

# UNITED STATES PATENT OFFICE.

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APPARATUS FOR BURNING COAL AND HYDROCARBON FUEL IN COMBINATION.

SPECIFICATION forming part of Letters Patent No. 411,555, dated September 24, 1889.

Application filed September 8, 1888. Serial No. 284,956. (No model.)

*To all whom it may concern:*

Be it known that I, ALLAN MASON, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Apparatus for Burning Coal and Hydrocarbon Fuel in Combination; and I do hereby 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.

My improved contrivance for burning pulverized coal and liquid-hydrocarbon fuel together consists of injecting apparatus for introducing the pulverized coal into and about the flame of an injected-oil fire and keeping the coal in suspension, so that the combustion of the coal is largely facilitated by the oil-fire, and in such manner that the coal is consumed without coming in contact with the oil that sustains the oil-fire, which it is desirable to avoid, because when oil is projected on or comes in contact with the coal in the combustion-chamber it seems to extract suddenly from the coal the more volatile portions, which consume readily and leave the rest of the coal hard and slaty and so that it does not burn readily and becomes a compact mass that chokes up. The coal, in a finely-comminuted state, and air are injected together into the furnace-chamber above a still-air space below for reception of the ashes and by suitable appliances caused to deflect upward, over, and backward along the incoming jet, so that for a time the coal is maintained in suspension by the forces of the said incoming jet for the more rapid and effective combustion, and so that the larger particles not yet consumed and falling into the incoming jet will be continued in suspension by being again taken along by said jet; and at the same time I also inject the liquid-hydrocarbon fuel by compressed air or steam, so as to receive the coal atoms in the oil-flame, but not in such juxtaposition as that the oil will mix with coal prior to the combustion of the oil, all as hereinafter fully described, reference being made to the accompanying drawing, which represents a longitudinal sectional elevation of a boiler-furnace with apparatus contrived for carrying out my invention.

In such or any other approved or suitable furnace I provide for injecting and maintaining the fine coal in suspension by the fan-blower *j*, nozzle *k*, and a feed-hopper *l*, said hopper being connected with and discharging a continuous stream of the fine coal into the discharge-pipe *m* of the fan, so as to be injected into the furnace through nozzle *k* along with the blast of air from the fan, and to be projected upward, backward, and along the incoming jet, as by the pan-deflector *n*, on which the incoming jet first impinges and is turned upward, deflector *o* in the upper part of the chamber projecting it backward over the incoming jet and the deflector *p* projecting the unconsumed particles downward again into the same, thus maintaining continuous cycles of the coal until wholly consumed while in suspension; and together with the coal thus injected and held in suspension I also inject oil, and thus produce and combine the flame thereof with the coal while being thus maintained in suspension to utilize the more intense flame thereof and of the gases resulting from the decomposition of steam employed to inject the oil for more intense combustion than the coal is capable of alone, and thereby insure the complete combustion of the coal, which if burned alone is not as effective, owing to considerable waste through the precipitation of a considerable percentage of unconsumed particles into the ash-pit. For this purpose I employ a steam-nozzle *q* in an air-induction tube *s*, with an oil-feeding pipe *t* introduced at the fire-door and discharging into the coal-jet from the side of the furnace opposite to that from which the coal-jet comes for the more effectual commingling of the oil-flame and coal-jet and the better maintenance of the cycles for bearing up the coal. The oil-pipe is arranged to drip on the steam-nozzle near the end of the latter, for the mixing of the air and the oil around said nozzle and drawing them together off the end of the nozzle into the steam. Said pipe will be connected with a reservoir, and the steam-nozzle will have suitable connection with the boiler for the supply of the steam.

In practice the coal will be used in much larger proportions than the oil for the most

(No Model.)

T. NORTON.  
PICKER CHECK FOR LOOMS.

No. 411,556.

Patented Sept. 24, 1889.

