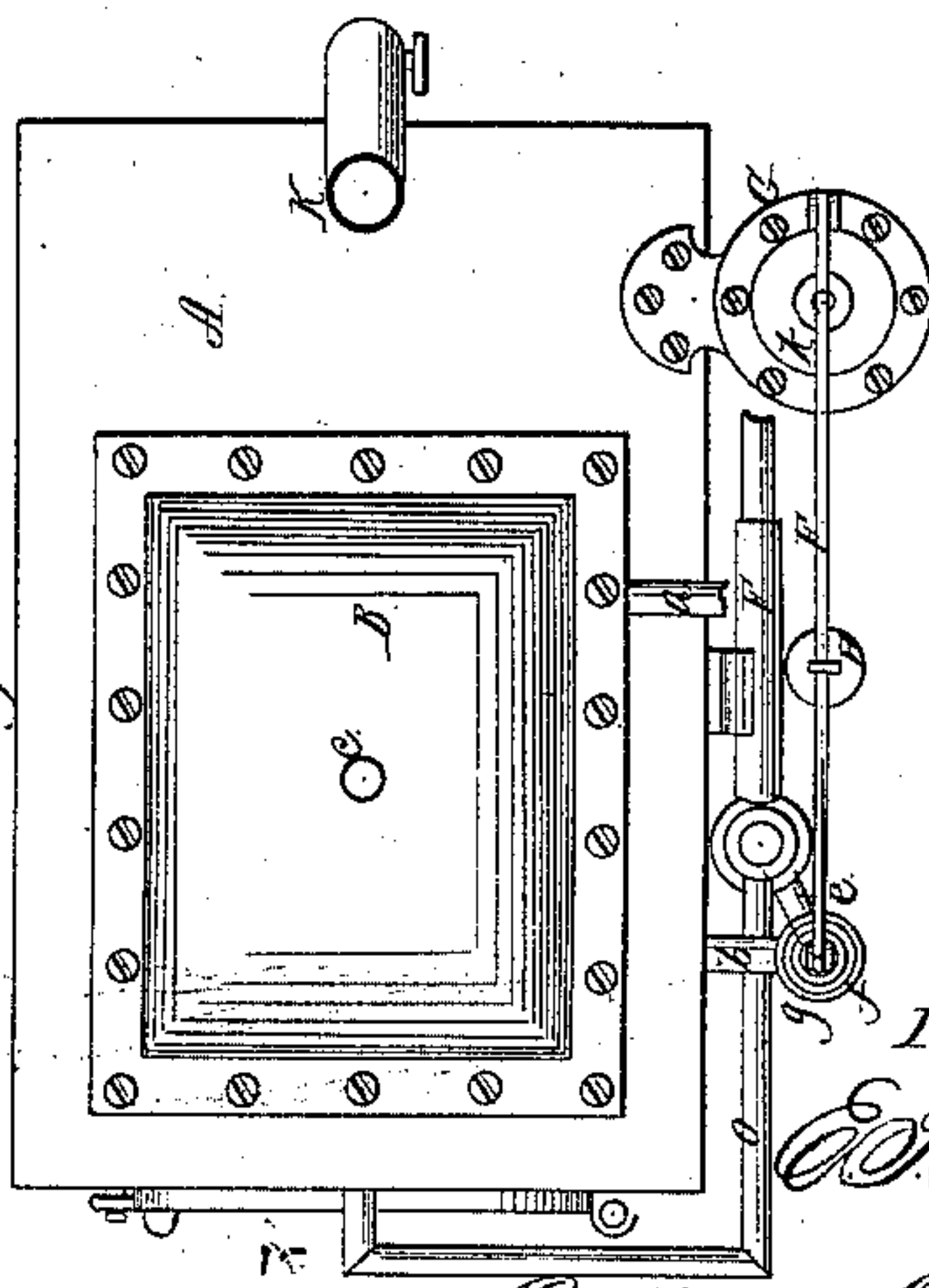
