

No. 882,294.

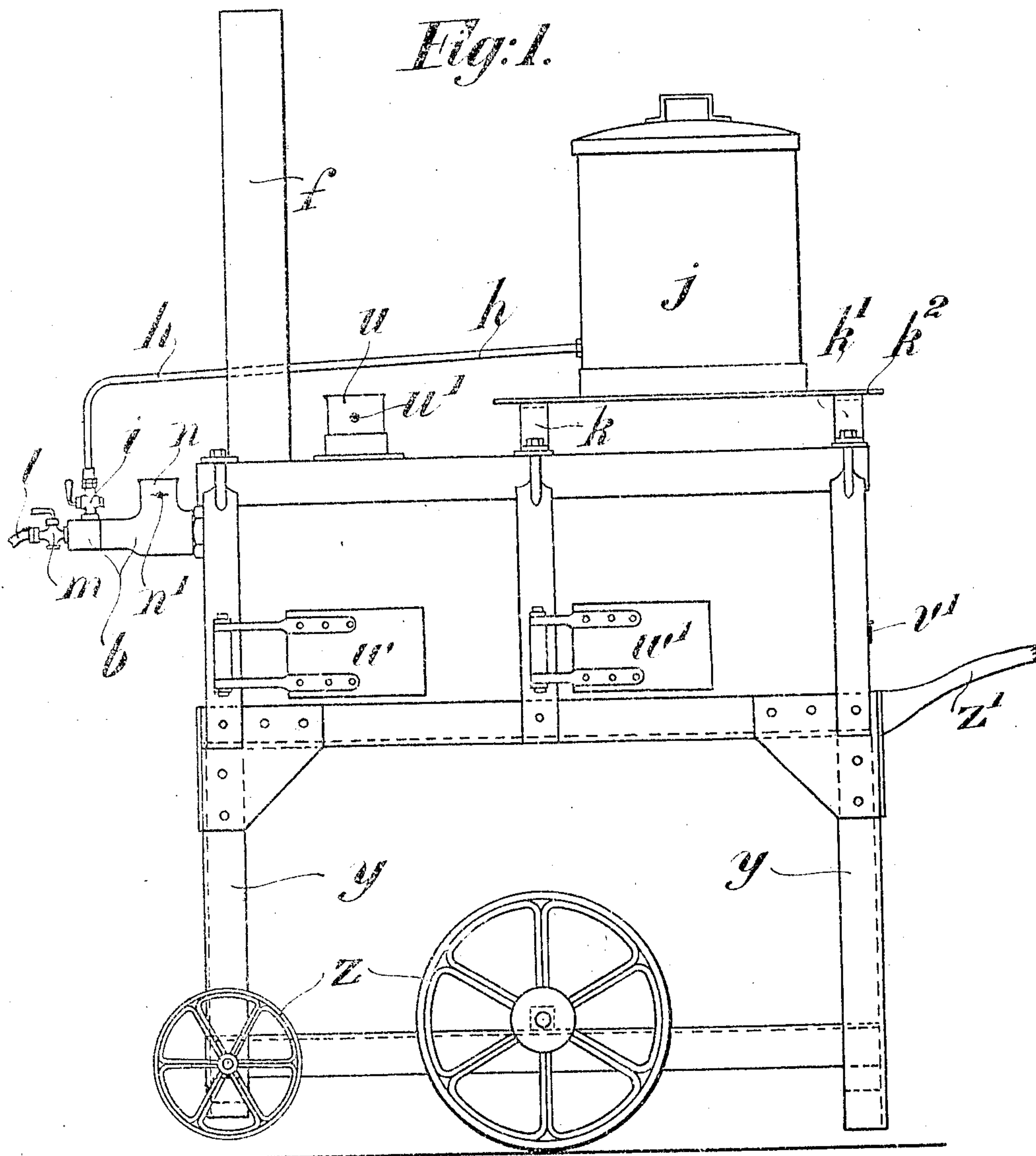
PATENTED MAR. 17, 1908.

