

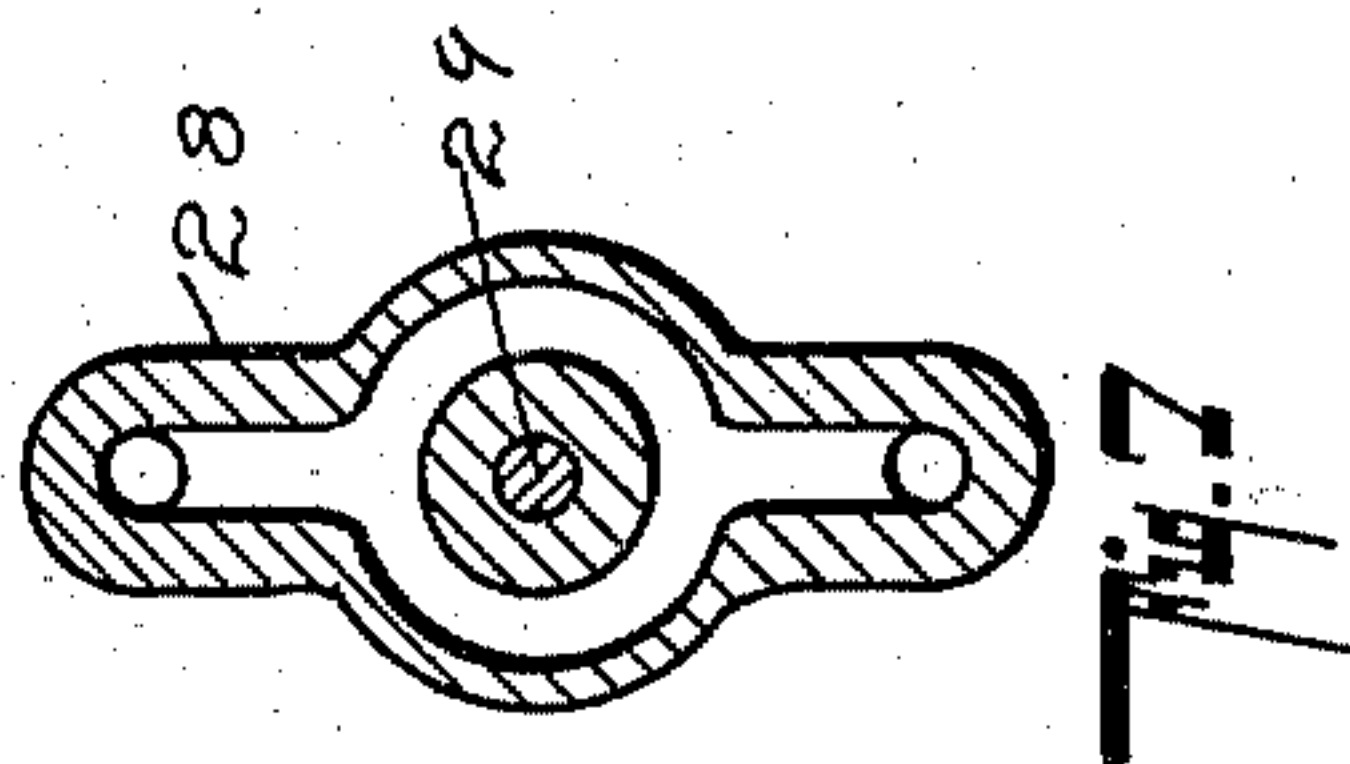
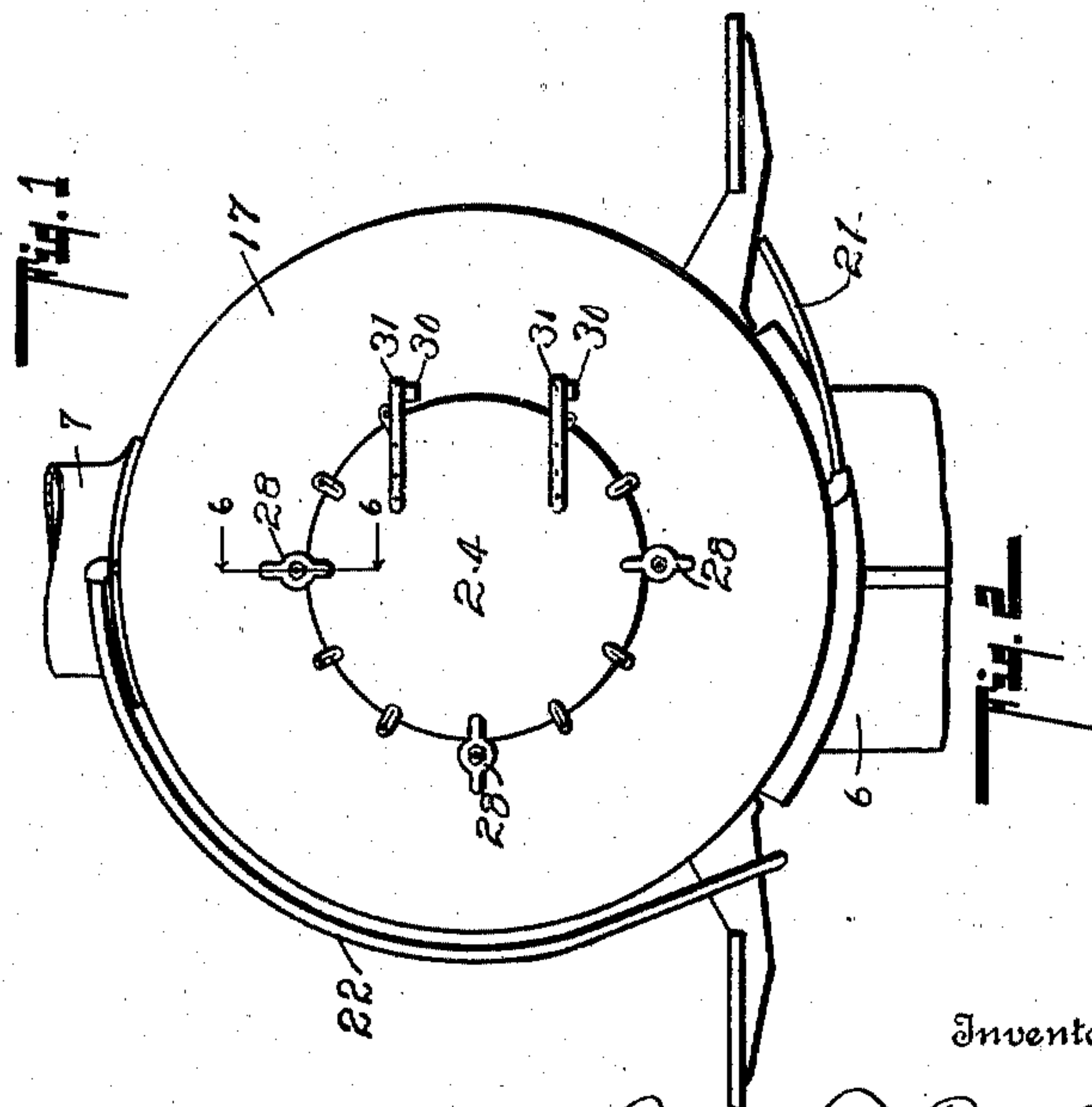
