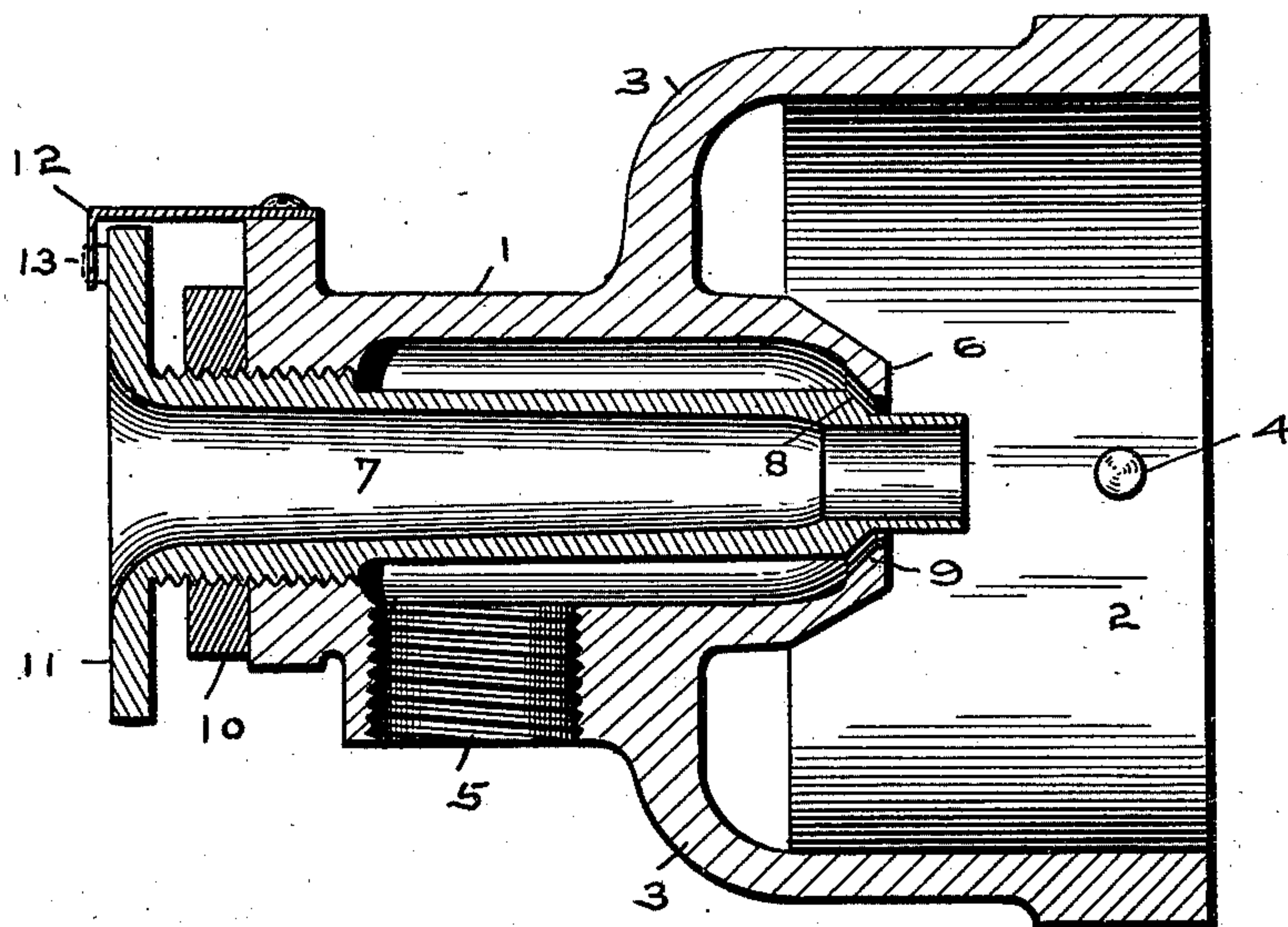
2 Sheets—Sheet 2.

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NATURAL GAS MIXER.

No. 561,404.

Patented June 2, 1896.

FIG. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

JAMES B. KNICKERBOCKER, OF INDIANAPOLIS, INDIANA, ASSIGNOR TO
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NATURAL-GAS MIXER.

SPECIFICATION forming part of Letters Patent No. 561,404, dated June 2, 1896.

Application filed March 11, 1895. Serial No. 541,262. (No model.)

To all whom it may concern:

Be it known that I, JAMES B. KNICKERBOCKER, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Natural-Gas Mixers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to new and useful improvements in mixers, and more particularly to one of that class which is designed to mix a proper proportion of air with natural gas before it is burned; and the object is to provide such a mixer that will perform, first, the office of mixing air with the gas in an improved manner to secure more perfect combustion; second, one that will also serve as a cut-off or regulating-valve for the gas which passes through it, and, third, one that indicates or measures at all times the amount of gas that is passing through it.

In the drawings, where the preferred form of my mixer is shown, Figure 1 is a side elevation of the mixer. Fig. 2 is a front elevation of the same, showing its indicating dial or face; and Fig. 3 is a longitudinal section through the mixer, taken on the line X X of Fig. 2.

In detail, 1 represents the body or shell of the mixer, which is provided with the enlarged inner end 2, forming a mixing-chamber, this part being cylindrical and connected with the first by arms 3, thus leaving an air-space between the two parts.

4 are set-screws which hold the end of a pipe (not shown) which fits in the end of the mixer, and through which the gas and air pass after they have been properly mixed and before being burned.