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LIQUID FUEL FURNACE.

APPLICATION FILED SEPT. 12, 1907.

3 SHEETS--SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 2.

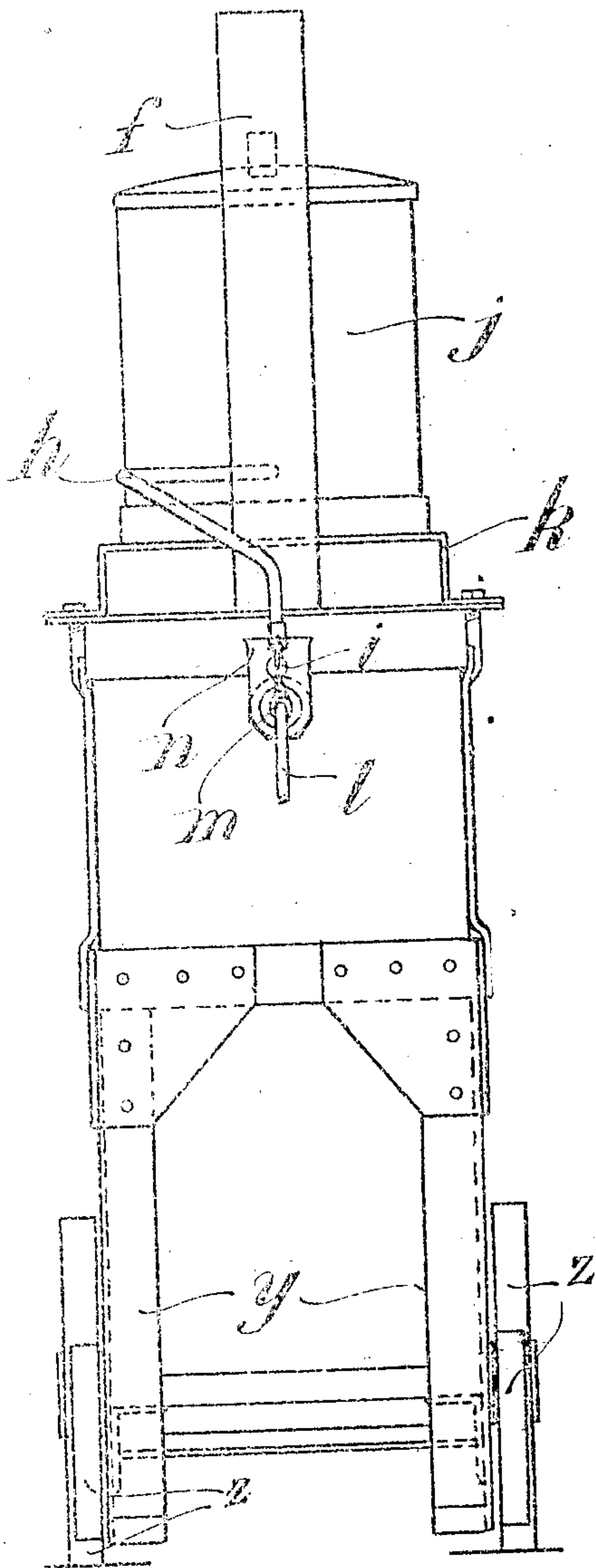
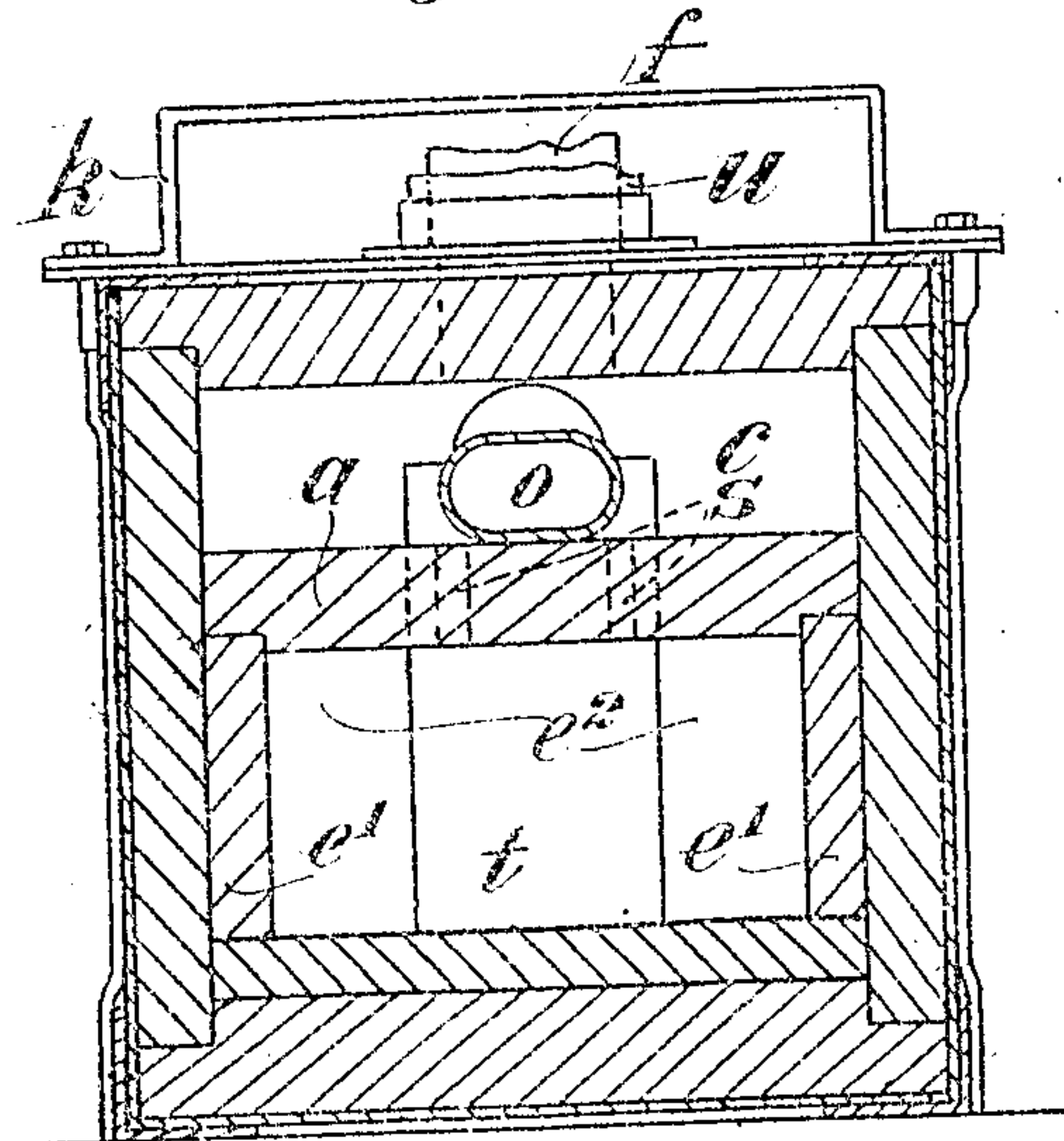