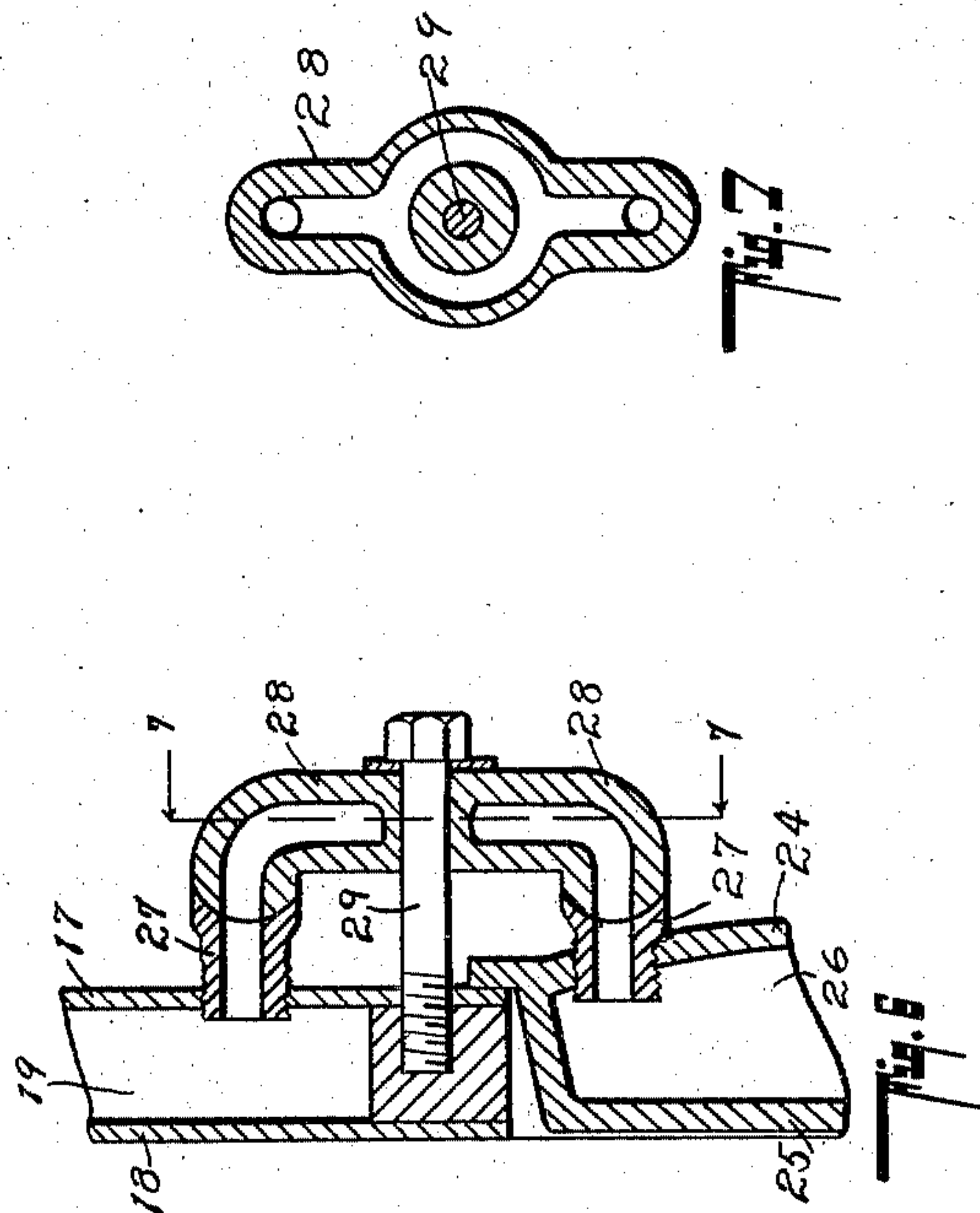