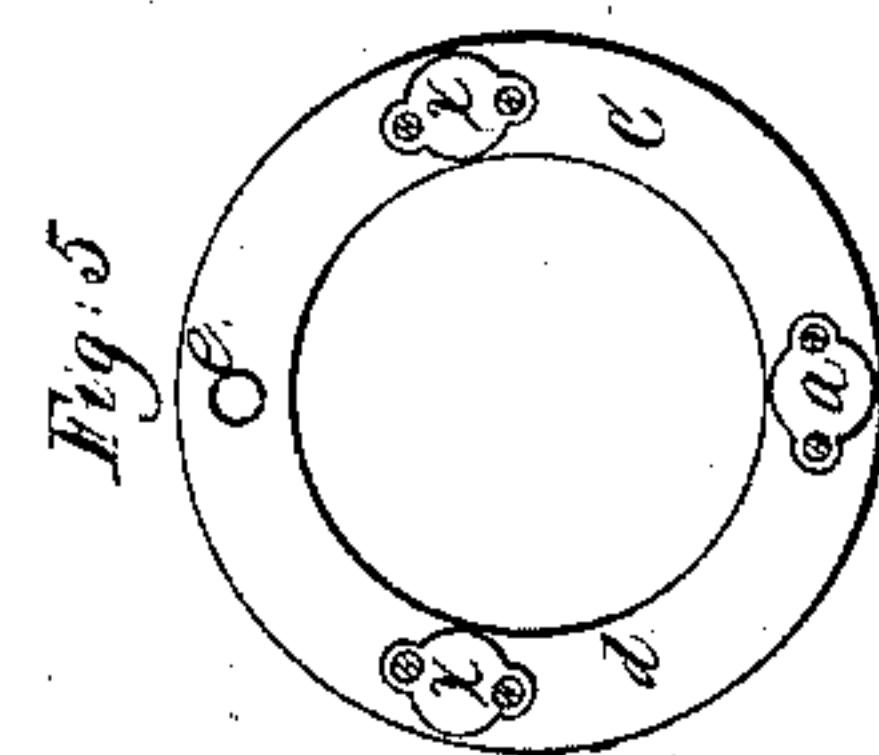
