

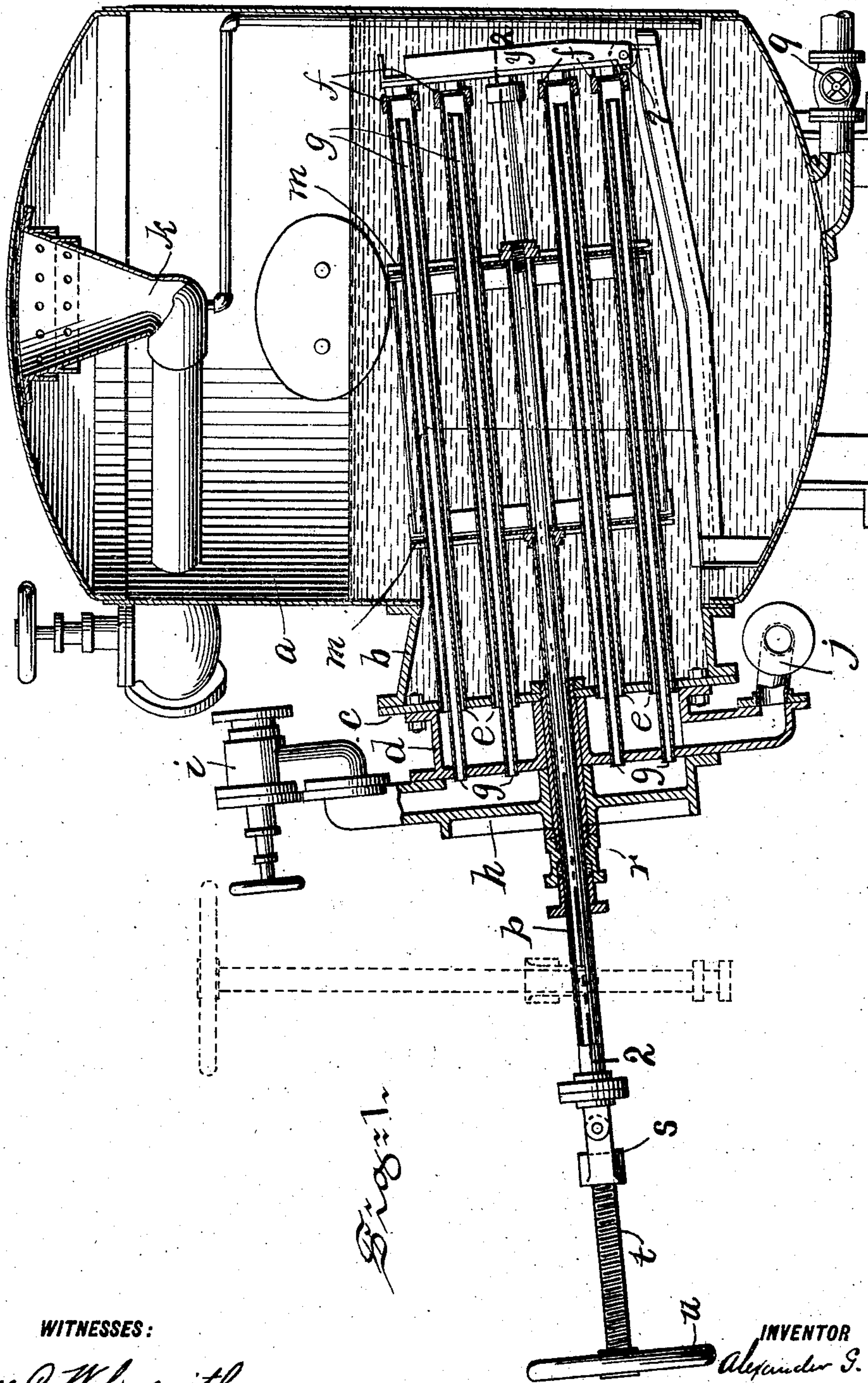
No. 849,898.

PATENTED APR. 9, 1907.

A. G. HAY.  
BOILER TUBE SCRAPING APPARATUS.

APPLICATION FILED OCT. 27, 1906.

