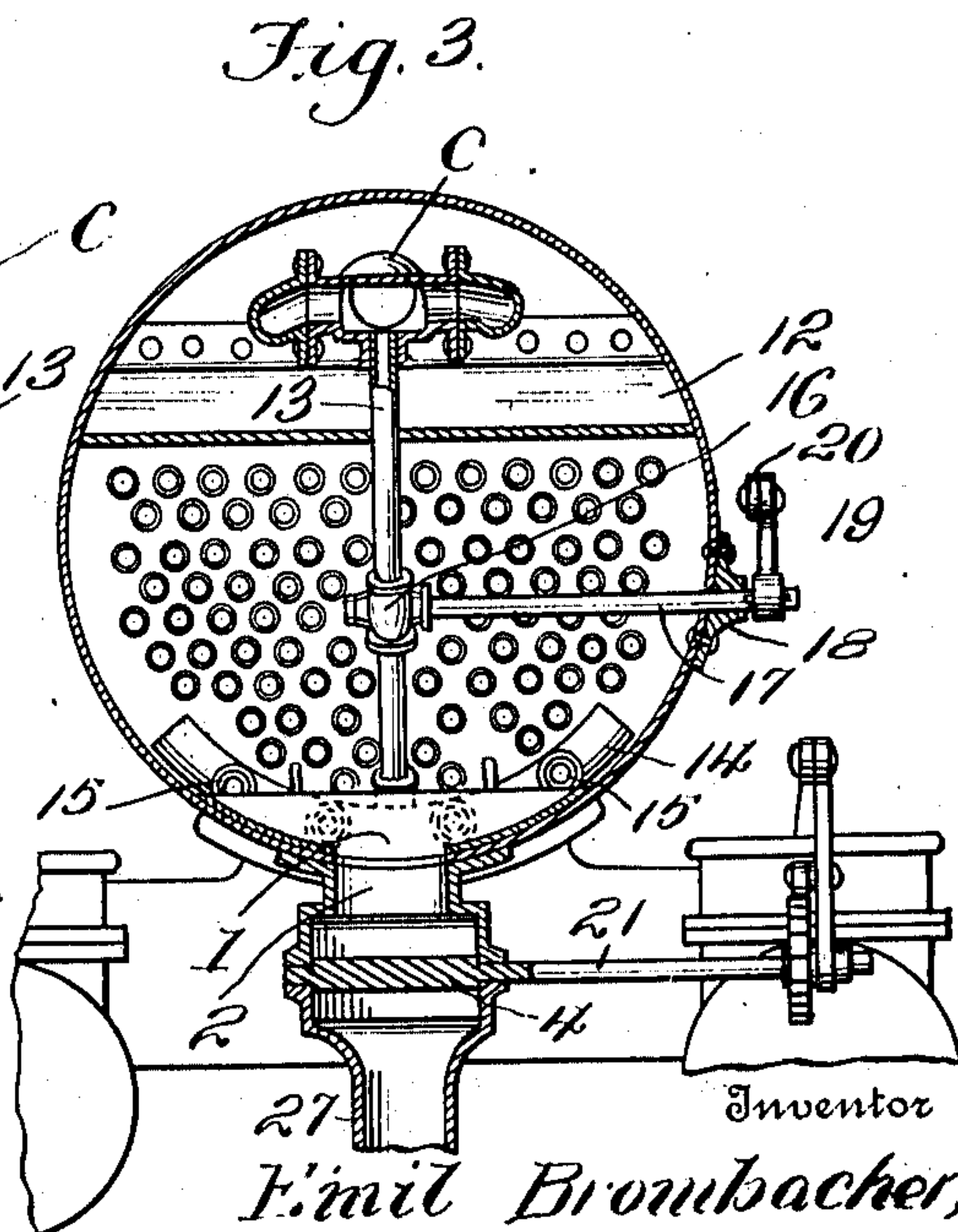
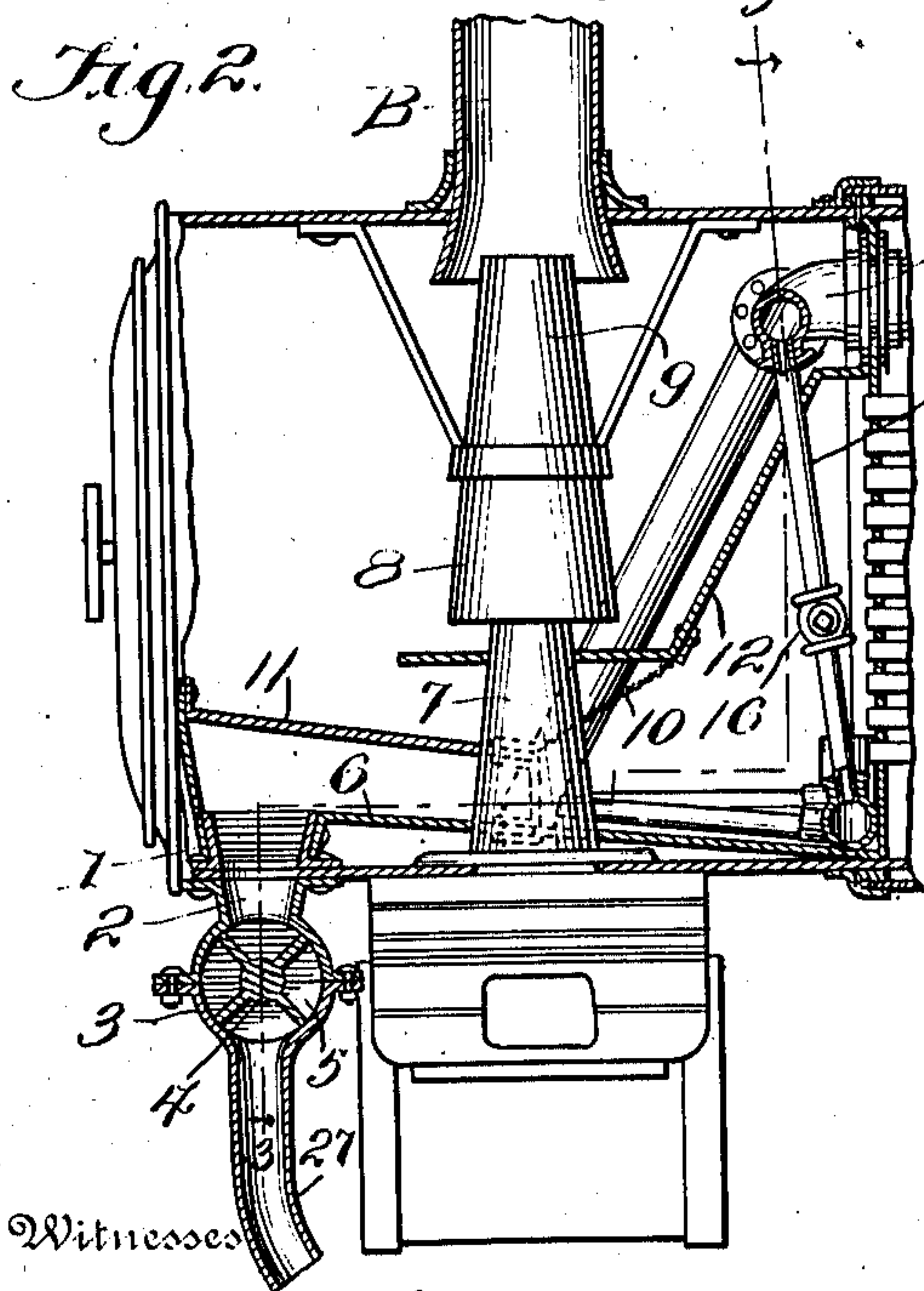
