

No. 730,895.

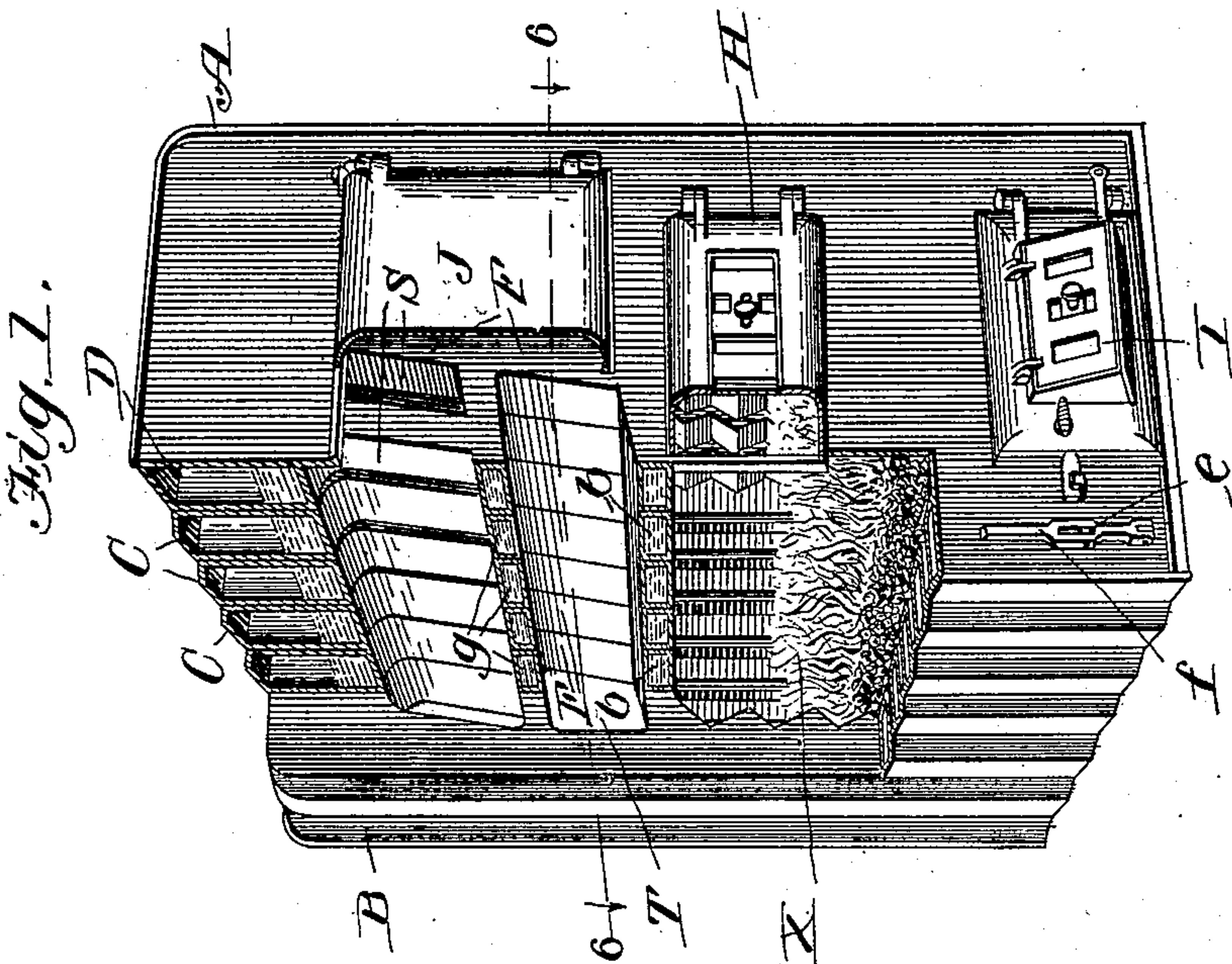
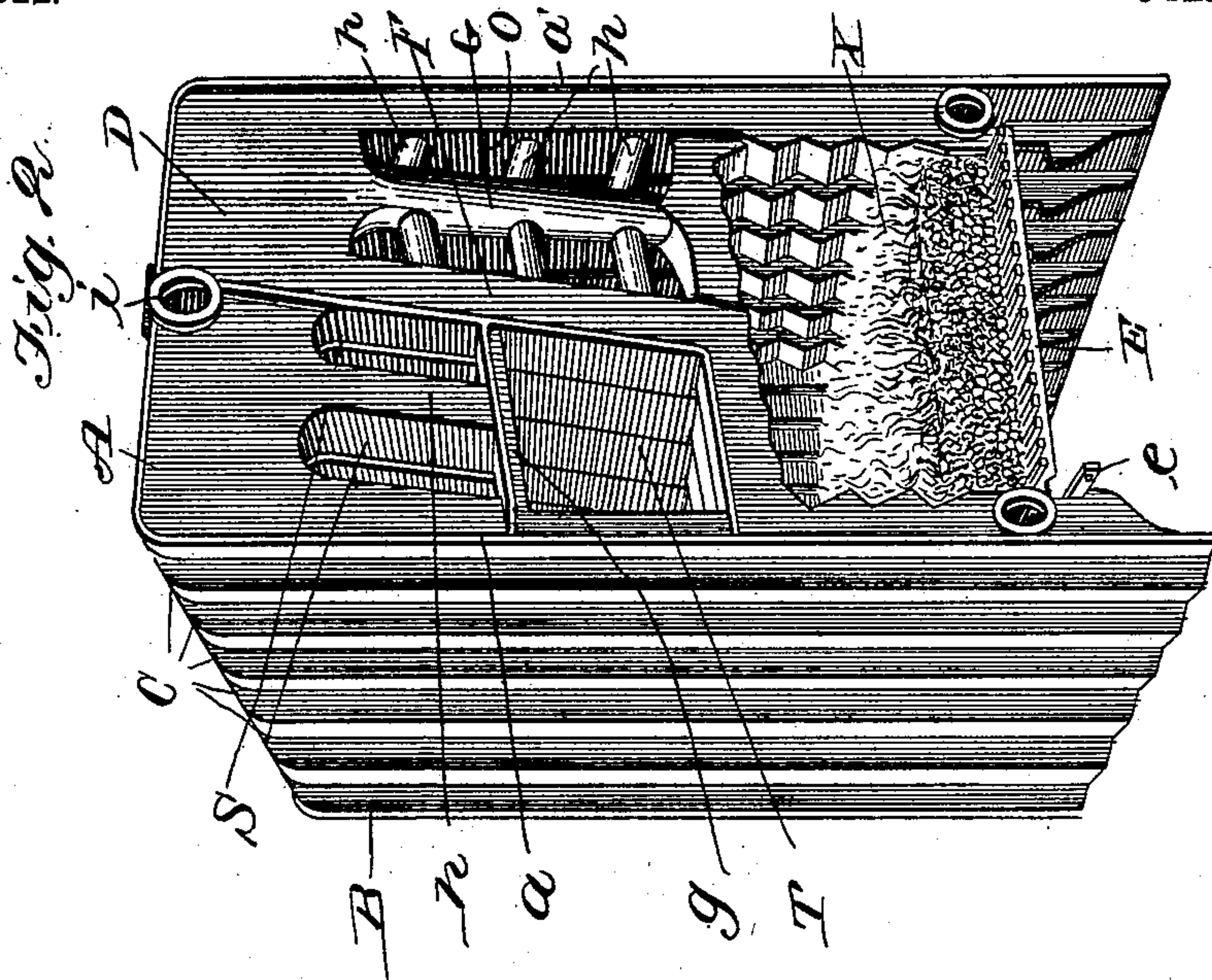
PATENTED JUNE 16, 1903.