3 SHEETS—SHEET 1.



WITNESSES:

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*J. L. Moister*

INVENTOR

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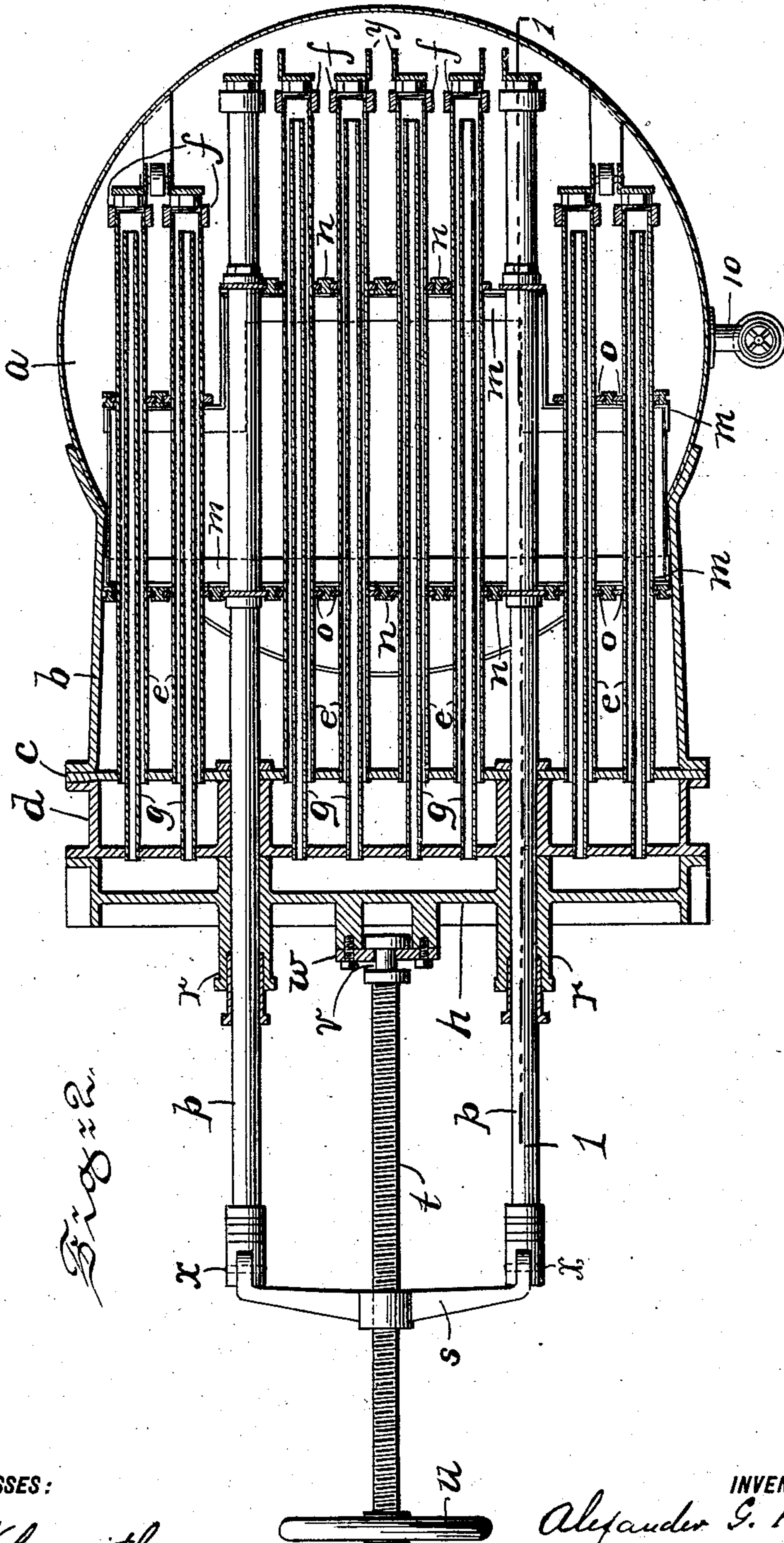
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