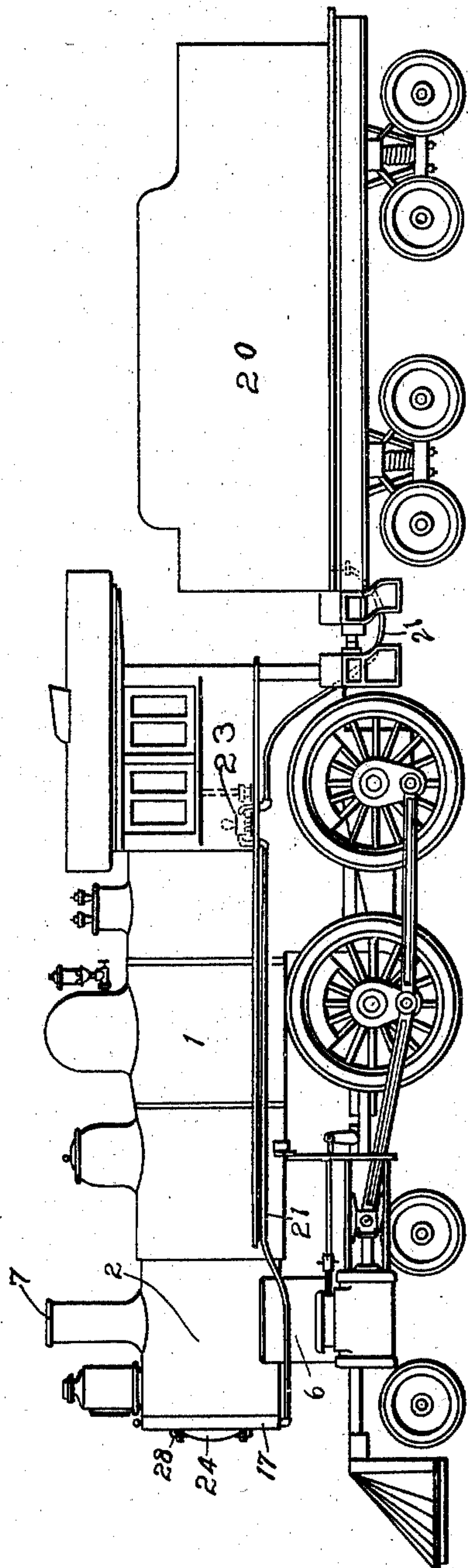
J. F. BECK.  
LOCOMOTIVE.