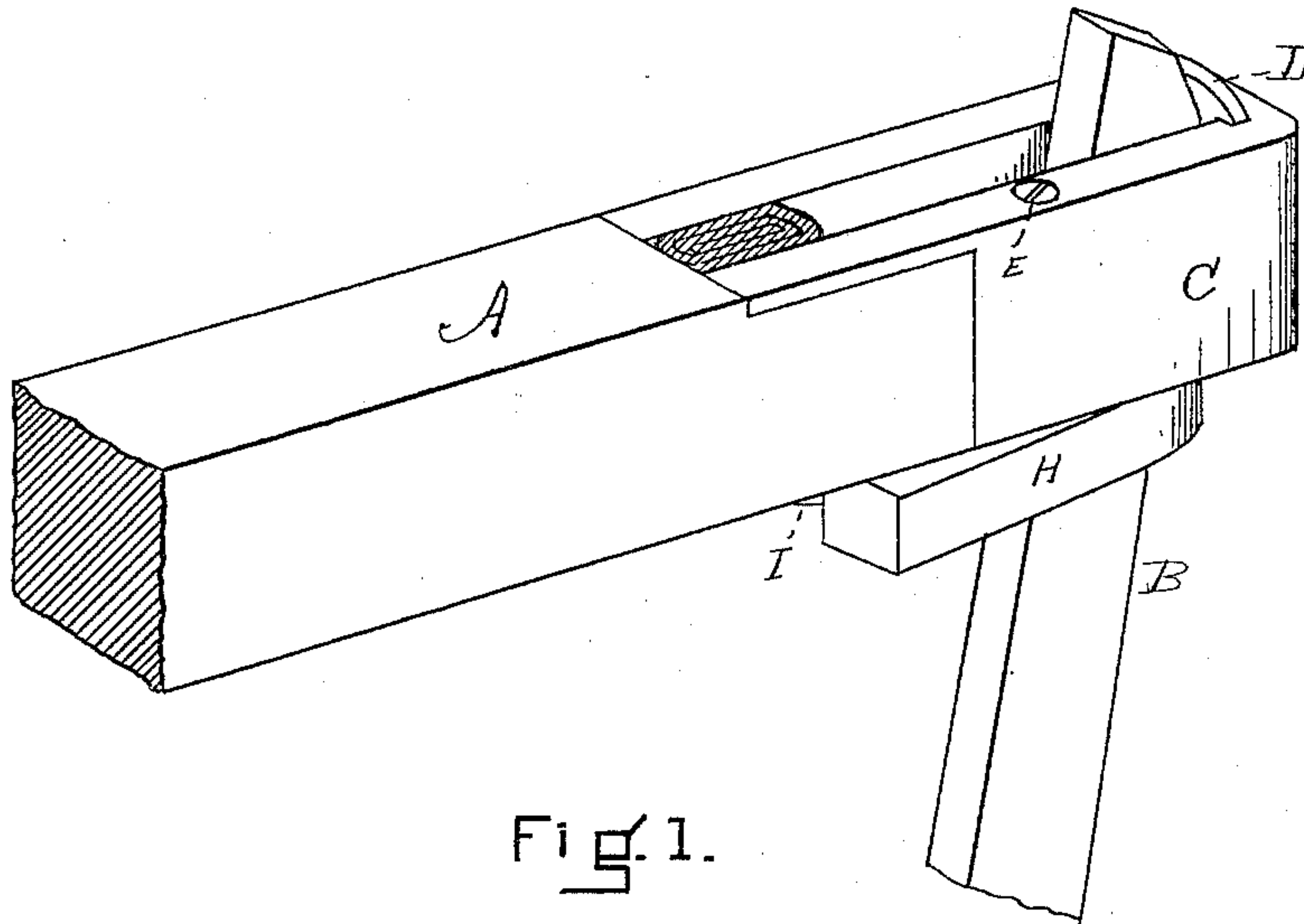


Fig. 1.