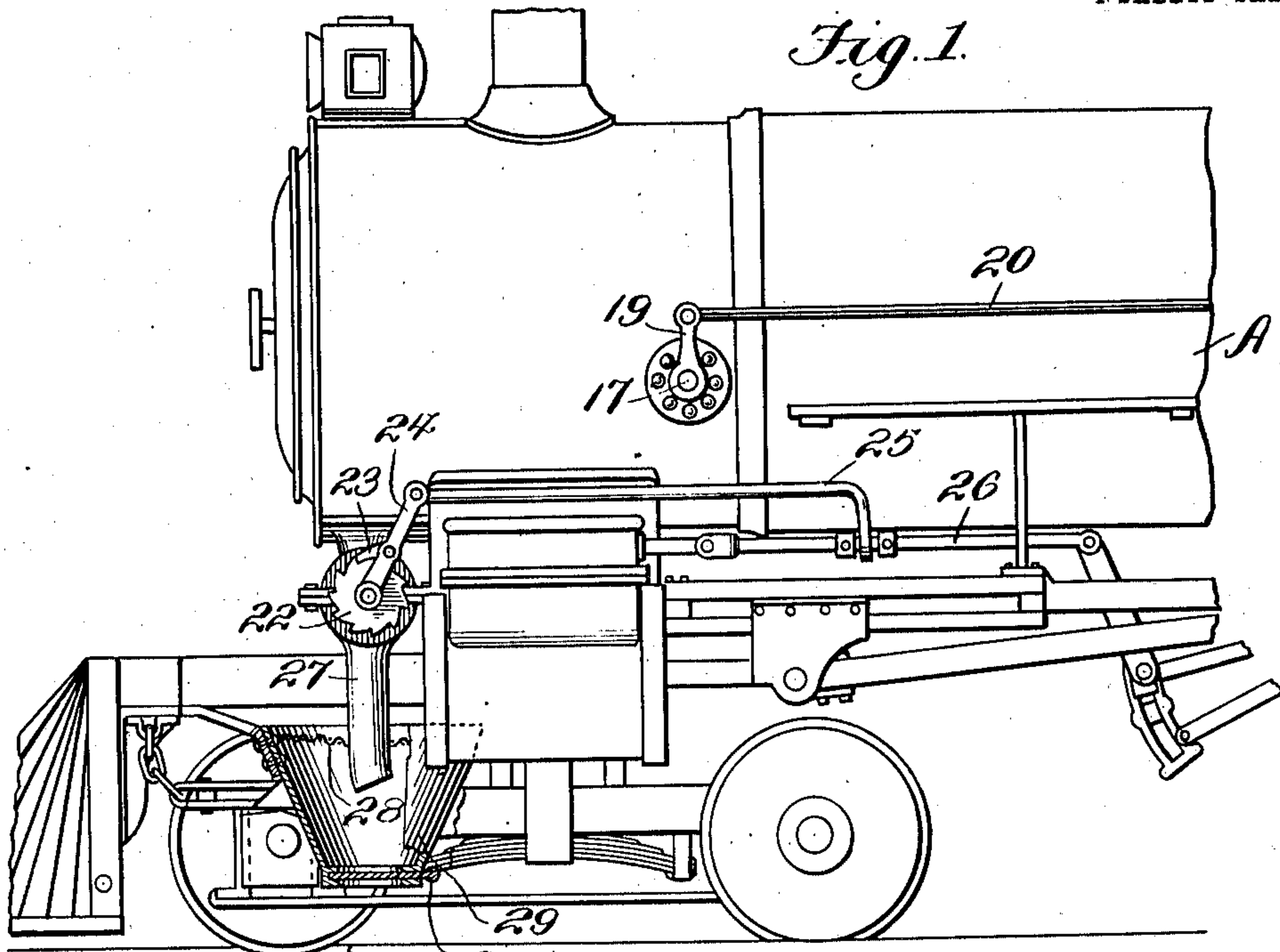


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4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.

Fig. 4.