APPLICATION FILED MAY 26, 1909.

966,884.

Patented Aug. 9, 1910.

3 SHEETS—SHEET 1.



Witnesses  
Margaret Glasgow.  
G. E. Braden

384

Inventor  
John F. Beck  
Chas. E. Earl  
Attorneys.

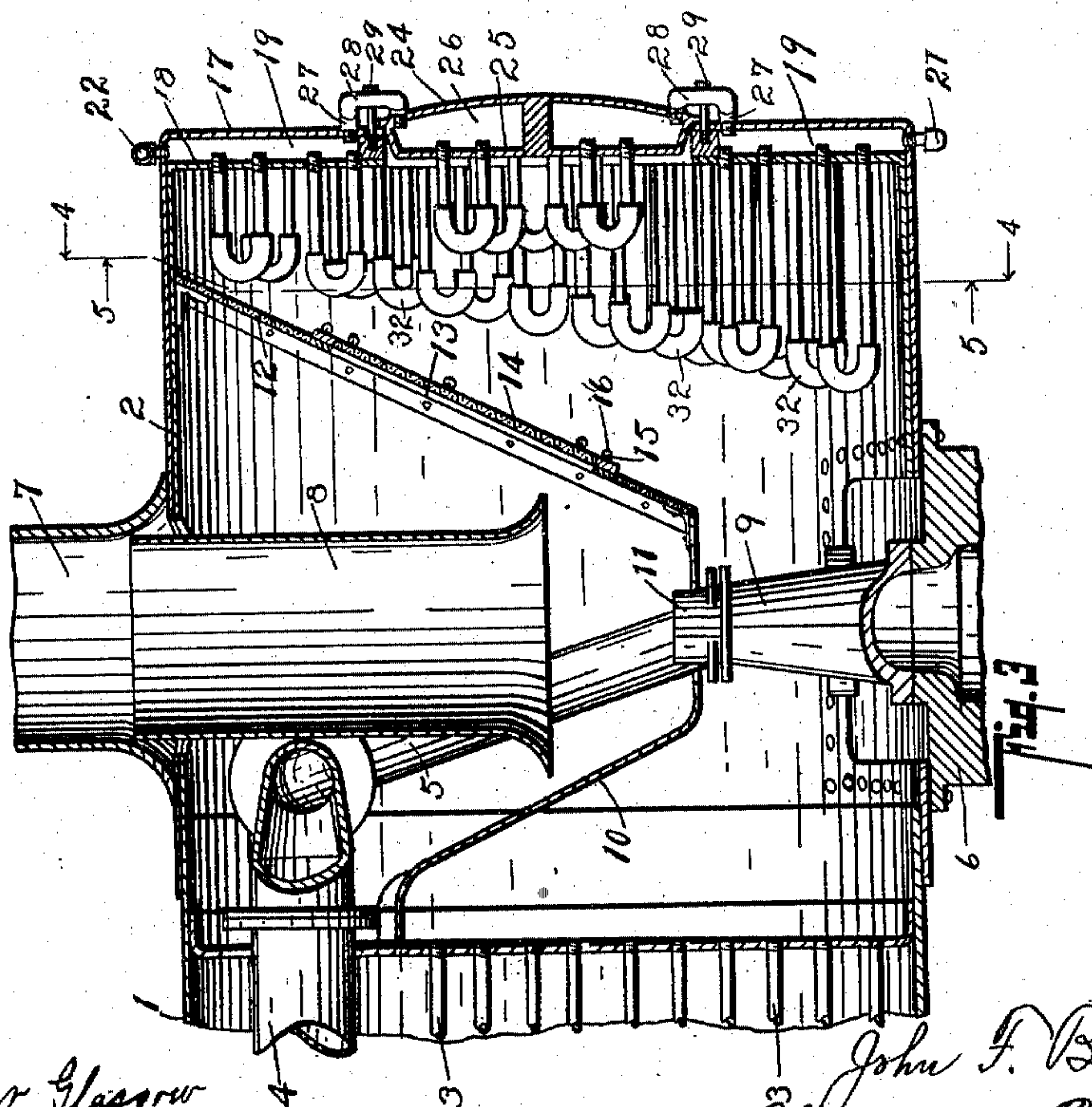
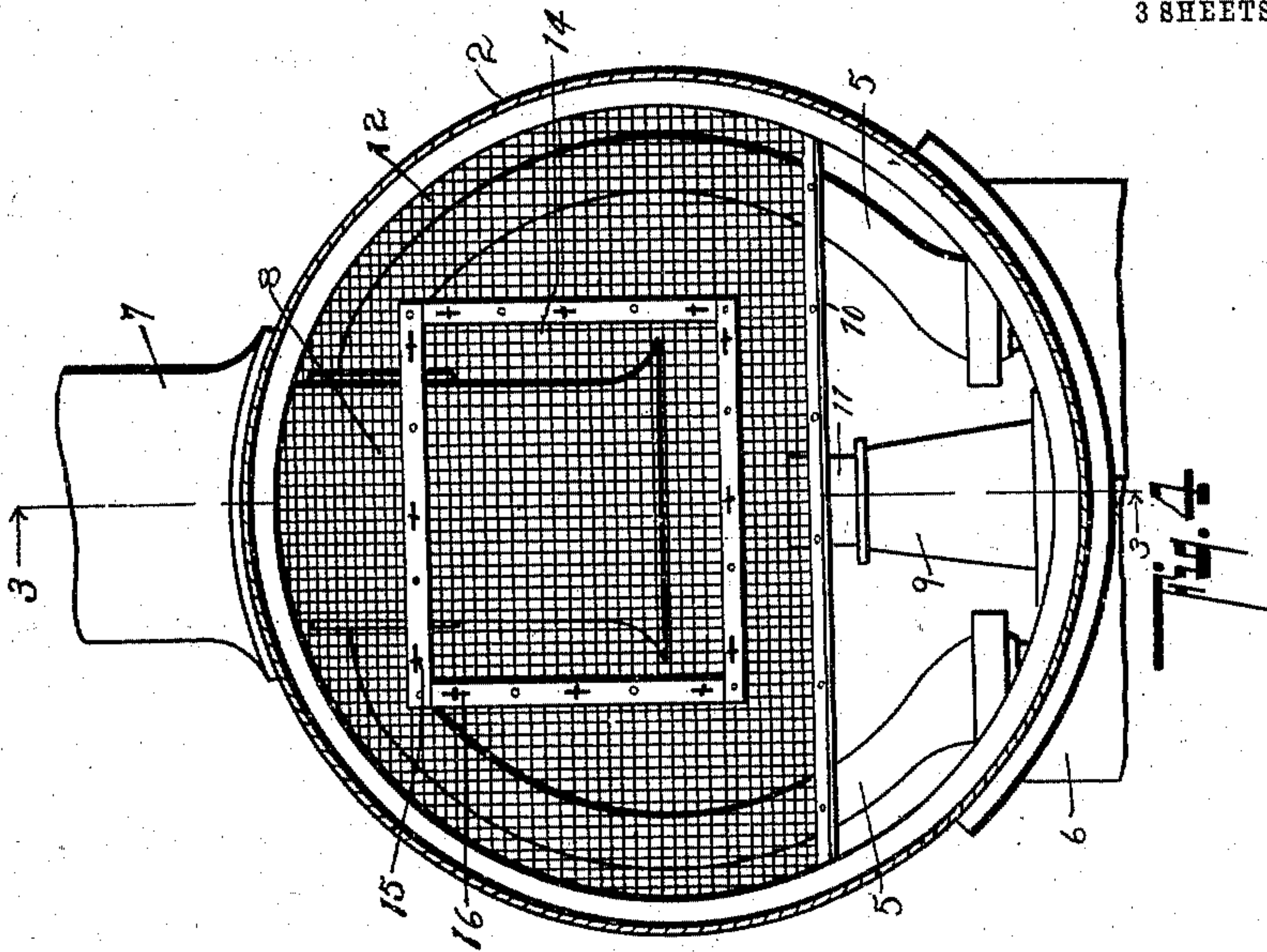
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3 SHEETS—SHEET 2.