E. M. FANCHER.  
SECTIONAL BOILER.

APPLICATION FILED JAN. 25, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses:

H. S. Gaither.  
M. Friel.

Inventor:

Eugene M. Fancher  
by Frank D. Thompson  
Attorney.

No. 730,895.

PATENTED JUNE 16, 1903.

E. M. FANCHER.  
SECTIONAL BOILER.

APPLICATION FILED JAN. 25, 1902.

NO MODEL.

3 SHEETS—SHEET 2.

Fig. 5.

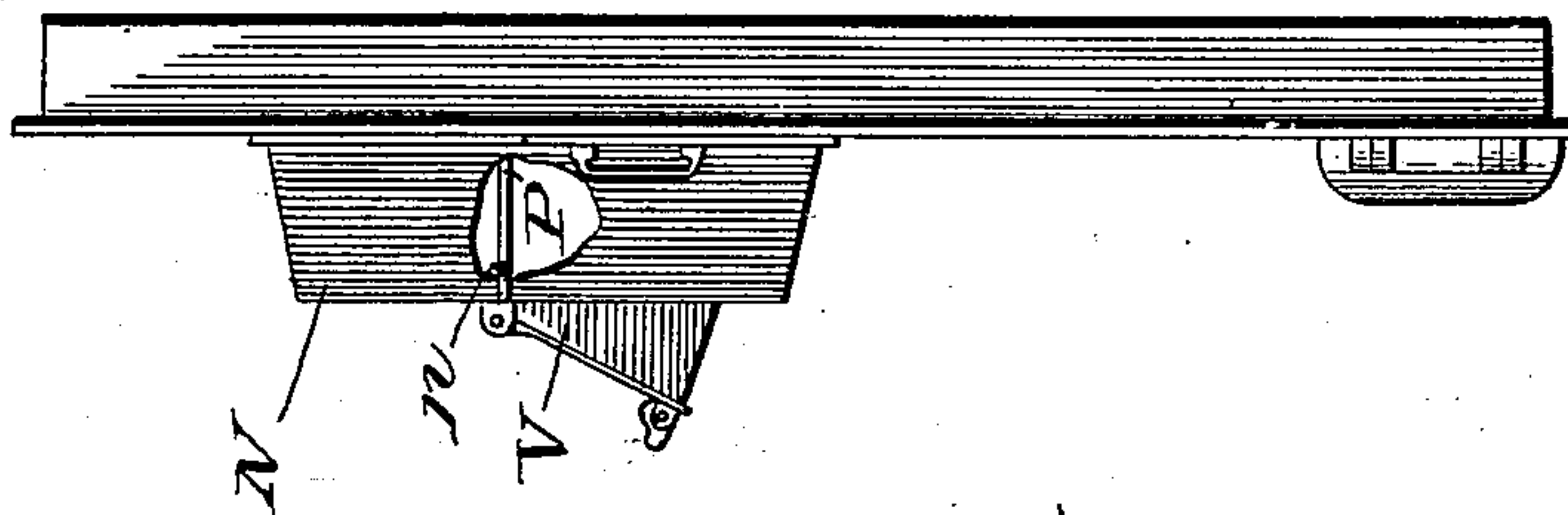


Fig. 4.