Fig. 4.



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3 SHEETS—SHEET 3.

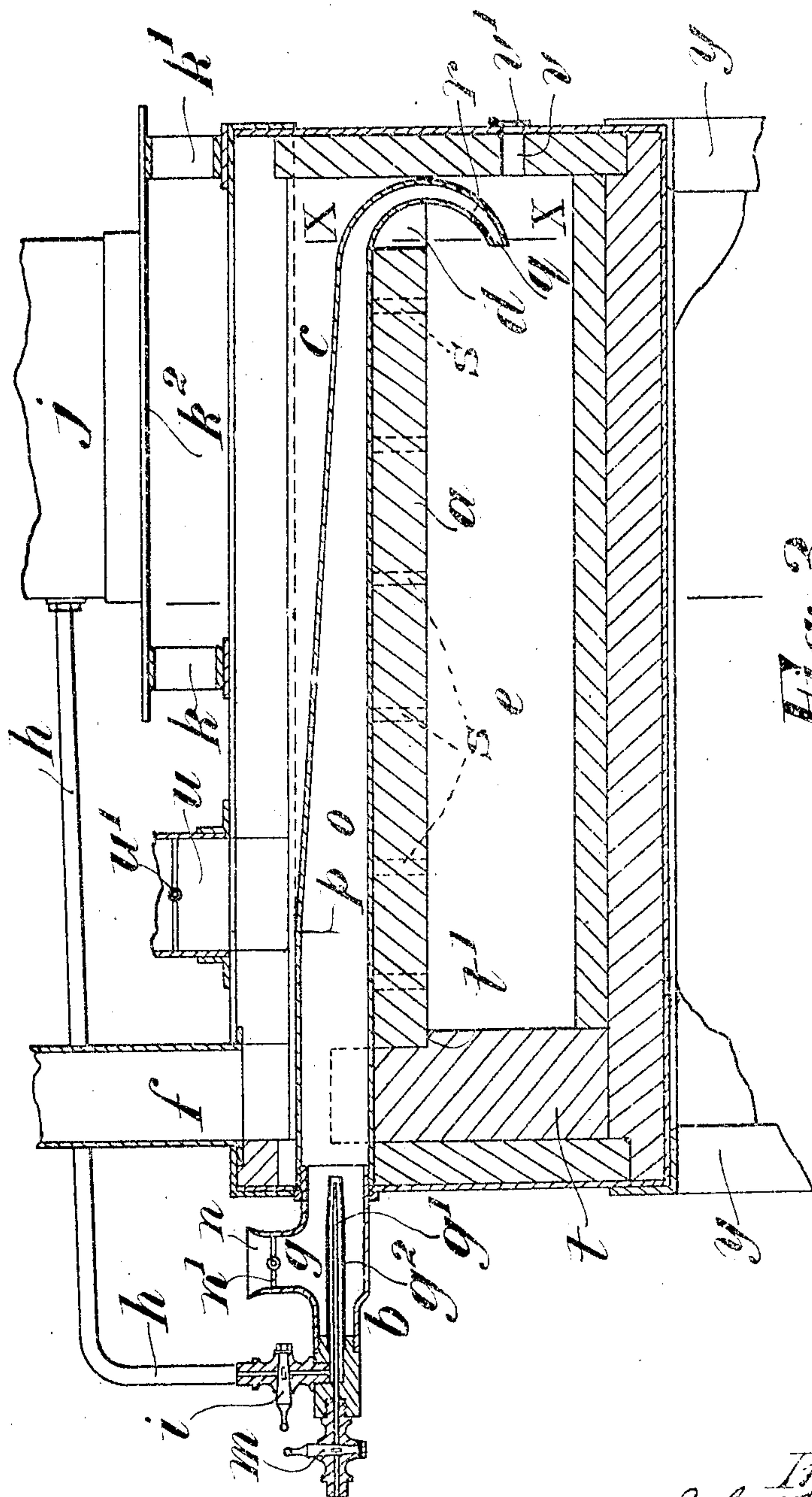


Fig. 3.