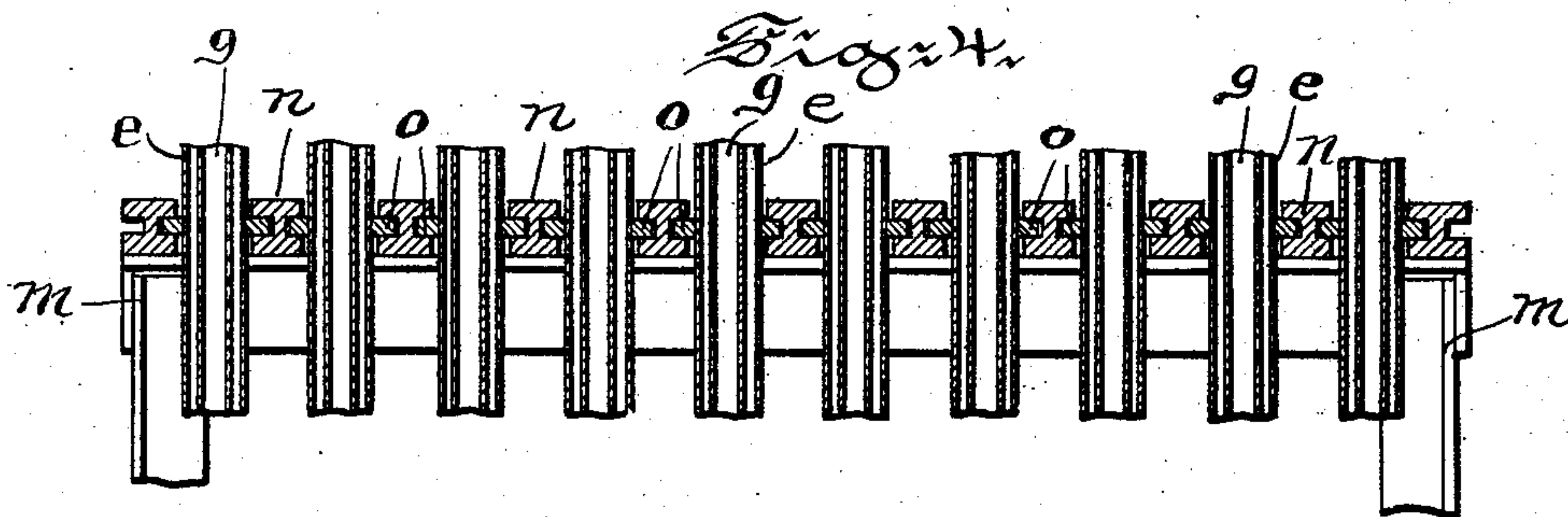
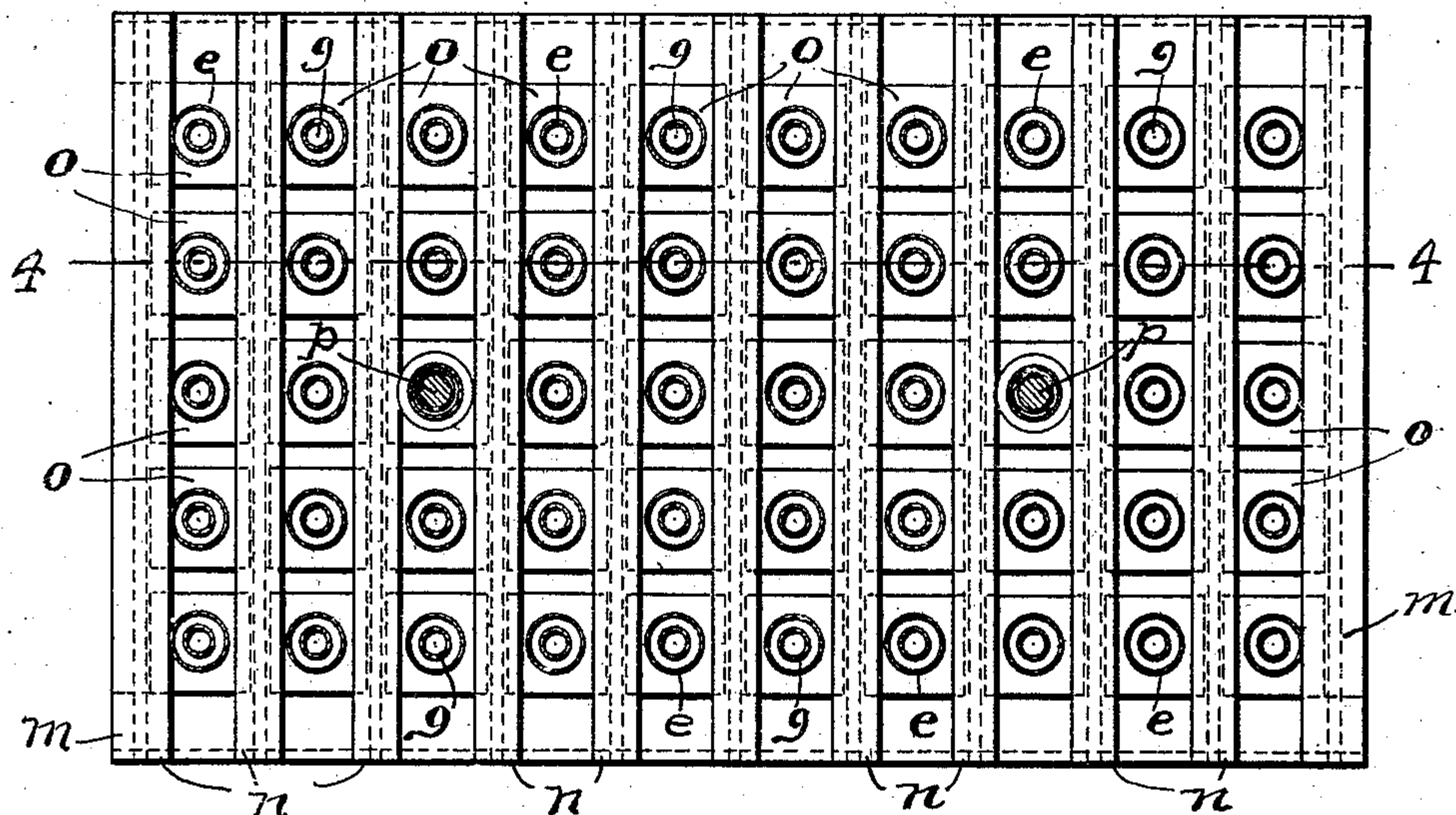
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