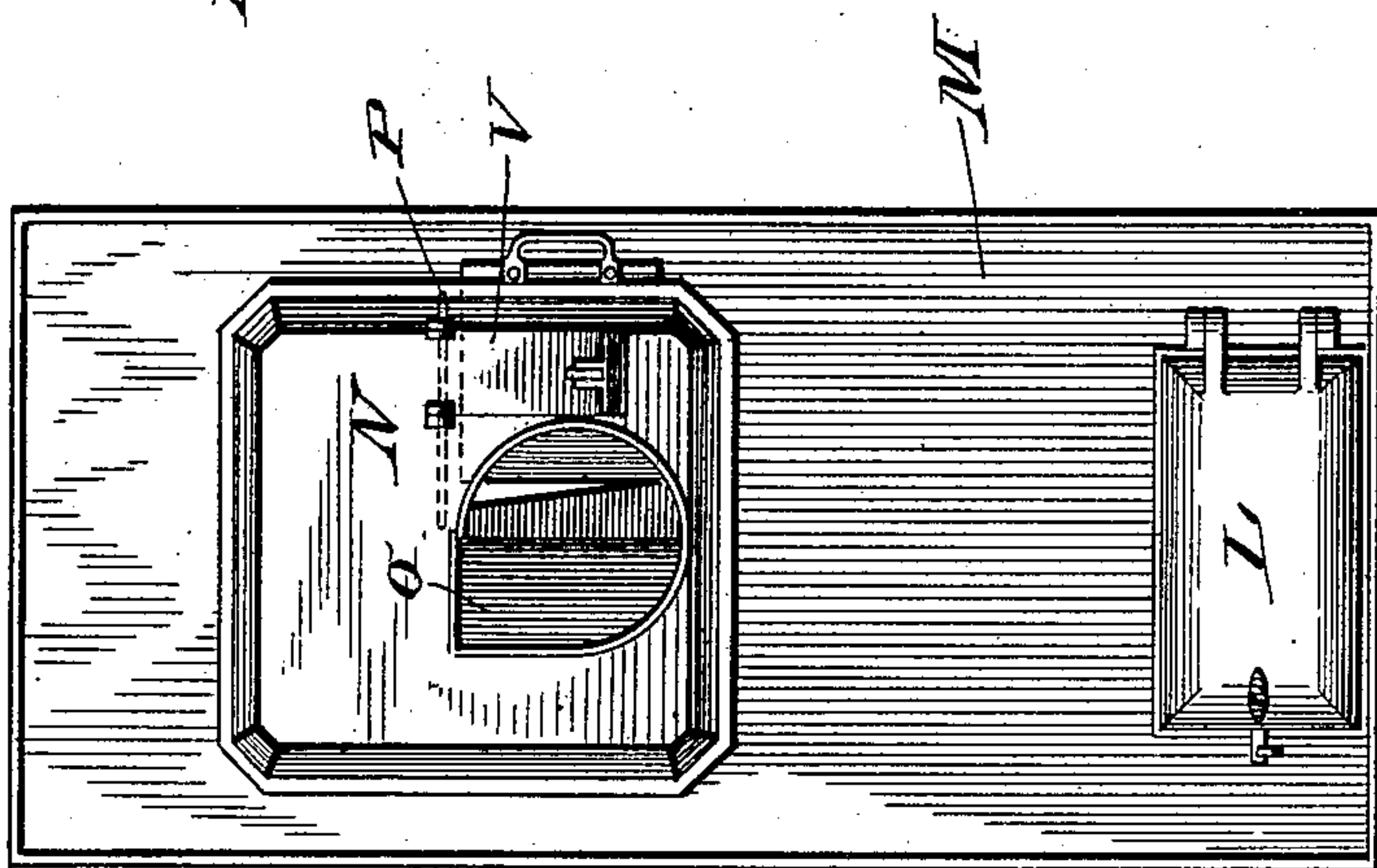
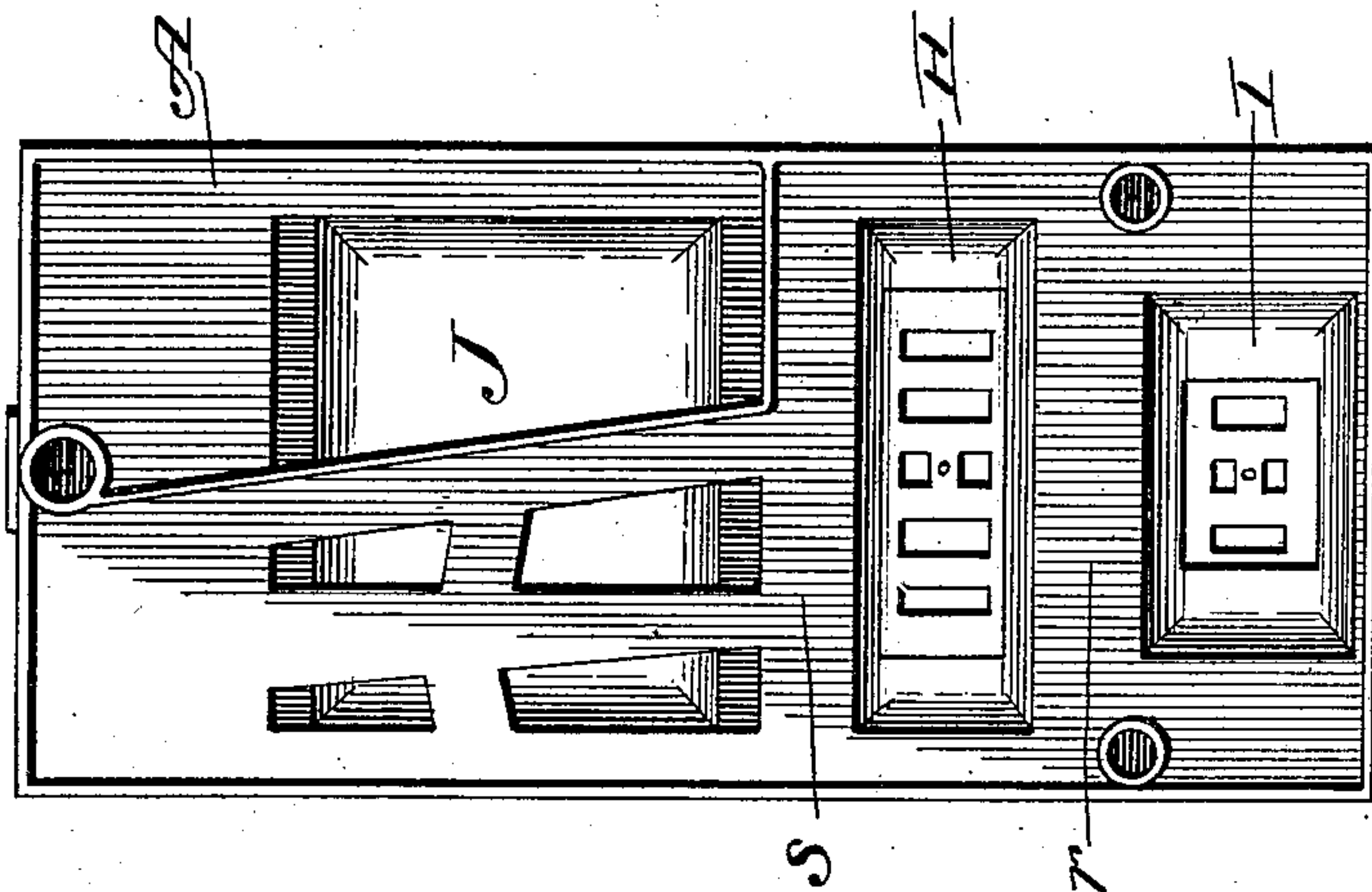