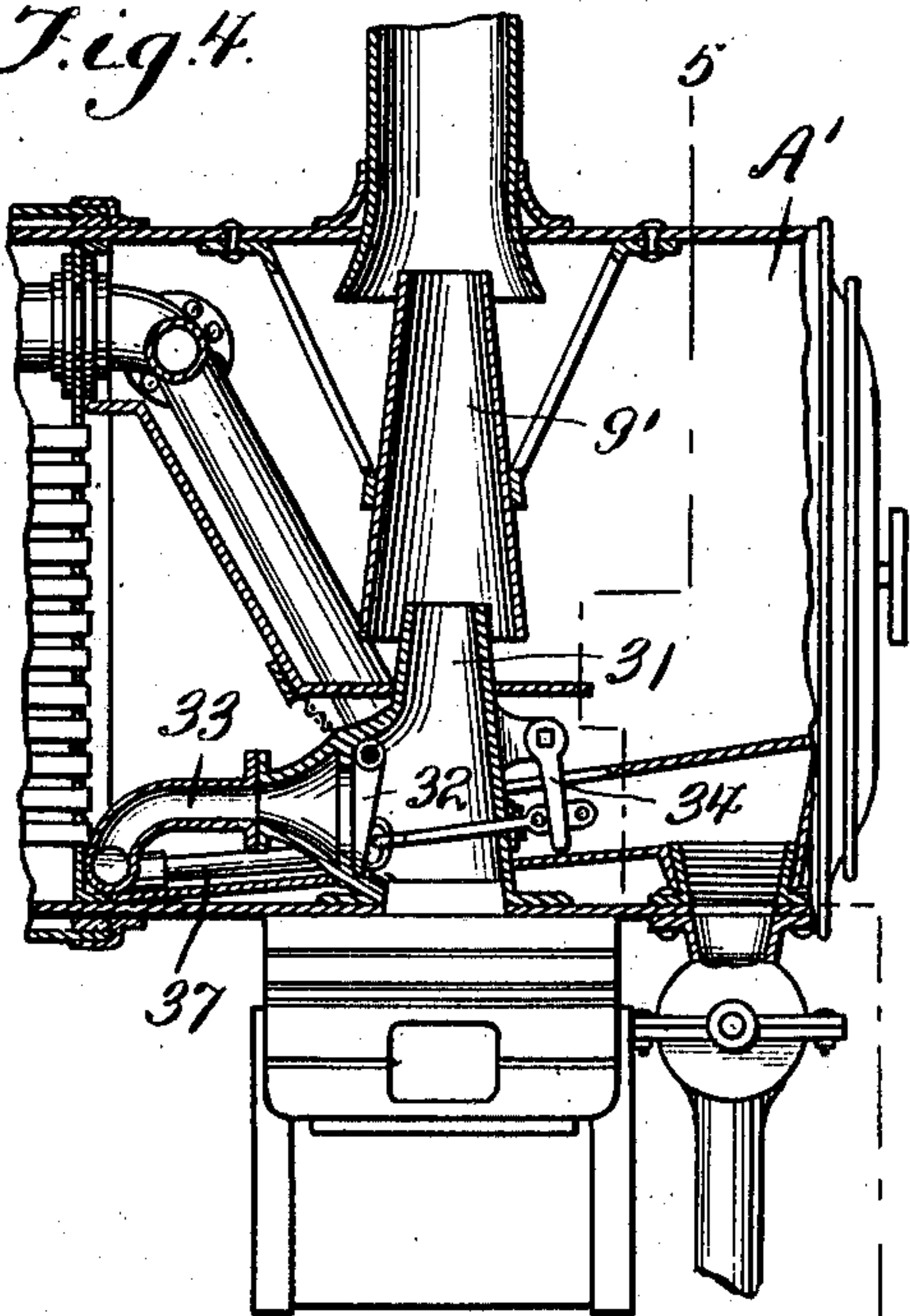


Fig. 5.