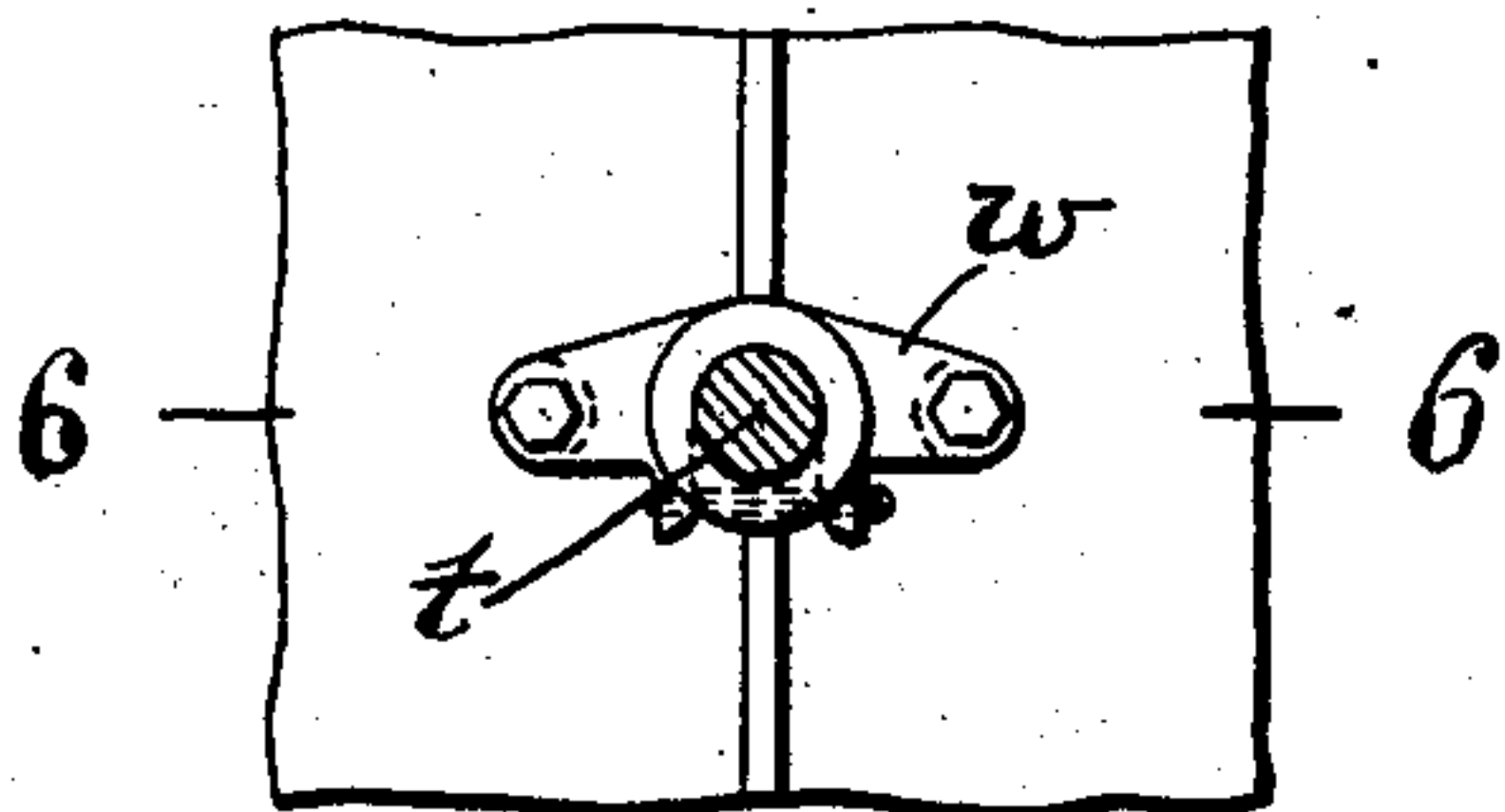
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3 SHEETS—SHEET 3.