5 is the gas-inlet to the mixer, to which is connected a supply-pipe, and 6 is a contracted nozzle formed on the inner end of the mixer-shell 1, this nozzle extending into the enlarged part 2 thereof. The outer end of the mixer has an opening therein which is screw-

threaded for the reception of a hollow stem 7, the inner end of which is contracted in size and when in place projects through the nozzle 6, the end of the larger part of the stem 7 forming a valve, as at 8, which is adapted to seat against an inner face or seat 9 on the nozzle if it is desired to cut the gas entirely off through the mixer.

10 is a lock-nut which screws on the screw-threaded portion of the stem 7, and when screwed up on such stem tightly against the outer end of the mixer holds the stem in any position it may be set.

11 is a dial or face on the outer end of the hollow stem 7, and this dial also serves as a handle for turning the stem. There are marks on the dial or face to indicate the amount of gas that is passing through the mixer at any time, 12 being a pointer which is fixed to the mixer and its end projecting over the face of the dial in line with the indicating-marks.

13 is a stop on the dial-face to prevent such dial-face and its stem from being turned more than once around, for the stop will then engage with the pointer 12.

It will be noticed that there are three rows of indicating-figures on the dial, these three rows showing the number of cubic feet of gas which would pass through the mixer under three different pressures—namely, eight, twelve, and sixteen ounce, these being the pressures most common.

In making a mixer such as I have described, to correctly mark the stem-dial, after the mixer has been completed with the exception of the dial-numbers, a perfectly correct meter is connected with the gas-supply pipe, the supply-pipe being also connected with the mixer. Then the valve 8 of the stem 7 is opened by means of the dial 11, which serves as a handle, until the meter indicates that there is one hundred feet of gas per hour passing through it and the mixer and, we will suppose, at an eight-ounce pressure. The dial is then marked and turned until the meter indicates two hundred feet of gas per hour passing through the meter, when the dial is marked again, and so on until the dial has been marked up to the full capacity of the mixer and for the different gas-pressures,

so that at any time thereafter, when in use, the stem-dial will show how much gas is passing through the mixer at a given pressure.

It is impossible to increase the amount of
5 gas through the mixer by manipulating it, as the dial will only turn once before the stop 13 strikes the pointer 12, and even should the pointer be removed from the mixer the stem 7 would have to be entirely unscrewed
10 from the mixer before the opening between the valve 8 of the stem and the seat 9 of the nozzle was increased in size. This is caused by the fact that the contracted inner end of the stem is of sufficient length to extend
15 through the opening in the nozzle a distance which will insure that a portion of said end will be within said opening until the stem has been backed out of its seat until it is free from its screw-threaded connection therewith.
20 Thus the end of the stem cannot be withdrawn inside of the nozzle to increase the space between such nozzle and stem without entirely unscrewing the stem from the mixer, which would cause such mixer to become use-
25 less.

When the mixer is being used to its full capacity, the air-draft may be increased or decreased by adjusting said stem so that said end will extend a greater or less distance with-
30 in the mixing-casing, said end thus serving a double function, as will be readily understood.

In the drawings the mixer is shown open to its full capacity at any pressure, and it only requires one complete turn of the dial or face-
35 plate in the direction of the arrow (to close) to completely cut off the gas supply through the mixer.

It will be noticed that there are two air-currents mixed with the gas as it escapes from
40 the nozzle 6, one current being through the central opening of the stem 7 and inside of the circular opening of the nozzle through which the gas escapes and the other through the mixer outside of the nozzle. The most
45 perfect mixing of the air with the gas is thus obtained, and therefore most perfect combustion, this result being due more to the fact of the mixing of air with the gas within the body of the gas itself.

50 In addition to the benefit derived from the mixer both as a mixer and a gas cut-off is the fact that it is a measuring-mixer and always shows the amount of gas which is being con-

sumed. This is of great advantage where a new boiler or other gas-consuming outfit is
55 put in, for the amount of gas which is required to run it can be readily ascertained by the mixer, which is to be used thereafter, and if the gas is to be supplied by the month or year a fair estimate can be made of what
60 will be consumed in the future.

The mixer is simple in construction, cheap to manufacture, easy to operate, and, serving the several purposes it does, is a great improvement over those in ordinary use. 65

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination, in a gas-mixer, of an open mixing-shell, a gas-chamber connected
70 therewith provided with a discharge-nozzle within said shell and connected to a gas-supply pipe, a valve-seat being provided just within said discharge-nozzle, a hollow open-ended valve-stem mounted in the outer end
75 of said chamber by a screw-threaded connection and extending through the nozzle at its inner end and provided with an annular valve at the proper point to seat in the valve-seat in said nozzle, its inner end extending
80 through and some distance beyond said nozzle, whereby the longitudinal adjustment of said stem will operate to regulate the air-draft through the same, substantially as set forth. 85

2. The combination, in a gas-mixer, of the mixing-shell, the gas-chamber connected therewith, and provided with a receiving-opening and a discharge-nozzle, a valve-seat in said nozzle, and a valve-stem mounted by
90 a screw-threaded connection in the outer end of said chamber and provided with a valve near its inner end, which is adapted to seat in the valve-seat of said nozzle, said stem extending beyond said valve a distance greater
95 than the distance between the forward end of the screw on its outer end and the rear end of the screw within the chamber or casing at a time when the valve is seated, substantially as set forth. 100

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

JAMES B. KNICKERBOCKER.

Witnesses:

H. D. NEALY,
J. C. BAKER.