Fig. 3.



Witnesses:  
H. S. Gaither  
M. Friel.

Inventor:  
Eugene M. Fancher.  
by Frank D. Thomson  
Attorney.



No. 730,895.

PATENTED JUNE 16, 1903.

E. M. FANCHER.  
SECTIONAL BOILER.

APPLICATION FILED JAN. 25, 1902.

NO MODEL.

3 SHEETS—SHEET 3.

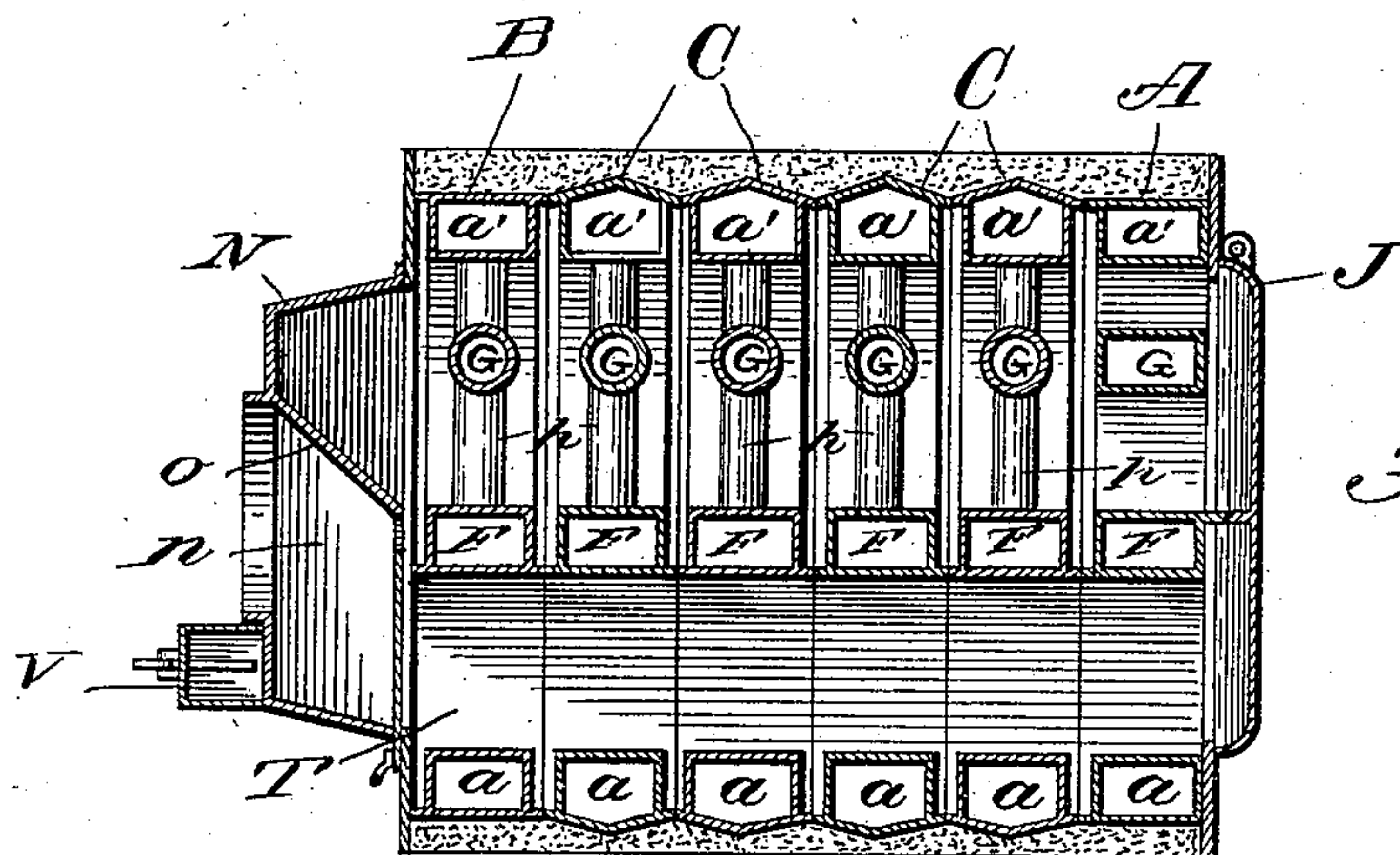


Fig. 6.

