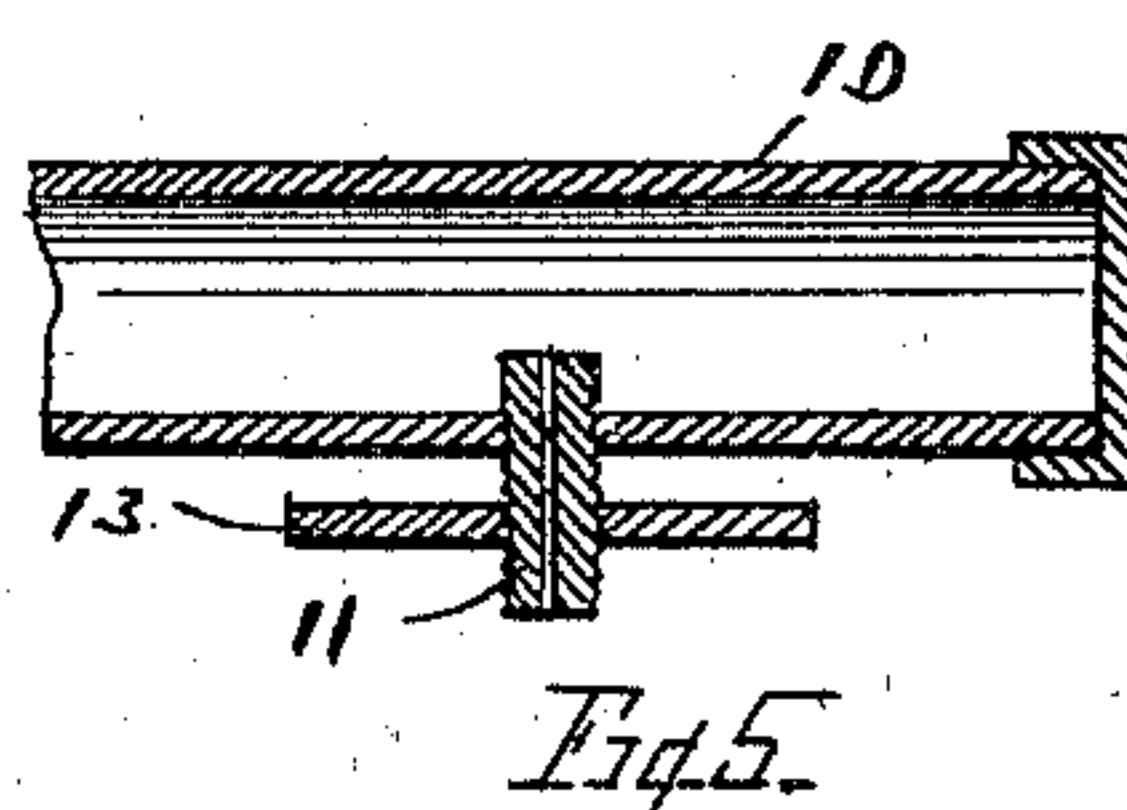