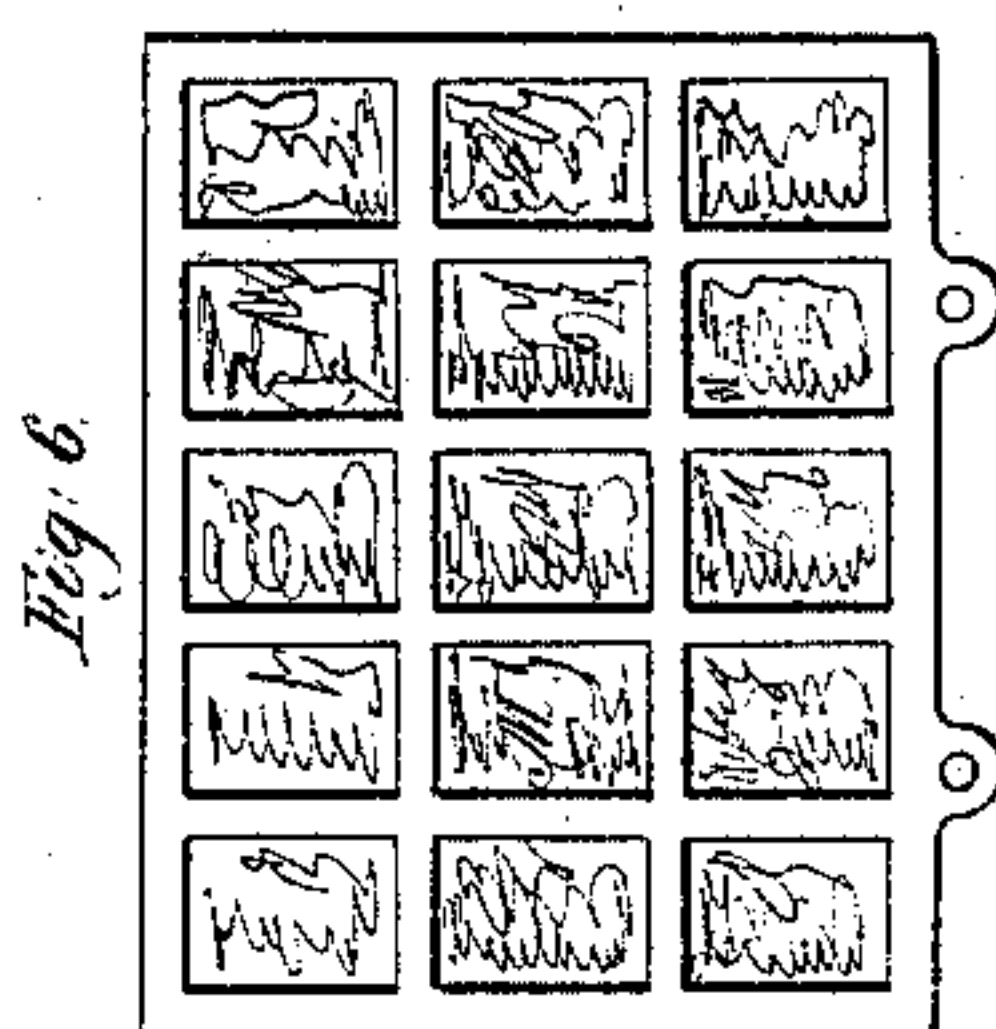
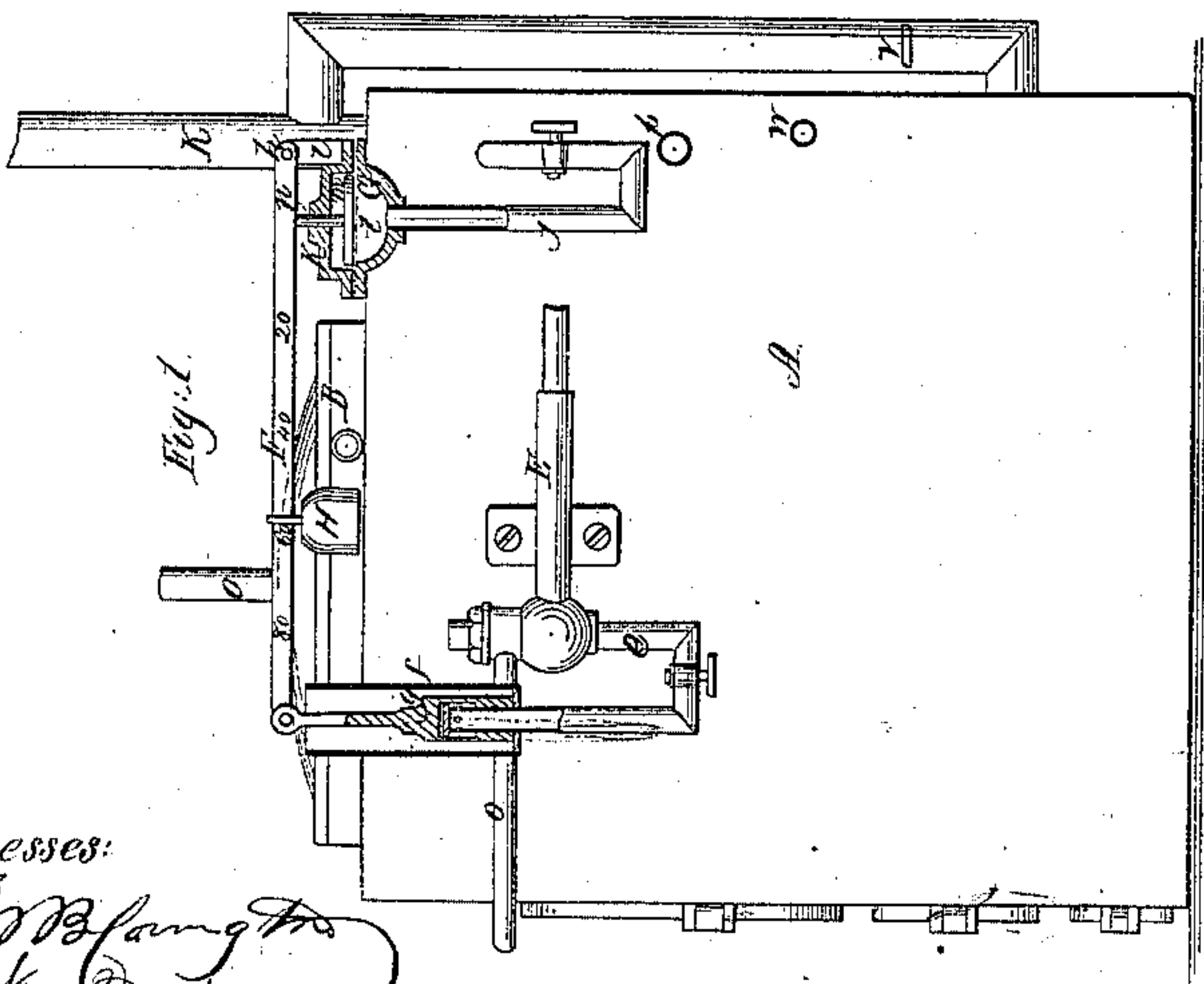