Inventor

Witnesses  
Margaret Glasgow  
Clifford E. Braden

By

John F. Beck  
Chappell & Earl

Attorneys



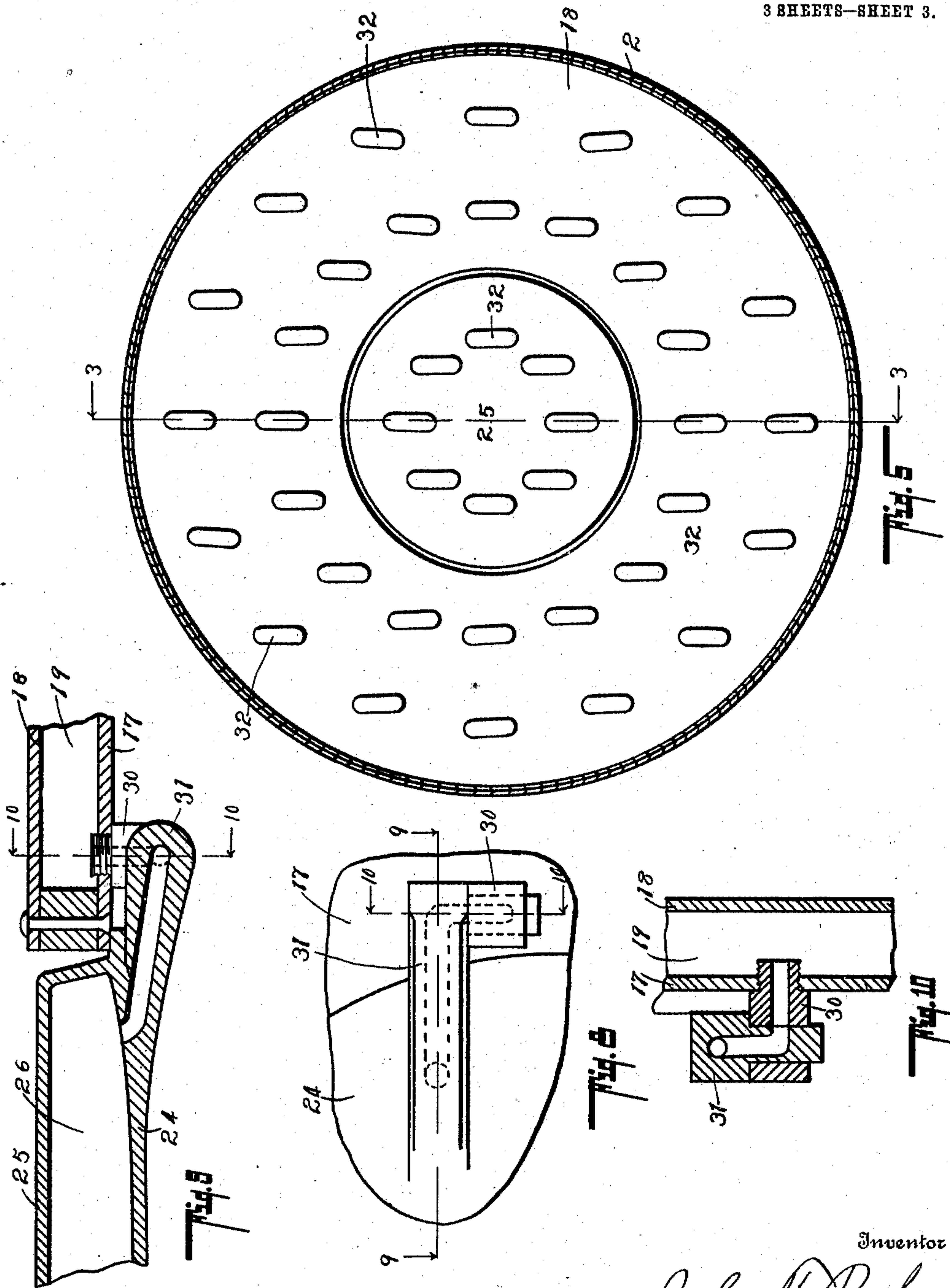
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3 SHEETS—SHEET 3.



Witnesses  
Margaret Glasgow.  
Gloria E. Braden

334

Inventor  
John F. Beck  
Chapman & Earl  
Attorneys



# UNITED STATES PATENT OFFICE.

JOHN F. BECK, OF GRAND RAPIDS, MICHIGAN, ASSIGNOR OF ONE-HALF TO HARRY VANDERVEEN, OF GRAND RAPIDS, MICHIGAN.

## LOCOMOTIVE.

966,884.

Specification of Letters Patent.

Patented Aug. 9, 1910.

Application filed May 26, 1909. Serial No. 498,578.

*To all whom it may concern:*

Be it known that I, JOHN F. BECK, a citizen of the United States, residing at Grand Rapids, Michigan, have invented certain new and useful Improvements in Locomotives, of which the following is a specification.

This invention relates to improvements in locomotives.

My improvements relate particularly to the smoke box and front of locomotives, although it may be adapted for use, and certain features of it are of advantage for use in other structures.

The main objects of this invention are: First, to provide in a locomotive, an improved smoke box and front so constructed as to effectively withstand the effect of the heat from within and the cold from without to which it is subjected in use. Second, to provide in a structure of the class described, a smoke box in which a large per cent. of the heat units of the products of combustion passing therethrough are utilized. Third, to provide in a structure of the class described, an improved smoke box and front in which the expansion and contraction and warping of the front due to the extremes of heat and cold are obviated.

Further objects, and objects relating to structural details, will definitely appear from the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The structure described constitutes one effective embodiment of my invention. Other embodiments would be readily devised by those skilled in the art.

The invention is clearly defined and pointed out in the claims.