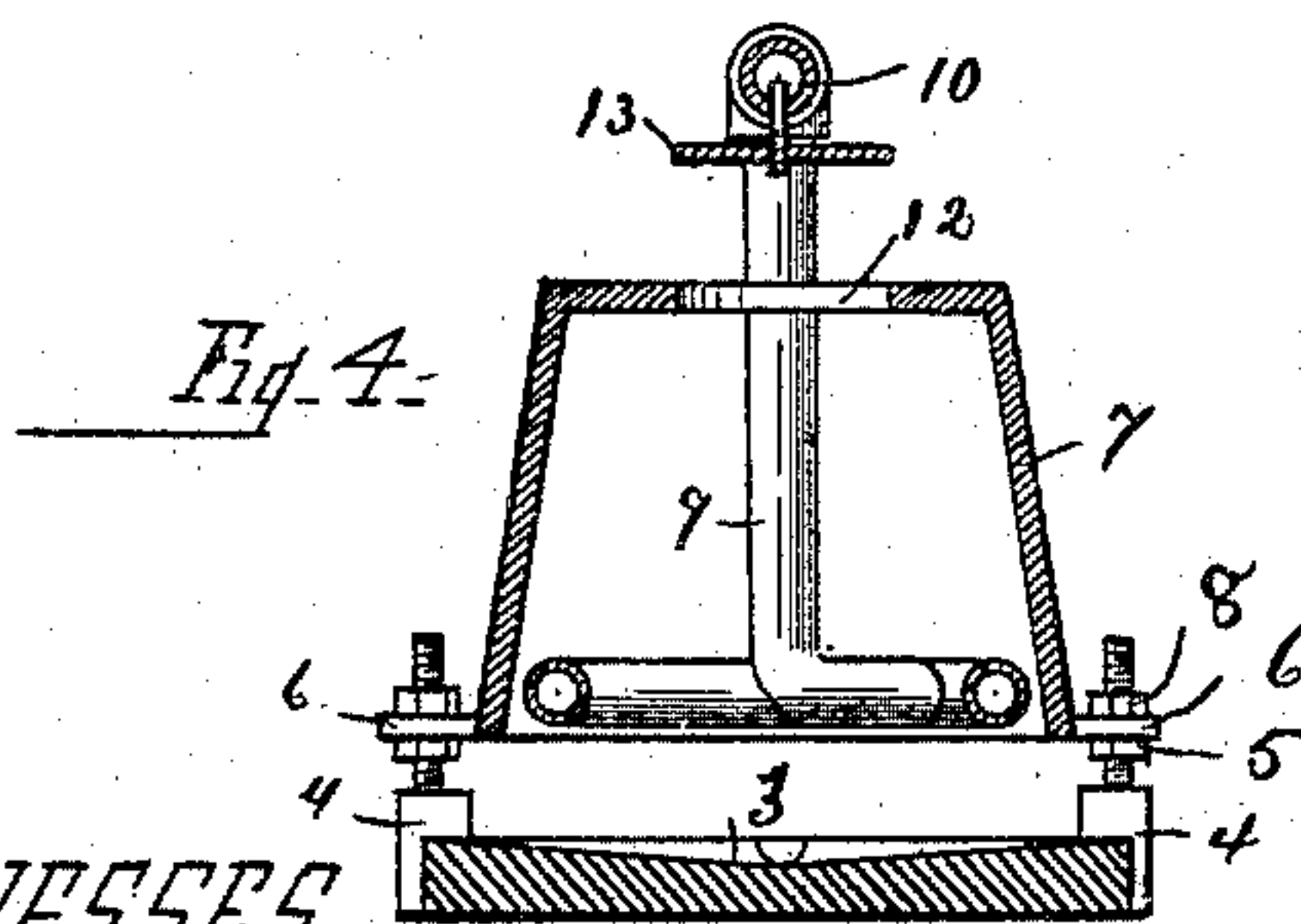
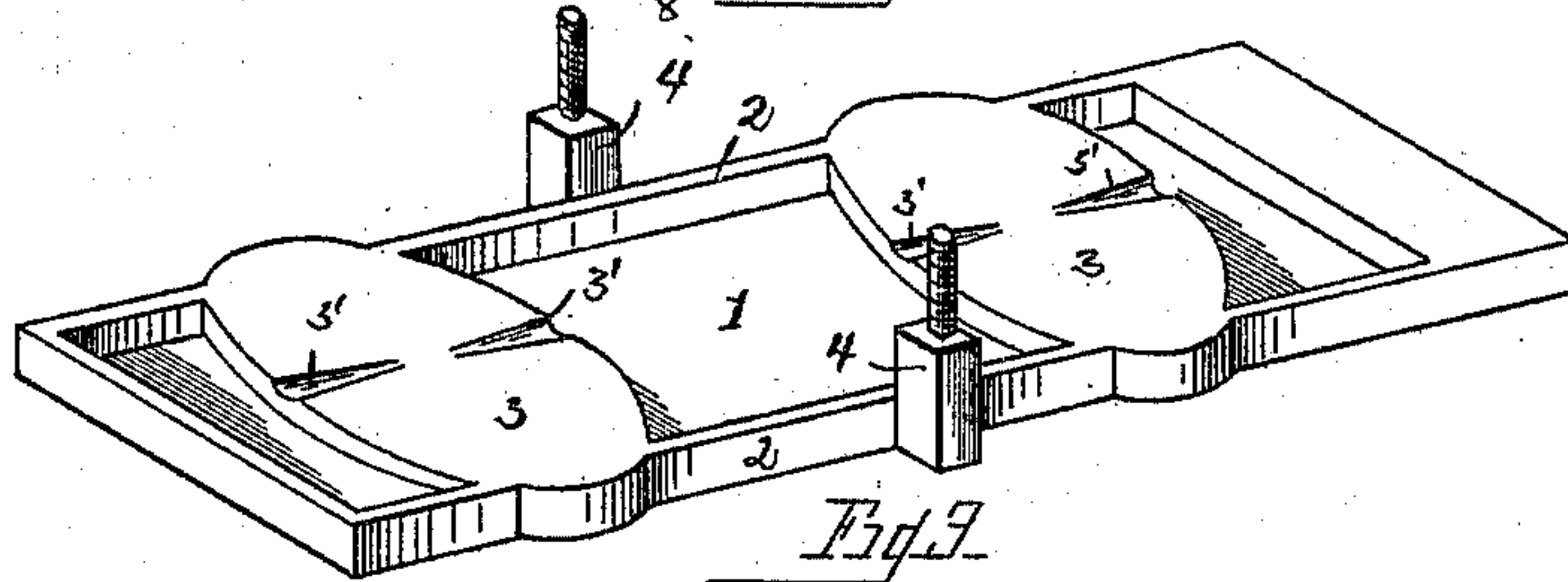