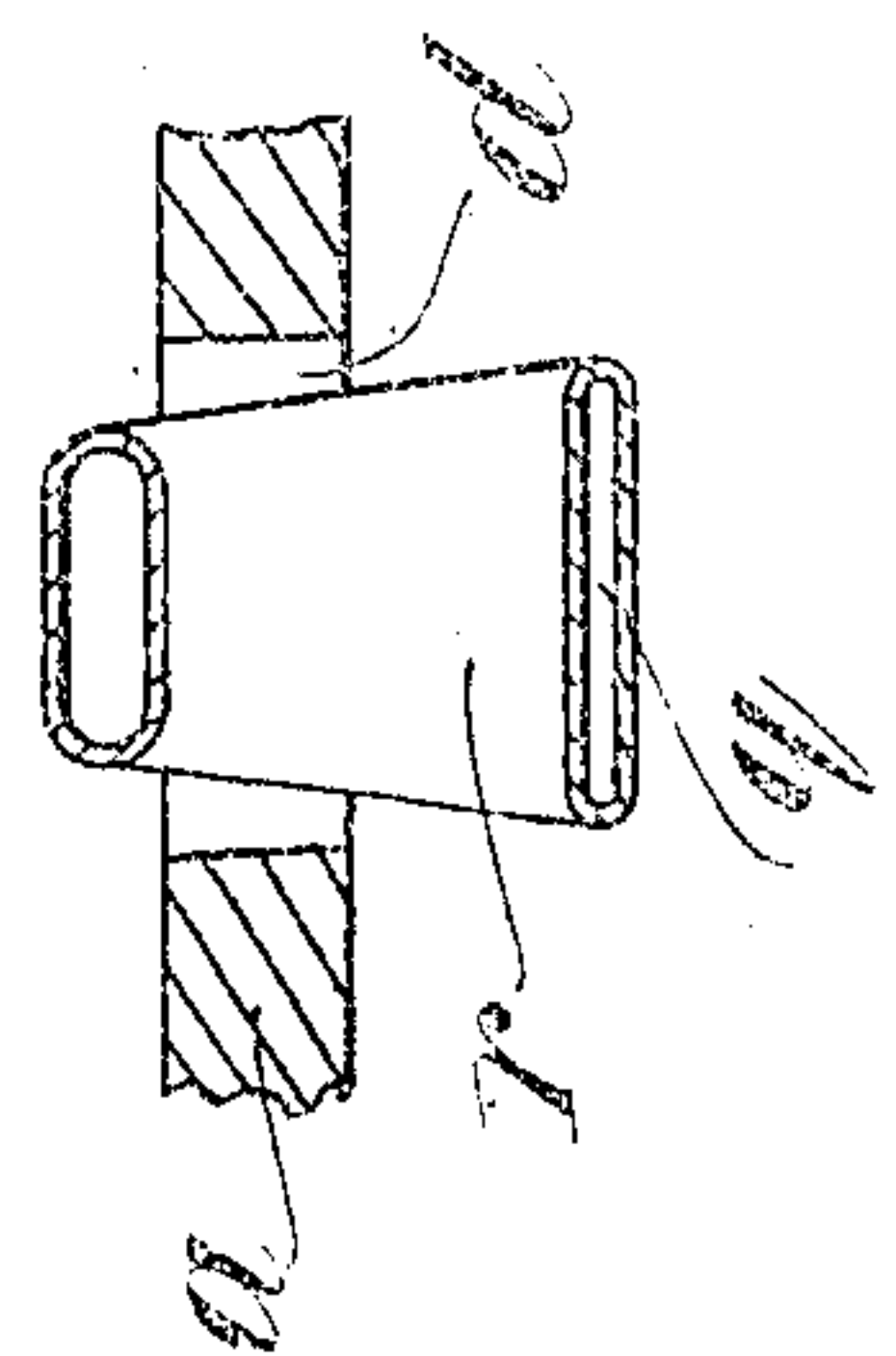


Fig. 5.

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UNITED STATES PATENT OFFICE.

JOHN BURDON, WILLIAM M. BURDON, AND MATTHEW M. BURDON, OF BELLSHILL, SCOTLAND.

LIQUID-FUEL FURNACE.

No. 882,294.

Specification of Letters Patent.

Patented March 17, 1908.

Application filed September 12, 1907. Serial No. 392,562.

To all whom it may concern:

Be it known that we, JOHN BURDON, WILLIAM MURRAY BURDON, and MATTHEW MURRAY BURDON, subjects of the King of Great Britain, residing at Caldervale Works, Bellshill, Lanarkshire, Scotland, have invented certain new and useful Improvements in Liquid-Fuel Furnaces, of which the following is a specification.

This invention relates to liquid fuel furnaces and has for its object to improve their construction and especially the burners thereof.