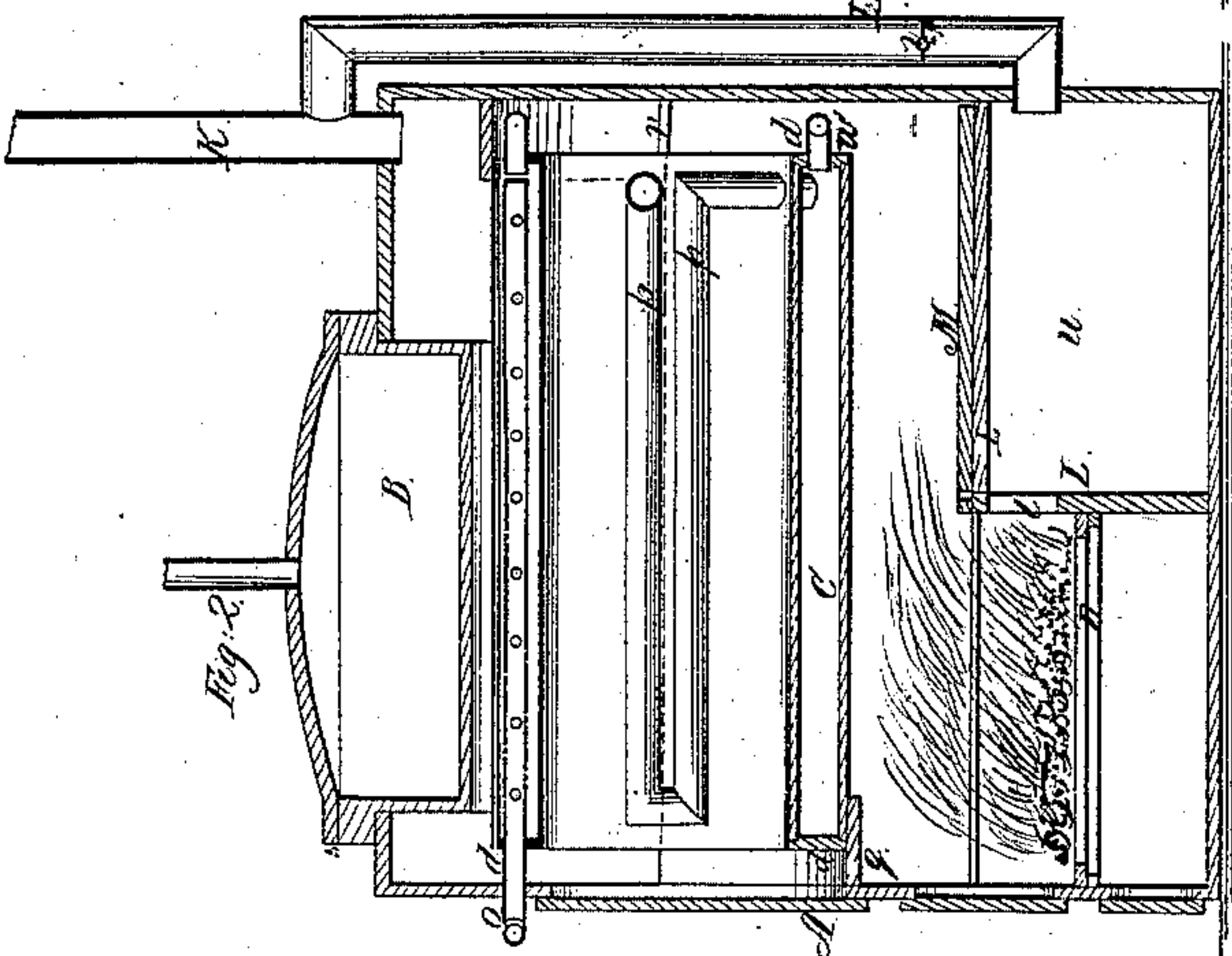