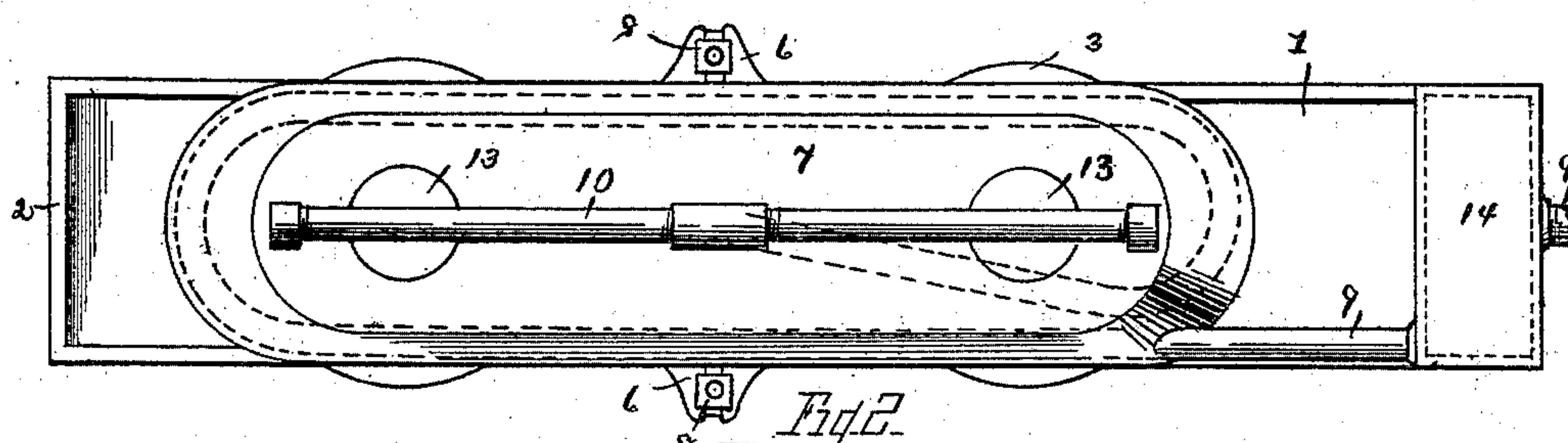