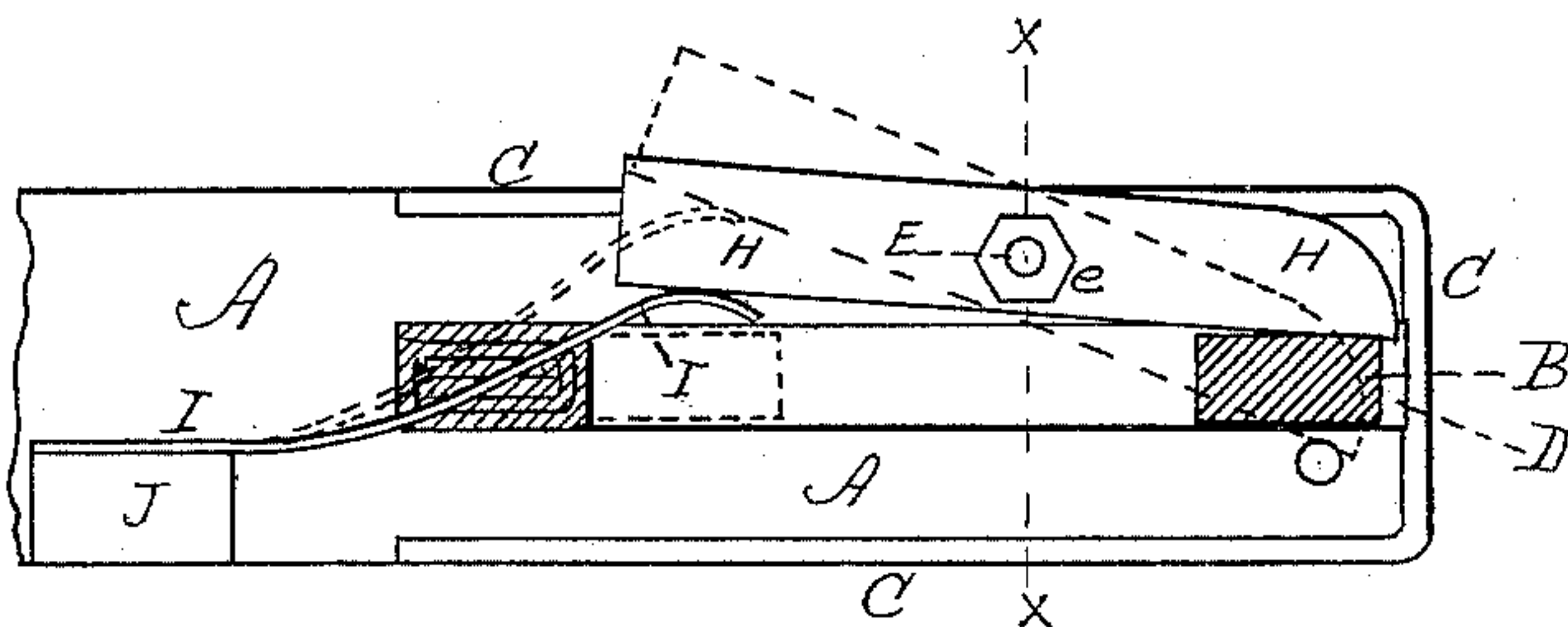


Fig. 2.

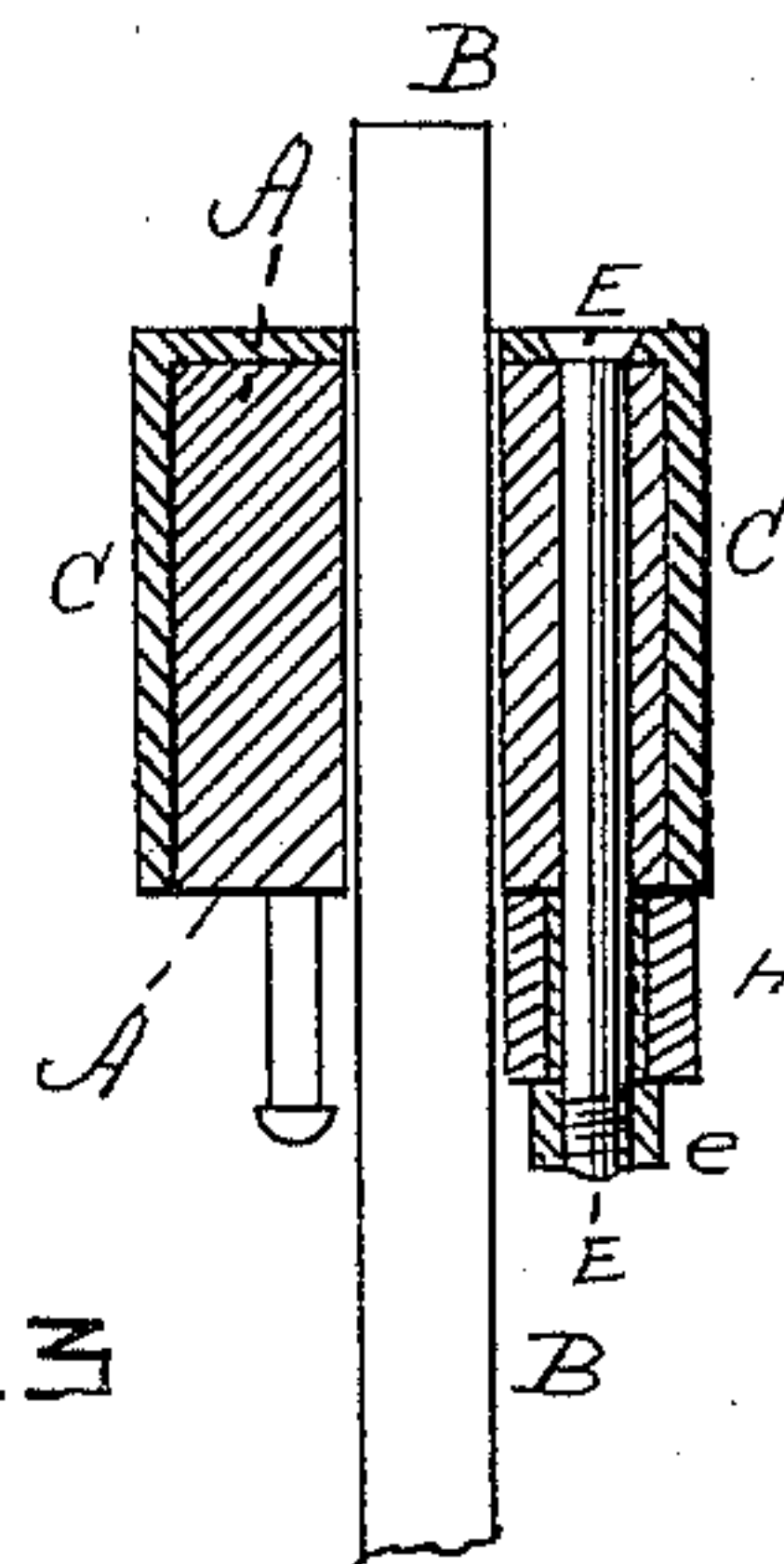


Fig. 3.

WITNESSES

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