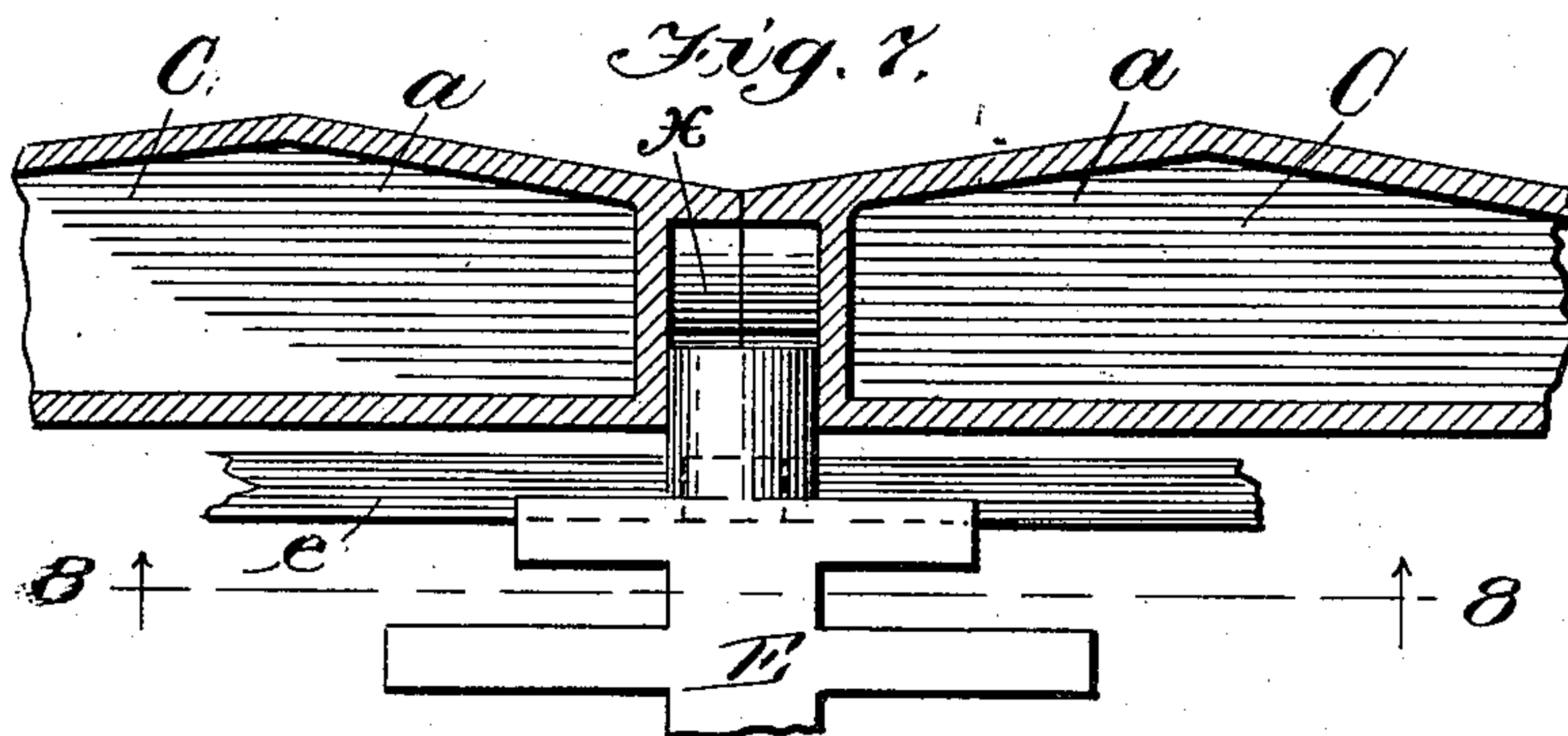


Fig. 7.