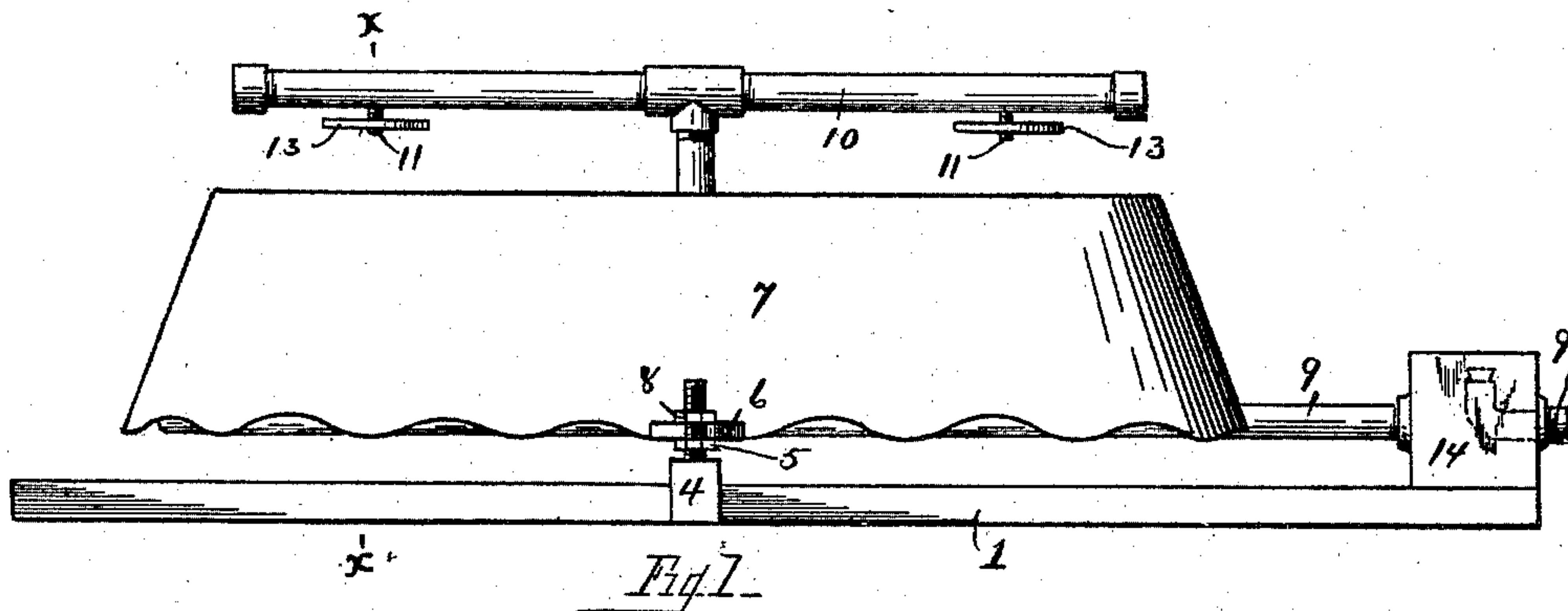