A structure constituting an effective and preferred embodiment of the features of my invention is clearly illustrated in the accompanying drawing, forming a part of this invention, in which:

Figure 1 is a side elevation of a locomotive and its tender, embodying the features of my invention. Fig. 2 is an enlarged detail front elevation thereof. Fig. 3 is an enlarged detail longitudinal section taken on a line corresponding to line 3—3 of Fig. 4, through the smoke box thereof. Fig. 4 is a detail vertical section taken on a line corresponding to the broken line of Fig. 3,

looking in the direction of the little arrows designated by the numerals 4—4. Fig. 5 is an enlarged vertical section taken on the broken line of Fig. 3, looking in the direction of the arrows designated by the numerals 5—5, which is opposite to that of Fig. 4. Fig. 6 is an enlarged detail section through one of the front door clamps taken on a line corresponding to line 6—6 of Fig. 2. Fig. 7 is a detail section taken on a line corresponding to line 7—7 of Fig. 6. Fig. 8 is an enlarged detail elevation of one of the hinges for the front door. Fig. 9 is an enlarged detail section taken on a line corresponding to line 9—9 of Fig. 8. Fig. 10 is a detail section taken on a line corresponding to line 10—10 of Fig. 8.

In the drawings, similar reference characters refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the little arrows at the ends of the section lines.

Referring to the drawing, the locomotive, which is designated generally in the drawing by the numeral 1, is provided with a smoke box 2 at its forward end. The furnace flues 3 are arranged to deliver to the smoke box, as is indicated in the drawing, the details only of the flues being shown. The steam pipe 4, which is also shown in detail, is arranged to deliver to the steam chests through the steam pipes 5. The cylinder saddle 6 is arranged beneath the smoke box, as is the common practice.

The smoke stack is preferably provided with a downwardly projecting petticoat or draft flue 8, the lower end of which is bell-shaped or flared outwardly. Below this draft flue or pipe 8 is the nozzle stand 9, details of which are not here illustrated.

The deflector plate 10 is arranged at the rear of the draft flue 8 and projects downwardly and forwardly beneath the same, the nozzle 11 being arranged through the deflector plate, as is indicated. From the forward end of the deflector plate to the top of the arch chamber and in front of the draft pipe, I arrange a screen 12. This screen is preferably provided with a door or man-hole opening 13, which is closed by a screen 14. This screen is, in the structure illustrated, secured by the means of staples 15 and hooks 16, so that it can be easily attached or detached.

The smoke box front is made up of an



outer wall 17 and an inner wall 18 to form a water chamber 19 between the same. This water chamber is connected to the supply tank of the locomotive, which is designated  
 5 generally by the numeral 20, by a suitable circulation connection consisting of a pipe 21, which is connected to the tank and to the chamber 19 in the smoke box front at the bottom thereof, and a return pipe 22 which  
 10 is connected to the tank and the chamber in the smoke box front at the top thereof, see Fig. 2.

In the pipe 21 is a circulation pump 23, which is indicated in conventional form,  
 15 see Fig. 1. By means of this pump and circulation connection, the water is circulated from the tender tank through the water chamber in the front.

The front door is formed of an outer wall  
 20 24 and an inner wall 25 to provide a water chamber 26 therein. This chamber 26 in the door is connected to the chamber 19 in front by suitable passages, preferably through the hinges and securing clamps for the door.  
 25 The details of one of the securing clamps, which is hollow, are illustrated in Figs. 6 and 7, while the details of one of the hinges, which is also hollow, are illustrated in Figs. 8, 9 and 10. The securing clamps for the  
 30 door preferably consist of the socket members 27, which are threaded into the outer walls of the front and door, and the yoke-shaped member 28, the ends of which are adapted to fit into the sockets. The member  
 35 28 is clamped in place by the clamping screw 29, see Fig. 6. These clamping means are provided with water passages so that the water chambers in the front and door are connected.

40 The hinge preferably consists of the knuckle member 30 and the pintle member 31, the knuckle member being tapped into the outer wall of the front, while the pintle member is secured to the door and provided  
 45 with a passage opening into the water chamber of the door. The passages in the pintle and knuckle members are arranged to register when the door is closed, but preferably brought out of register when the door is  
 50 opened, so that they serve as cut-off valves.

A plurality of clamps are preferably provided, spaced about the door so as to insure a circulation through the water chamber of the door. To add to the heating capacity,  
 55 I provide the smoke box front and door with a plurality of U-shaped heating pipes 32. These pipes are mounted on the inner walls of the front and door to project into the smoke box chamber. These U-shaped heat-  
 60 ing pipes are arranged one leg above the other so that circulation therein is insured. The products of combustion passing through the smoke box are deflected by the deflector plate against the inner walls of the smoke  
 65 box front and door and across these heating

pipes so that the structures serve as a very effective means of taking up the heat from the products of combustion, which is carried back to the supply tank through the circulation connections described. A very effective  
 70 and even circulation is secured through the water chamber of the front and door, so that a comparatively even temperature is maintained in the front, thereby preventing its being injured by excessive heat, or by excessive  
 75 heat within and excessive cold without, which injuries result from the conditions where adequate provision is not made to overcome the defect.