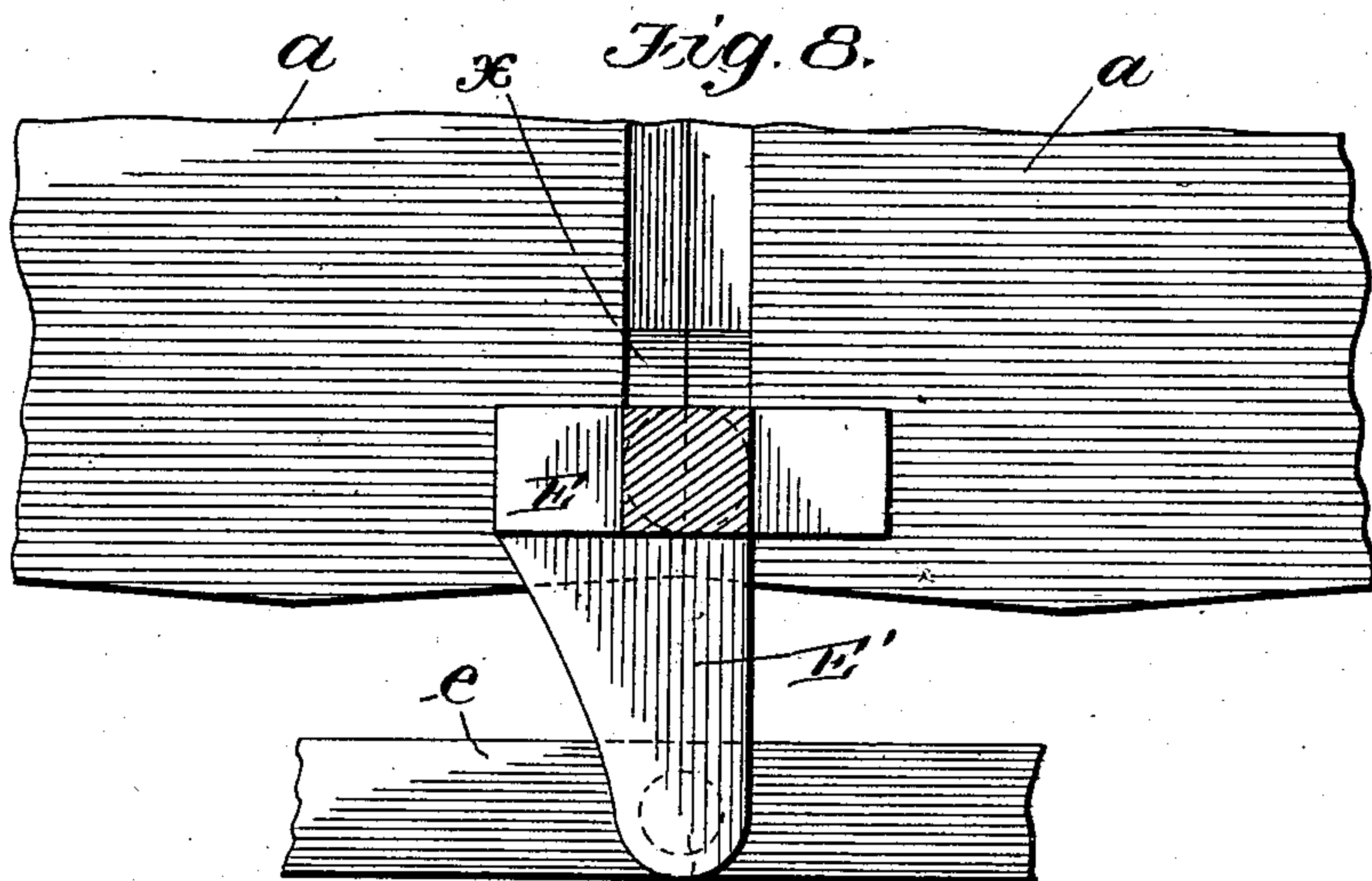


Fig. 8.

Witnesses:

H. S. Gaither

M. Friel

Inventor:

Eugene M. Fancher,  
by Frank D. Thomas  
Attorney.



# UNITED STATES PATENT OFFICE.

EUGENE M. FANCHER, OF CHICAGO, ILLINOIS.

## SECTIONAL BOILER.

SPECIFICATION forming part of Letters Patent No. 730,895, dated June 16, 1903.

Application filed January 25, 1902. Serial No. 91,191. (No model.)

*To all whom it may concern:*

Be it known that I, EUGENE M. FANCHER, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sectional Boilers, of which the following is a full, clear, and exact description.

My invention relates to domestic sectional furnaces used in steam-heating and hot-water heating systems; and its object is, first, to thoroughly utilize the heated products of combustion thereof, both by exposing as much heating-surface as possible to the same and by the novel direction given the course of said heated products through the furnace; second, to prevent the accumulations of dust on the surfaces exposed to the heat; third, to so construct the waterways as to promote the circulations of the water and yet allow the steam to rise without materially disturbing the water, and thus prevent priming, and, fourth, to promote the circulation of water by giving the products of combustion a peculiar direction while in transit from the fire-chamber to the exit of the furnace, so that in process of cooling or condensation the heat will be maintained at a higher degree near the fire-chamber and at less and less degree the farther said products get from the same. This I accomplish by the means hereinafter fully described, and as particularly pointed out in the claims.

In the drawings, Figure 1 is a perspective view of my improved furnace, showing a portion of one side thereof broken away. Fig. 2 is a similar view with the front section of the furnace removed. Fig. 3 is a rear view of the front section. Fig. 4 is a rear elevation of the furnace. Fig. 5 is a side elevation of the rear section of the same. Fig. 6 is a horizontal section through the furnace, taken on dotted line 6 6, Fig. 1. Fig. 7 is a detail view showing a section through the lower portion of two abutting sections of the furnace, taken on a horizontal plane just above the grates and the broken-away end portion of the grate journaled in the open bearings between the same. Fig. 8 is a detail view of the same, showing a section taken on dotted line 8 8, Fig. 7, looking in the direction indicated by arrows.

My improved furnace consists of a number of transverse sections, the exterior dimensions of all of which correspond to such an extent that when properly assembled they make a rectangular structure, the sides and top of which it is customary to protect by a veneering of asbestos cement and the front and rear sections A and B, respectively, are in so far as they are designed to close the ends of the furnace and afford a means of access into and exit from the same different in construction from the central or mediate sections C C, which latter embody the salient features of my invention and can be used in greater or less numbers, according as it is desired to build a large or small furnace. Each of these central sections C comprise two legs *a a'*, the outer faces of which when the furnace is properly assembled form part of the side walls of the same. These legs are hollow from the top, where they are connected by the horizontally-disposed steam-chamber D, to a point just below the grates E and are connected by a slanting water-bar *b* about midway their height, which spans over the grate-surface and assists in forming the roof of the fire-chamber X. Below the water-bar *b* the width of the hollow portion of the legs is less than the width of the section until a point just below the grates is reached, whereupon the width of the hollow portion is increased to correspond to that of the section of which it forms a part. When several of said central sections are properly connected, this lessened width of the legs forms open bearings *x* for the journals of the rocking grate-section E, from which they can be very easily removed or into which they can be dropped into place, as desired. These grate-sections E are each provided with a depending arm *E'* near one journal, and this arm near its lower end is provided with a lateral stud *e'*, that enters an opening in the horizontal shaking-bar *e*, and this shaking-bar extends out through a suitable opening in the front section and is provided with a suitable lever *f* to vibrate it and rock the grates, substantially as shown in the drawings.