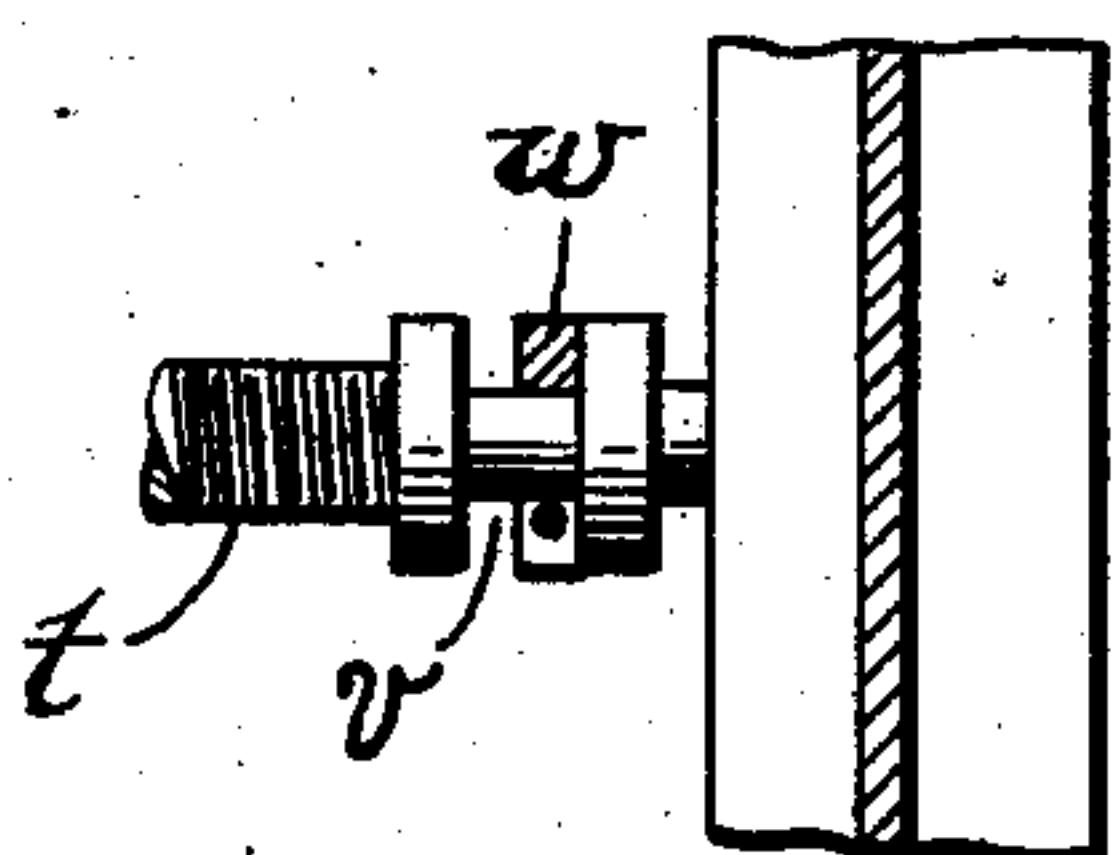
*Fig. 3.*



*Fig. 5.*



*Fig. 6.*



WITNESSES:

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# UNITED STATES PATENT OFFICE.

ALEXANDER G. HAY, OF CAMDEN, NEW JERSEY.

## BOILER-TUBE-SCRAPING APPARATUS.

No. 849,898.

Specification of Letters Patent.

Patented April 9, 1907.

Application filed October 27, 1906. Serial No. 340,850.

*To all whom it may concern:*

Be it known that I, ALEXANDER G. HAY, a citizen of the United States, and a resident of the city and county of Camden, State of New Jersey, have invented certain new and useful Improvements in Boiler-Tube-Scraping Apparatus, of which the following is a specification.

My invention relates to improvements in that class of salt-water-distilling apparatus in which a series of steam-pipes placed within a chamber are used for boiling the water within said chamber; and the objects of my invention are, first, to so arrange the steam-chest that the tube-plate joint is not in contact with the water in the chamber on the outside and steam on the inside; second, to furnish a means for conveniently removing deposits of salt from the exterior of the steam-pipes without removing them from the salt-water chamber; third, to furnish convenient means for operating the pipe-cleaners, and, fourth, to furnish certain details of construction, as will be hereinafter fully described and illustrated.

In the accompanying drawings, forming part of this specification, and in which similar letters of reference indicate similar parts throughout the several views, Figure 1 is a vertical sectional elevation of my distilling apparatus, taken upon a line 1 1, Fig. 2; Fig. 2, a section of Fig. 1 on line 2 2; Fig. 3, a front elevation of the perforated tube-scraping plates and their carrying-frame, the tubes being shown in section; Fig. 4, a section of Fig. 3 on line 4 4; Fig. 5, a front elevation of part of outside cover of tube-box, showing cap for engaging the grooved inner end of the scraper-operating screw; Fig. 6, a section of Fig. 5 on line 6 6.

*a* is a chamber which contains the salt water which is to be distilled. To the front of this chamber is riveted a flanged tube-box *b*, to which is bolted the outer carrying tube-plate *c* and the tube-box *d*, into which the front ends of the outer tubes *e* open, this end of these tubes being secured to the plate *c* in a well-known manner. The rear ends of the tubes *e* are closed by caps *f*. Within the tubes *e* are placed the internal tubes *g*, the inner ends of these tubes discharging into the tubes *e* near the caps *f* and their outer ends passing through the outer side of the tube-

box *d* and opening into the steam-chest *h*, which is secured to the outer side of the tube-box *b*.