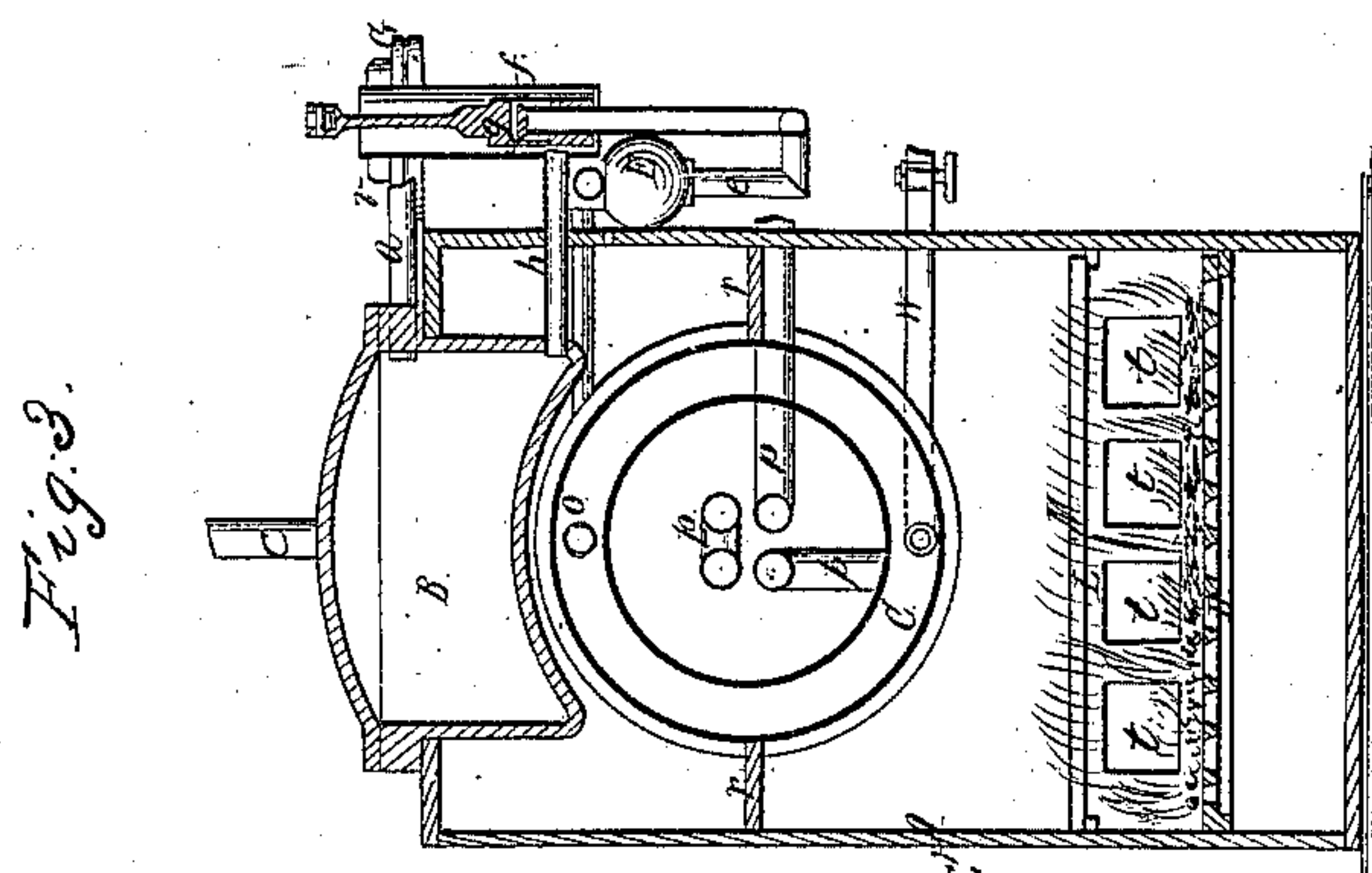