The under side of the water-leg *a* is corrugated, and the inner vertically-disposed surfaces of the water-bars that are exposed to and form the top wall of the fire-chamber are cor-



rugated, so as to present as much heating-surface as possible without affording a lodgment for the dust from the fire. The water-bars *b* are connected at a point about their centers of length with the transverse steam-chamber D at the top of the section by an inclined tubular upright F, which in turn is connected at about its center of height with the right-hand water-leg *a* by a short tubular waterway *g*, and this short waterway *g* is connected about its center of length by an inclined vertically-disposed tubular wall *h*, which thus makes two arched longitudinal flues with the steam-chamber D. The width of the water-bar *b*, bridging over the fire-chamber and all of that part of each central section comprising the steam-chamber, tubular walls, waterway, &c., located between the tubular upright and the leg of the section away from which said upright right inclines, is of the same width as the said section; but the width of the water-bar *b* between the upright F and the leg of the furnace-section toward which said upright inclines is slightly narrower than the width of the section. Thus when several of these central sections are brought together the water-bars *b* form a grated passage, up through which the products of combustion pass into the chamber formed above the same and between said tubular uprights on one side, the legs of the sections toward which the uprights incline on the other side, and the steam-chamber overhead. The flues or passages above the water-bars *b*, formed on the other side of the upright F, have their joints in such close contact that they are practically closed to the direct action of the products of combustion from the fire-chamber and are open only at the front and the rear of the furnace.

The center of length of the narrower portion of the water-bars *b* is connected with the steam-chamber D by a tapered-shape column G, which is narrowest at its lower end, and this column is connected by a series of laterally-projecting inclined tubular branches *h h* to the upright F and the adjacent water-leg *a'* of the section, thus forming a tree through which the water is free to circulate, substantially as hereinafter fully described. These sections are connected by means of suitable nipples *i* at the center of the steam-chamber next the top of the section and by nipples *j j*, located at points *j j* near the bottom of each leg just above the plane of the fire-grates.

At the front of the furnace the forwardmost central section is connected to the front section A in substantially the same manner as it is connected to its fellows. This front section has a tubular formation substantially similar to the central sections C, except that it is minus the short waterway *g* and tubular wall *h*, and instead of having a grate has its legs hollow almost to the floor and has a transverse tubular member *r*, connecting said legs. Just below the part *s*, corresponding in position to the water-bar *b*, the front section is provided with a fire-door H, of suitable

construction, and below the transverse member *r* it is provided with a suitable door I, through which access can be had to the ash-pit of the furnace below the grates. Just in front of the tubular formation of the central sections of the furnace above the plane of the water-bars *b* the front section is provided with a swell front J, of rectangular proportions, of such dimensions that it extends from one water-leg *a* to the other of the sections of the furnace and from just above the plane of the water-bar *b* to a plane below the steam-chambers of the section D, so as to establish an end communication with all the longitudinally-disposed passages or flues of the furnace above the plane of the water-bars *b*. In order to facilitate access to all of the passages above the water-bars *b*, (through which the products of combustion must pass while in transit through the furnace,) I prefer to hinge the swell front J to the front section, as shown in the drawings. This, however, need not be done unless desired. The rear section B is likewise of a tubular formation. Its construction above the plane of the water-bars is substantially the same as that of the central sections; but below the plane of said water-bars it has a hollow water-wall M, which forms the rear wall of the fire pot or chamber, which extends as far down as the grate. Below the plane of the grate-bars this rear section is provided with a door L, through which access can be had to the lower part of the furnace. Above the plane of the grate-bars the rear wall of said rear section is cut away and is covered and closed by a box-shaped shell or drum N, with the lower part of which the pipe leading to the chimney connects. This shell N has a horizontal partition *n* on about the plane of the waterways *g* and an oblique vertical partition *o*, which contacts with the tubular upright F of the rear central section C and, together with partition *n*, forms a continuation of the lower flue T, formed by the legs *a*, water-bars *b*, waterways *g*, and uprights F to the exit or chimney-opening. The remainder of the interior space of shell N is open and establishes a communication between the chamber O above the grated water-bars and the arched flues S S on the other side of uprights F and above waterways *g*.

In operation the products of combustion from the fire-chamber first enter chamber O, then pass into shell N. From thence they pass forward through the arched flues S S into the small front J and then down into and back through the flue T below waterway *g* out of the furnace. If desired, a damper P may be made in the horizontal partition *n* of the shell N, by opening which a direct draft may be had through the same from chamber O out of the furnace. If desired, the rear of the shell or drum N may, back of flue T, be provided with a suitable check-valve V. Any suitable arrangement may be provided for this purpose, however. It will thus be observed that by always bringing the more



highly-heated products of combustion against the right side of the furnace and then directing them in a less-heated state through flues S and then in a still cooler state directing them back through flue T, I give the water in the tubular parts of the furnace an upward movement, then a movement from right to left, and then a downward movement on the left-hand side of the furnace, which continues easily and without undue friction all the time the furnace is in operation. The incline and slant given to the interior tubular constructions of the furnace assist in affording an easy and comparatively unobstructed chance for the steam to rise and escape into the steam-chamber and the water to descend unobstructed and prevents priming. These and other advantages will be observed by the practical furnace-maker, all of which I desire to be understood as coming within the scope of my invention so long as substantially the same means are employed.

What I claim as new is—

1. A sectional boiler comprising several corresponding central or mediate sections, each having water-legs connected at the top by a steam-chamber, and below said steam-chamber and above the fire-chamber connected by a transverse horizontally-disposed water-bar, about one-half the length of which is the same width as said sections, respectively, and the remainder less in width than the same.