In our invention the furnace is divided into two compartments by means of a partition, the fuel burner having a tubular tapered mixing and vaporizing chamber which passes along the one compartment, constituting a hot chamber, to and through an opening in the partition and into the other compartment which is adapted for the reception of rivets, bars, or other articles to be heated or fired. The burner is constructed and arranged so as to produce practically a blue Bunsen flame.

In order that our said invention may be clearly understood we have hereunto appended two explanatory sheets of drawings which show, by way of example, our invention applied to a portable rivet heating furnace.

On the drawings:—Figure 1 is a side view of the furnace. Fig. 2 is an end view of the same. Fig. 3 is a longitudinal section and Fig. 4 a transverse section of the body of the same. Fig. 5 is a sectional view of the burner taken on the line X, X, Fig. 3.

In carrying out our invention we preferably build the rivet heating furnace with a body composed of fire bricks which are bound together by metal straps and supported on a framework. The body is of rectangular form and the interior thereof is divided into two compartments, one above and divided from the other by means of a horizontal partition *a*. The upper compartment *c* which constitutes a hot chamber, is of a flat rectangular shape and extends the full length and breadth of the furnace while the lower compartment or flame chamber *e* is deeper and also somewhat narrower than the upper one and is provided with side

walls *e*¹, *e*², which serve to support the partition *a*. The front part of the compartment *c* communicates by passages *e*² with the compartment *e* and the funnel *f*.

b is the atomizer which is supported at the front of the furnace and has a long mixing and vaporizing chamber *o* of tubular shape which extends from the air chamber *g* at the front of the furnace right down the center of the hot chamber *c* to the end thereof and is then bent downwards, through an aperture *d* in the partition, into the rear end of the compartment *e*. Liquid fuel is supplied to the atomizer by a pipe *h* and cock *i* from a tank *j* on top of the furnace and which may be supported on brackets *k*, *k*¹, and plate *k*². Compressed air or steam can be supplied to the atomizer by means of a pipe *l* and cock *m*. The furnace has an outlet *u*, provided with a valve *u*¹, and an air inlet *v* which can be regulated by means of a damper *v*¹. The side of the furnace is provided with doors *w*, *w*¹ communicating with the lower compartment *e*, the rivets to be heated being inserted through the one door and removed through the other. The body of the furnace is mounted on the frame work *y* which is carried on wheels *z*. Handles *z*¹ are provided for use when the furnace is being wheeled from place to place.

For the purpose of heating the compartment *c* and also the tubular mixing and vaporizing chamber *o* therein a number of vertical passages *s* are made in the partition, through which hot air and gases can pass from the flame chamber *e*.

As before stated, the atomizer is of a special construction and is made so as to give practically a Bunsen or blue flame. It consists of an outer air chamber *g*, an oil nozzle *g*² which projects through the center of the chamber *g*, and an inner steam or compressed air nozzle *g*¹ arranged within and concentric with the nozzle *g*². The chamber *g*, as will be seen is much larger in diameter than the nozzles *g*¹, *g*², and is provided with an air inlet *n* at its upper side having a valve *n*¹ therein for the purpose of regulating the admission of air. Secured to the end of the chamber *g* is the long mixing and vaporizing chamber *o* of tubular shape, which, as aforesaid extends the full length of the furnace. This tubular

chamber *o* is of cylindrical shape up to the point *p* and is then flattened out with a uniform taper from *p* to *q* the part *r* of the tube where it passes through the aperture *d* being curved so that the mouth *q*, which is flattened to such an extent that the opening therein presents a narrow slit or slot for the passage of the flame faces the opposite end of the furnace. This flattened form of the tubular chamber *o* insures a distribution of the flame and heat over the whole width of the compartment *e*. The tubular chamber rests upon the partition *a* and only occupies a portion of the chamber *c* so that the heated air and products of combustion therein can come in contact with the sides of the tubular chamber and heat the same.

The tubular chamber *o* where it enters the furnace is supported by a pillar *t* which is made with a shoulder *t'* by which it also supports the horizontal partition *a*.