# E. P. Chase, Steam-Boiler Superheater.

N<sup>o</sup> 58,164

Patented Sep. 18, 1866.



Witnesses:

*W. B. Langford*  
*W. C. Brown*

Inventor:

*E. P. Chase*

*Per Mum & Co atty.*



# UNITED STATES PATENT OFFICE.

E. P. CHASE, OF ROCKLAND, MAINE, ASSIGNOR TO HIMSELF AND JOHN EATON, OF SAME PLACE.

## IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. 58,164, dated September 18, 1866.

*To all whom it may concern:*

Be it known that I, E. P. CHASE, of Rockland, Lincoln county, and State of Maine, have invented a new and Improved Steam-Generator; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a sectional side elevation of this invention. Fig. 2 is a longitudinal vertical section of the same. Fig. 3 is a transverse vertical section of the same. Fig. 4 is a plan or top view of the same. Fig. 5 is an end view of the generator detached. Fig. 6 is a detached plan or top view of the sliding damper.

Similar letters of reference indicate like parts.

This invention relates to a steam-boiler in which a water-heater and a series of steam-superheating pipes are combined with the generator. The water is drawn from the heating-tank and injected into the generator by means of a pump of any desirable construction, and a self-acting regulator governs the supply of water drawn by the pump, according to the pressure of steam existing in the generator. After having been drawn from the tank, the water is injected in the form of a fine spray into an annular generator which is exposed to the direct action of a fire, and by these means the water instantly flashes into steam, which passes through a serpentine pipe or through a series of pipes in the space or flue surrounded by the annular generator, where the same is superheated, and whence it passes off to the engine or to the spot where it is to be used.

The supply of water to the generator is regulated by a flexible diaphragm, which supports a lever with a slip-weight, and which connects with a cap that serves to open or close the connection between the pump and the generator whenever the pressure of steam rises beyond a certain point.

A represents a case, which may be made of sheet or of cast metal; or, if desired, said case may be built up of brick or of any other suitable material.

In the top of the case A is placed the heater B, which is provided with a supply-pipe, *a*, and with a discharge-pipe, *b*. In this heater the feed-water is to be heated nearly or quite to the boiling-heat, and any steam that may form in the same escapes through the pipe *c*.

Under the heater, and completely inclosed by the case A, is the generator C, which consists of an annular cylinder, and the ends of which are closed by annular plates or rings *d*, so that the flames or heated products of combustion emanating from the fire-place or grate D can pass clear round said generator, and also through its interior.

By these means the annular space of the generator is highly heated, and water injected in the same in the form of a fine spray flashes instantly into steam. The water used in this process is drawn from the heater B and injected into the generator by the action of a pump, E, the plunger of which receives its motion from an engine or other motor.

The pipe *e*, which passes from the pump toward the heater, terminates in a barrel, *f*, which connects with the discharge-pipe *b* of the heater B, and which incloses the cap *g*; and the end of said pipe extends through the bottom of the barrel, and is perforated on its sides with small holes, as clearly shown in Figs. 1 and 3 of the drawings.