2. A sectional boiler comprising several corresponding central or mediate sections, each having water-legs connected at the top by a steam-chamber, and below said steam-chamber and above the fire-chamber being connected by a transverse horizontally-disposed water-bar, which latter at about its center of length is connected to the steam-chamber by a tubular upright, said water-bars being the same width as their respective sections on one side of said upright and less in width on the other side thereof.

3. A sectional boiler comprising several corresponding central or mediate sections, each having water-legs connected at the top by a steam-chamber, and below said steam-chamber and above the fire-chamber being connected by a transverse horizontally-disposed water-bar, which latter at about its center of length is connected to the steam-chamber by a tubular upright, said water-bars being the same width as their respective sections on one side of said upright and less in width on the other side thereof, and said water-bar and upright being slanted or inclined in the same direction.

4. A sectional boiler comprising several corresponding central or mediate sections, each having water-legs connected at the top by a steam-chamber and connected about mediate their length by water-bars, which latter are connected with the steam-chamber by a tubular upright, which in turn is connected about midway its height with one of said legs

by a waterway and said water-bar being less in width on the side of said upright opposite said waterway than the remaining structure of each section, thus forming three longitudinal chambers or flues in said sections one only of which communicates direct with the fire-chamber and which are connected to each other only at their ends substantially as specified.

5. A sectional boiler comprising several corresponding central or mediate sections, each having water-legs connected at the top by a steam-chamber and connected about mediate their length by water-bars, which latter are connected with the steam-chamber by a tubular upright, which in turn is connected about midway its height with one of said legs by a waterway and said water-bar being less in width on the side of said upright opposite said waterway than the remaining structure of each section said water-bars uprights and waterways all inclined or slanting in the same direction, thus forming three longitudinal chambers above said water-bars which are adapted to be connected only at their ends, substantially as hereinbefore specified.

6. A sectional boiler comprising several corresponding central or mediate sections, and a front and rear end section operatively connected together, said central sections each having water-legs connected at the top chamber and above the fire-pot provided with transverse water-bars connecting said legs, about one-half the length of which is less in width than the remainder thereof, substantially as described, tubular uprights connecting said water-bars and steam-chambers and waterways connecting one of said legs and said uprights said front and rear end sections having their upper portions constructed similar to said central sections and in conjunction therewith forming longitudinal flues or passages and said front and rear sections being provided with box-shaped chambers whereby communication is established between said longitudinal flues or passages, substantially as specified.

7. A sectional boiler comprising several corresponding central or mediate sections, and a front and rear end section operatively connected together, said central sections each having water-legs connected at the top chamber and above the fire-pot provided with transverse water-bars connecting said legs, about one-half the length of which is less in width than the remainder thereof, substantially as described, tubular uprights connecting said water-bars and steam-chambers and waterways connecting one of said legs and said uprights said front and rear end sections having their upper portions constructed similar to said central sections and, together therewith slanting in the same direction and in conjunction therewith forming longitudinal flues or passages and said front and rear sections being provided with box-shaped chambers



whereby communication is established between said longitudinal flues or passages, substantially as specified.

8. A sectional boiler comprising several corresponding central or mediate sections, and a suitable front and a rear end section, each of said central sections having water-legs connected at the top by a steam-chamber and above the fire-pot provided with a transverse horizontally-disposed water-bar connecting said legs, a tubular upright connecting said water-bar and steam-chamber, and between said upright and one of said water-legs provided with an invertly-tapered water-column connecting said water-bar and steam-chamber, substantially as set forth.

9. A sectional boiler comprising several corresponding central or mediate sections, and a suitable front and a rear end section, each of said central sections having water-legs connected at the top by a steam-chamber and above the fire-pot provided with a transverse horizontally-disposed water-bar connecting said legs, a tubular upright connecting said water-bar and steam-chamber, and between said upright and one of said water-legs provided with an invertly-tapered water-column connecting said water-bar and steam-chamber, and said upright and water-leg between which it is placed, substantially as set forth.

10. A sectional boiler comprising several corresponding central or mediate sections, and a suitable front and a rear section, said central sections each comprising water-legs connected at their upper ends by a suitable steam-chamber, a transverse water-bar connecting said legs below said steam-chamber and above the fire-pot, tubular uprights connecting said water-bars and said steam-chambers, waterways connecting said tubular uprights and one of said legs, and an invertly-tapered column connecting said water-bars

and steam-chamber on the side of said upright opposite said waterway, substantially as set forth.

11. A sectional boiler comprising several corresponding central or mediate sections, and a suitable front and a rear section, said central sections comprising water-legs connected at their upper ends by a steam-chamber, a transverse water-bar connecting said water-legs at a point below said steam-chamber and above the fire-pot, and having a portion of the length thereof narrower than the remainder, tubular uprights connecting said water-bar and steam-chamber, and waterways connecting said upright and one of said water-legs, and an invertly-tapered water-column connecting the narrower portion of said water-bar and the steam-chamber on the side of the upright opposite said waterway.

12. A sectional boiler comprising several corresponding central or mediate sections, and a suitable front and a rear section, said central sections comprising water-legs connected at their upper ends by a steam-chamber, a transverse water-bar connecting said water-legs at a point below said steam-chamber and above the fire-pot, and having a portion of the length thereof narrower than the remainder, tubular uprights connecting said water-bar and steam-chamber, and waterways connecting said upright and one of said water-legs, and an invertly-tapered water-column connecting the narrower portion of said water-bar and the steam-chamber on the side of the upright opposite said waterway, said water-bar, tubular upright, water way and column all slanting or inclined in the same direction.

EUGENE M. FANCHER.

Witnesses:

EDWIN W. HART,

FRANK D. THOMASON.