With this furnace, when the atomizer is lighted, the air admitted to the mixing and vaporizing chamber *o* is regulated by means of the damper *n*¹. The compressed air (or steam) sprays the oil from the nozzle *g*² into the chamber *o* and at the same time draws in air through *g* by induction. The combined oil and air rushes through the tube *o* and is thoroughly mixed therein and the oil converted into vapor owing to the heat of the tube which latter is maintained at a high temperature by the hot air and gas in the compartment *c*, and it has been found in practice that when the air admitted through the valve *n*¹ is properly regulated and also the oil and compressed air (or steam) admission, the flame produced at the end of the burner *q* is of a blue or Bunsen character giving a great heat which, owing to the flattened nature of the end of the tube *o*, is distributed over the width of the compartment *e*. It has been found in practice that with a long tubular tapered mixing and vaporizing chamber, such as shown, the best results are obtained as the air and oil are thoroughly mixed and the oil vaporized before escaping from the end of the burner. An additional air supply can be given through opening *v* if so desired and hot air and gas can be allowed to escape when necessary from the chamber *c* by means of the valve *w*¹.

Having now fully described my invention what I claim and desire to secure by Letters Patent is:—

1. A liquid fuel furnace comprising a body with two compartments therein the one compartment extending the length of the furnace and forming a hot chamber and the other compartment forming a chamber for the reception of the articles to be heated or fired, a liquid fuel atomizer, means for supplying liquid fuel to the atomizer and for spraying

the same and a tubular and tapered mixing and vaporizing chamber which extends through the compartment constituting the hot chamber and is bent into the other compartment.

2. A liquid fuel furnace comprising a body with two compartments therein the one compartment extending the length of the furnace and forming a hot chamber and the other compartment forming a chamber for the reception of the articles to be heated or fired, a liquid fuel atomizer comprising an inner air or steam nozzle, a second outer concentric oil nozzle and a third outer air chamber, means for supplying liquid fuel to the second nozzle, means for supplying compressed air or steam to the inner nozzle and means for regulating the air supply to the outer chamber and a tubular and tapered mixing and vaporizing chamber extending from said air chamber through the compartment constituting the hot chamber into the other compartment.

3. A liquid fuel furnace comprising a body with two superposed compartments therein the one compartment forming a hot chamber and the other compartment a chamber for the reception of the articles to be heated or fired, a liquid fuel atomizer, means for supplying fuel to the atomizer and a long mixing and vaporizing chamber extending from the atomizer through the hot chamber into the other chamber, said mixing and vaporizing chamber being of tubular shape and gradually tapered and flattened towards its end.

4. A liquid fuel furnace comprising a body with two superposed compartments therein the one compartment forming a hot chamber and the other compartment a chamber for the reception of the articles to be heated or fired, a partition between said compartments made with an opening at one end thereof, a liquid fuel atomizer, means for supplying liquid fuel to the atomizer, means for supplying steam or compressed air to the burner, means for supplying air to the burner and a tubular and tapered mixing and vaporizing chamber which extends along the bottom of the hot chamber and is bent downwards through the opening at the end of the partition into the other chamber.

5. A liquid fuel furnace comprising a body with two superposed compartments therein the one compartment forming a hot chamber and the other compartment a chamber for the reception of the articles to be heated or fired, a partition between said compartments, holes being made in the partition and a large opening at the one end thereof, a liquid fuel atomizer arranged so as to deliver the flame into the upper compartment means for supplying liquid fuel to the atomizer, means for supplying compressed air or steam to the atomizer, an air chamber surrounding the

burner, an air inlet valve therein, and a tubular mixing and vaporizing chamber connected to said air chamber and extending along the bottom of the hot compartment and being
5 bent down into the other compartment, the said tubular mixing and vaporizing chamber being gradually tapered and also flattened at its end.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN BURDON.

WM. M. BURDON.

MATTHEW M. BURDON.

Witnesses:

WILLIAM BROWN,

WILLIAM BOOTH VERITY.