The cap *g* fits nicely over the end of the pipe *e*, as shown, and it is provided with suitable slots or apertures in its sides, so that the water admitted to the barrel *f* from the heater can pass through said apertures and the small holes into the pipe *e*, and through it to the pump. If the cap is raised, the small holes are gradually closed, and the supply of water to the pump is diminished and finally stopped.

The cap *g* is suspended from the end of a lever, F, which has its fulcrum on a pivot, *h*, secured in a standard, *i*, which rises from the flange of a cup, G. This cup is secured to the end of a pipe, *j*, which communicates with the interior of the generator C, and it is provided with a closely-fitting cover, *k*, as shown in Figs. 1 and 3. Between the flanges of the cover and cup is secured a flexible diaphragm, *l*, which supports a disk, *m*, from which rises a stem, *n*, through the cover, and the upper end of this stem bears against the edge of the lever



F. This lever is graduated, and it is provided with a weight, H, which slides on it, like the weight on the lever of a safety-valve. The weight is adjusted to the desired pressure, and if the pressure of the steam in the generator rises beyond this point the lever is forced up by the action of the steam against the flexible diaphragm *l*, and the supply of water is diminished or stopped; and as soon as the pressure in the generator sinks down below the point for which the weight is adjusted the cap *g* reassumes its original position and the communication between the supply-pipe and the pump is reopened.

From the pump E leads a pipe, *o*, into the upper part of the annular space of the generator and extends through its entire length, and that portion of said pipe which is situated between the annular heads of the generator is perforated with a large number of small holes, through which the water issues in a fine spray, which instantly flashes into steam. The steam generated by these means passes off through a pipe, *p*, which circulates back and forth in the flue inclosed by the inner shell of the generator C, and finally leads out through the side of the case A to the engine or other place where the steam is to be used. While passing through the serpentine pipe *p* the steam is superheated, and all the advantages of a combined steam generator and superheater are obtained.

The heated gases and products of combustion rising from the fire in the fire-place strike the bottom of the generator C, and they are compelled by partitions *q r* to pass to the rear end of said generator, returning through the inner shell of the same to its front end, and passing back over it and between the same and the heater B to the rear end of the case A, from which emanates the chimney or smoke-stack K.

The bridge-wall L, which rises at the rear end of the grate D, is perforated with channels *t*, extending to a chamber, *u*, in the lower part of the case A, and from this chamber emanates a smoke-pipe, L', which connects with the chimney K. In this smoke-pipe is a damper, *v*, of any suitable construction, and on

the top of the chamber *u* rests a slide, M, made of soap-stone or other refractory non-conductor of heat, which may be supported by a suitable frame of cast-iron. This slide extends clear across the bridge-wall, and it is so arranged that it can be readily drawn out over the grate D. If the damper *v* is opened and the slide drawn out over the grate, the heated gases and products of combustion, instead of passing up and striking the generator, pass through the channels *t* and chamber *u* to the pipe L, and through this pipe to the chimney, and the generator can be left to cool off.

The surplus water which does not flash into steam in the generator and the water which may result from the condensation of steam in the generator are drawn off by means of a pipe, *w*, which may be provided with a water-trap; and hand-holes *x* (see Fig. 5) serve to clean out the impurities which may accumulate in the interior of the generator.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The arrangement of an annular steam-generator, C, substantially as and for the purpose set forth.
2. The combination of the annular generator C with the heater B, substantially as and for the purpose described.
3. The superheating pipe or pipes *p*, in combination with the annular generator C, and situated in the flue formed by the inner shell of said generator, substantially as and for the purpose set forth.
4. The cap *g*, weighted lever F, and diaphragm *l*, in combination with the generator C and pump E, constructed and operating substantially as and for the purpose described.
5. The slide M, channels *t*, chamber *u*, and additional smoke-pipe L', in combination with the grate D and generator C, constructed and operating substantially as and for the purpose set forth.

E. P. CHASE.

Witnesses:

WM. F. MCNAMARA,  
W. HAUFF.