(No Model.)

B. N. HAWES.  
HYDROCARBON BURNER.

No. 492,466.

Patented Feb. 28, 1893.



WITNESSES.

Samuel J. Webster.  
Grace E. Lehaney.

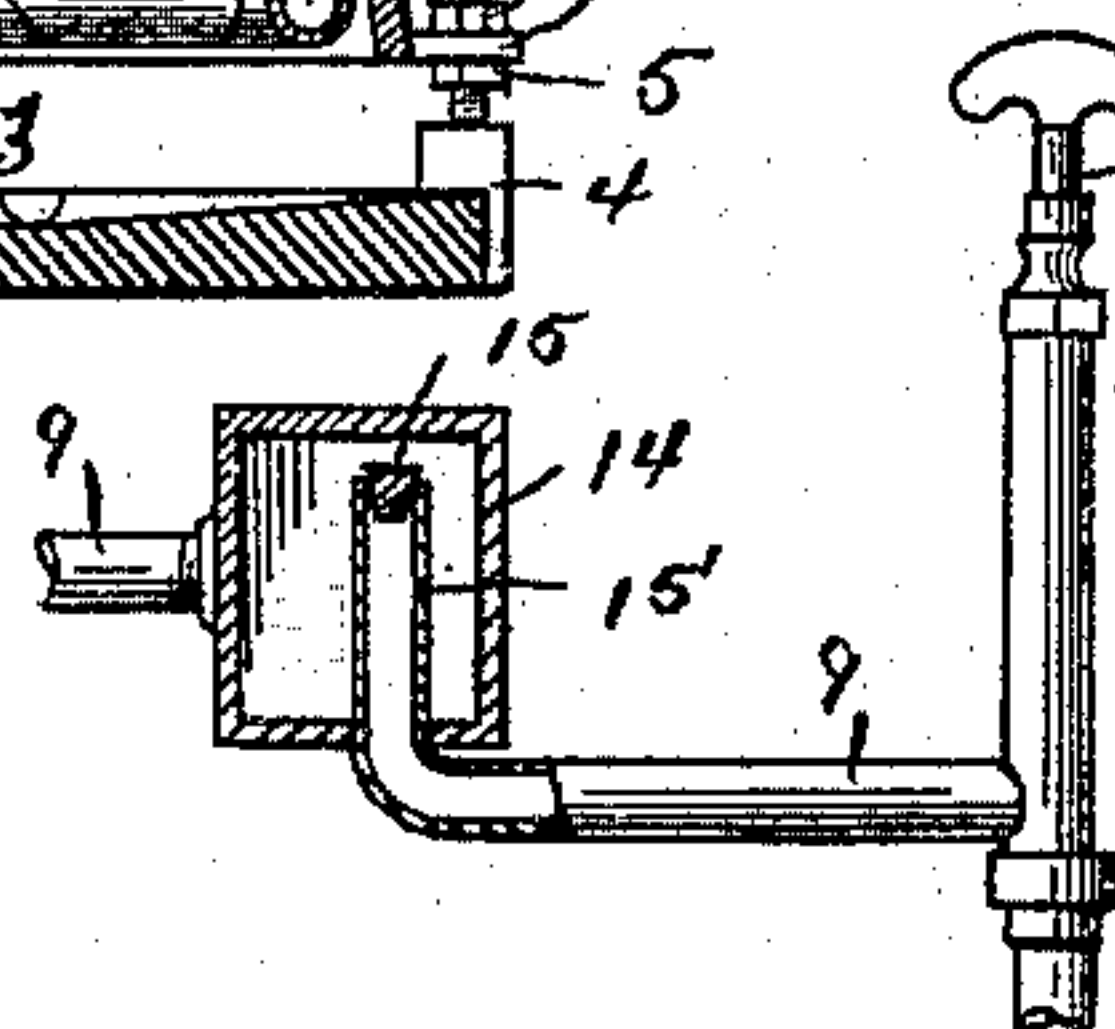


Fig. 6.

INVENTOR.

Benjamin N. Hawes  
By William Webster  
att'y.



# UNITED STATES PATENT OFFICE.

BENJAMIN N. HAWES, OF TOLEDO, OHIO.

## HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 492,466, dated February 28, 1893.

Application filed March 4, 1892. Serial No. 423,690. (No model.)

*To all whom it may concern:*

Be it known that I, BENJAMIN N. HAWES, of Toledo, county of Lucas, and State of Ohio, have invented certain new and useful Improvements in Hydrocarbon-Burners; and I do hereby declare that the following is a full, clear, and exact description of the invention, which 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 part of this specification.

My invention relates to a hydro-carbon burner, and has for its object to construct a burner in which the fuel vapor shall be intimately commingled with air to support combustion and in which the products of combustion shall be projected downwardly upon deflectors arrayed co-incident with jet orifices, whereby the flame is spread and extends throughout the entire combustion chamber.

The invention consists in the parts and combination of parts, hereinafter described and pointed out in the claim.

Heretofore in the construction of burners for hydro-carbon oil one great difficulty has been in regulating the oil supply, the air supply and the admixture of the same in such relative relations as to insure a perfect combustion. Another difficulty has been in avoiding the clogging of the burner at the orifices through which the vaporized oil passes, and still another difficulty has been in preventing the contact of cold air with the vapor fuel when the lids of the stove are opened. I have overcome these difficulties in the construction herein described in which—

Figure 1 is a front elevation of a complete burner with the check valve attached. Fig. 2 is a top plan view of the same. Fig. 3 is a perspective view of the bottom plate showing the deflectors and also the screw threaded standards upon which the air mixing chamber is sustained. Fig. 4 is a transverse sectional view on lines  $x-x$  Fig. 1. Fig. 5 is a longitudinal vertical sectional view of a portion of the burner pipe adjustable jet nozzle and plate adjustably secured thereon. Fig. 6 is a sectional detail view of the check valve.

1 designates the bottom pan formed with vertical sides 2, circular deflectors 3, and standards 4 (one upon each side) the upper portion of the standards being screw threaded to receive nuts 5 upon which side plates 6 of an air mixing chamber 7 rest, the purpose of the nuts being to raise or lower the chamber 7 which is held in fixed relation thereto by nuts 8 which screw firmly upon the top of the plates holding the mixing chamber firmly in place and allowing of vertical adjustment of the same by screwing the nuts up or down this adjustment regulating the draft within the chamber and the force and volume of the flame passing between the bottom pan and lower edge of the chamber as well as the noise incident thereto.