The loops of pipe 32 are of different lengths, being longer toward the bottom,  
 80 which insures larger exposure of the surface. An important action of these loops of pipe is that they serve to break up large cinders and assist in reducing the size of the same  
 85 so that they pass readily through the screen and out, and, at the same time, owing to the fact that the pipes are filled with comparatively cool water, the heat of the cinders is reduced so that there is less likelihood of  
 90 damage by fire along the right of way.

I have illustrated and described my improvements embodied in a structure which I consider highly satisfactory. Various of the  
 95 parts are shown only in conventional form, and the particular details of construction which I have illustrated can be very greatly varied without departing from the essence of my invention. I desire to be understood  
 100 as claiming the same in detail in the form illustrated and described, as well as broadly.

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

1. The combination of a locomotive hav-  
 105 ing a smoke box containing a downwardly-inclined deflector in front of the flues with a nozzle arranged therethrough for creating draft; a front for said smoke box, having a  
 110 central door therein, which door and front are double-walled to provide water chambers therein; hollow connections for the said door to the said front to afford passages for  
 115 circulation of water between and through the said chambers; a plurality of horizontally-arranged U-shaped loops of heating pipes mounted upon the inner walls of said  
 120 front and door and arranged within the smoke box, the legs of which pipes are at different heights; a feed water supply tank; a circulating connection from said tank to the chambers of said front and door independent of the boiler connection; means to  
 125 act on the water to insure circulation, coacting as described.

2. The combination of a locomotive hav-  
 130 ing a smoke box containing a downwardly-inclined deflector in front of the flues with a nozzle arranged therethrough for creating draft; a front for said smoke box, double-



walled to provide a water chamber therein; a plurality of horizontally - arranged U-shaped loops of heating pipes mounted upon the inner walls of said front and door and arranged within the smoke box, a feed water supply tank; a circulating connection from said tank to the chambers of said front and door independent of said boiler connection, coacting as described.

10 3. The combination of a locomotive having a smoke box containing a downwardly-inclined deflector in front of the flues with a nozzle arranged therethrough for creating draft; a front for said smoke box containing a door, both double-walled to provide a water chamber therein; a feed water supply tank; a circulating connection from said tank to the chambers of said front and door independent of said boiler connection, co-  
15 acting as described.

20 4. The combination of a locomotive having a smoke box; a front for said smoke box, having a central door therein, which door and front are double-walled to provide  
25 water chambers therein; hollow connections for the said door to the said front to afford passages for circulation of water between and through the said chambers; a feed water supply tank; a circulation connection from  
30 said tank to the chambers of said front and door independent of said boiler connection, coacting as described.

35 5. The combination of a locomotive having a smoke box; a front for said smoke box, double-walled to provide a water chamber therein; a feed water supply tank; and a circulating connection from said tank to the chamber of said front independent of said boiler connection, coacting as described.

40 6. In a structure of the class described, the combination with the smoke box; a front for said smoke box double-walled to provide a water chamber therein; and a plurality of horizontally - arranged U-shaped  
45 loops of pipes mounted on the inner wall,

the legs of each loop being at different heights on said front and arranged within said smoke box, and means for circulating water through said front.

7. In a structure of the class described, 50 the combination with the smoke box; a front for said smoke box double-walled to provide a water chamber therein; and a plurality of horizontally - arranged U-shaped loops of pipe mounted on the inner wall of  
55 said front and arranged within said smoke box, and means for circulating water through said front.

8. In a structure of the class described, the combination with a smoke box having a  
60 front containing a water chamber; means for guiding the waste products of combustion from the furnace against the said water chamber; a feed water tank; and a circulating connection from the said feed water  
65 tank to the said water chamber independent of the boiler connection.

9. In combination with the water tank and the smoke chamber of a locomotive, a front to the smoke chamber having a water  
70 chamber therein, a hollow door in said front, clamps for securing said door to the front, some of said clamps having water channels through them for the flow of water from the water chamber in the front to and from  
75 the chamber in the door, a water pipe for returning the water from the water chamber in the front back to the tank, and a water pipe leading from the tank into the chamber  
80 in the front to insure a free flow of water from the tank to and through the front and the door and back to the tank.

In witness whereof, I have hereunto set my hand and seal in the presence of two witnesses.

JOHN F. BECK. [L. S.]

Witnesses:

CLARA E. BRODEN,  
PHINA WOODRUFF.