Steam passes from a boiler through suitable connections and a valve *i*, Fig. 1, to the steam-chest *h*, thence to and through tubes *g* to the inner ends of tubes *e*, thence forward through these latter tubes to the tube-box *d*, from which the condensed steam is taken by a drain *j*, Fig. 1. The steam in passing through tubes *e g* boils the water in chamber *a*, the steam from which passes to the separator and dry pipe *k*, the exterior of which is furnished with a stop-valve *l*, from which it passes to the usual condenser.

When the salt water is boiled in the chamber *a*, the solids which it carries are precipitated as scale upon the exteriors of the tubes *e*. Ordinarily this scale has been removed by chipping off with scaling-tools or by removing the tubes and immersing them in a scale-reducing acid-bath. If the efficiency of the apparatus is to be maintained, this cleaning has to be frequently done, and by the above methods it is very tedious and expensive. In order to clean the tubes completely and quickly, I make use of the following device: *m*, Figs. 1, 2, 3, 4, is a frame or frames carrying slotted bars *n*, which separate one row of tubes *e* from the next row. In the slots in the bars *n* are carried perforated plates or scrapers *o*, through which the tubes *e* pass, there being a plate or scraper for each pipe, each scraper being capable of a movement in its carrying-bars entirely independent of any of the other scrapers. Secured to the frame or frames *m* are operating-rods *p*, which pass out through the tube-box *d* and steam-chest *h* through stuffing-boxes *r*. The outer ends of the rods *p* are connected by a yoke *s*, through which passes a screw *t*, the outer end of which carries an operating-wheel *u* and the inner end of which is furnished with a groove *v*, which is adapted to engage with a cap *w*, which is bolted to the outside of the steam-chest *h*. The cap *w* is U-shaped and open at the bottom, as best shown in Figs. 5 and 6. The yoke *s* is preferably pivotally connected to the rods *p* at *x*, and when the cleaners are not being operated the rods *p* are moved all the way in and the screw *t* moved up vertically, as shown by dotted lines in Fig. 1, so as to economize



space, this movement being made possible through the hinged connections  $x$  and the open cap  $w$ .

At their inner ends the tubes  $e$  are carried by a frame  $y$ , the lower end of which is furnished with rollers 7, which rest upon tracks 8. By unbolting the tube-plate  $c$  the tubes and connected parts can be readily removed from chamber  $a$  at any time.

9 is a pipe through which the brine can be drawn from the chamber  $a$  as often as necessary; 10 a pipe through which water is admitted to chamber  $a$ . The chamber  $a$  is in practice fitted with the usual and well-known devices for indicating water-level and steam-pressure; but in the drawings these devices have been omitted.

The scale accumulates rapidly upon the tubes  $e$ , and at frequent intervals the scrapers  $o$  should be operated, and to do this it is only necessary to engage the inner end of the screw  $t$  with the cap  $w$  and to turn the screw so as to cause the rods  $p$  to move in and out, this movement causing the plates or scrapers  $o$  to be moved along the tubes  $e$  and to scrape from them any deposit that may be upon their outer sides. As has been before stated, each tube has its own scraping-plate, and these plates are mounted in grooved bars  $n$ .

This construction is for the purpose of permitting each plate to have sufficient movement to adjust itself to inequalities or bends in the pipe.

The live-steam chest  $g$  is separated from the salt water in the chamber  $a$  by the tube-box  $d$ , the tube-plate joint being so arranged that it is not in contact with the water on one side and the steam on the other.

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

In a boiler-tube-scraping apparatus, in combination, a boiler, a series of steam-pipes within said boiler, scrapers for each of said pipes, a frame carrying said scrapers, a pair of rods secured to said frame and passing out through the end of said boiler, stuffing-boxes carried by said boiler through which said rods pass, a yoke the ends of which are pivotally secured to the outer ends of said rods, a screw passing through said yoke, and an open cap carried by the boiler and adapted to engage a groove on the inner end of the screw.

ALEX. G. HAY.

Witnesses:

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