9 designates a pipe leading from the source of supply to within the air mixing chamber, in which it is coiled preferably once around the inner side of the chamber and extended vertically from the center thereof passing through the top and connected with a burner pipe 10 arrayed above and longitudinally of the mixing chamber, the ends of the burner pipe being capped to prevent a flow of gas except through jet nozzles 11 which are tapped into the burner a short distance from each end. Each nozzle 11 is screw threaded into the burner pipe to allow of projecting the end slightly within the pipe to prevent clogging of the orifice in the nozzle by sediment or dirt particles, contained within the oil.

Mixing chamber 7 is of elongated form with upwardly tapering sides and a top formed integral therewith, the top being perforated centrally (as has been stated) to allow the pipe to pass there-through, and with holes 12 co-incident with the jet nozzles so that the gaseous vapor is forcibly projected through holes 12 and into the mixing chamber, drawing the heated air from within the combustion chamber into the mixing chamber where it unites with the vapor in combustion.

13 designates plates adjustably secured upon the nozzles, which being directly over holes 12 of the mixing chamber prevent cold air from entering the same when the stove hole plate (not shown), directly above the burner is removed from the hole, thereby in-



sureing an even and regular combustion and preventing the usual disagreeable noise when the cover of the stove is raised.

14 designates a check valve chamber arrayed upon pipe 9 or connected therewith between the burner and inner side of the stove, there being a check valve 15 arrayed upon the end of the pipe, whereby all irregular or pulsating feed of oil is avoided insuring a steady and regular combustion, and all danger of the flame leading back into the pipe and oil storage is avoided.

Deflectors 3 are constructed to serve a double purpose, first to spread the oil, so that it will flow concentrically of, and to each end of the pan when starting an initial fire, so that the flame will envelop the coils and entire pipe within the mixing chamber, and convert the oil therein to a gaseous vapor in the shortest time possible, and second to deflect the flame over the entire area of the pan as has been described.

In operation to start the fire, valve 16 upon pipe 9 is opened, allowing the oil to flow through the check valve into chamber 14, to the burner pipe and through nozzles 11 falling upon deflectors 3 flowing each way therefrom through channels 3' into the bottom of the pan where it is ignited. The flame envelops the coil and vertical pipe to the burner, and soon converts the oil into a gaseous vapor which issues through nozzles 11 into the mixing chamber, valve 16 having been closed as soon as a sufficient quantity of oil has passed through the pipe into the pan to start a fire, remains closed until the oil in the pipe is vaporized when the valve is opened and oil permitted to flow in the quantity desired. In this operation of starting the fire the advantages of the adjustable nozzles is apparent as by their protruding through the pipe, all oil within the pipe is necessarily converted into a vapor before passing through the nozzles, as in subsequent operation of the

burner preventing the entrance of unvaporized oil or extraneous matter into the nozzle or clogging of the same.

By means of the nuts 5 and 8 the mixing chamber can be adjusted to any degree of draft of the flame, by regulating the distance between the pan and the lower edge of the chamber.

Plates 13 are adjusted by running the same either way upon the nozzles, to prevent the cold air from striking directly upon the gaseous vapor when the stove lid (not shown) is opened, and by this arrangement also deadening the noise.

The check valve chamber receives the oil from the supply pipe in the exact quantity required, and being within the combustion chamber of the stove the oil is heated therein by the heat from the burner.

What I claim is—

In a hydro-carbon burner, the combination with a bottom pan, having deflectors provided with oppositely disposed channels, the standards arranged at the side of the pan, a mixing chamber independent of the pan and vertically adjustable upon the standards, said chamber having openings in the top in vertical alignment with the deflectors on the pan, the vaporizing pipe arranged in the chamber, one end projecting through the top, a burner pipe arranged upon said projecting end, jet nozzles tapped into the burner pipe directly over the openings in the top of the chamber, and the vertically adjustable plates mounted upon the nozzles to protect the flame as described.

In testimony that I claim the foregoing as my own I hereby affix my signature in presence of two witnesses.

BENJAMIN N. HAWES.

Witnesses:

CARROLL J. WEBSTER,  
GRACE E. LEHANEY.