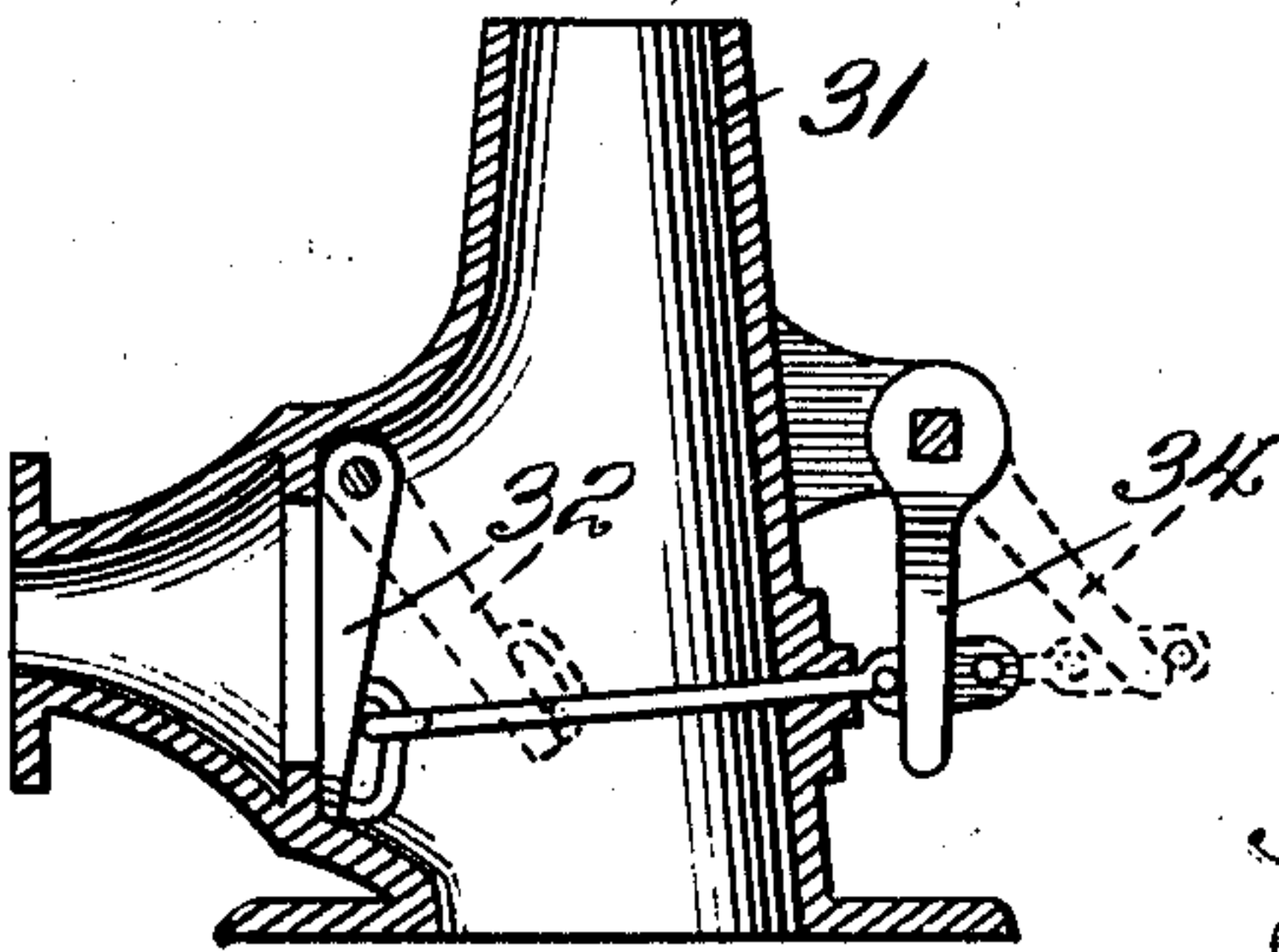
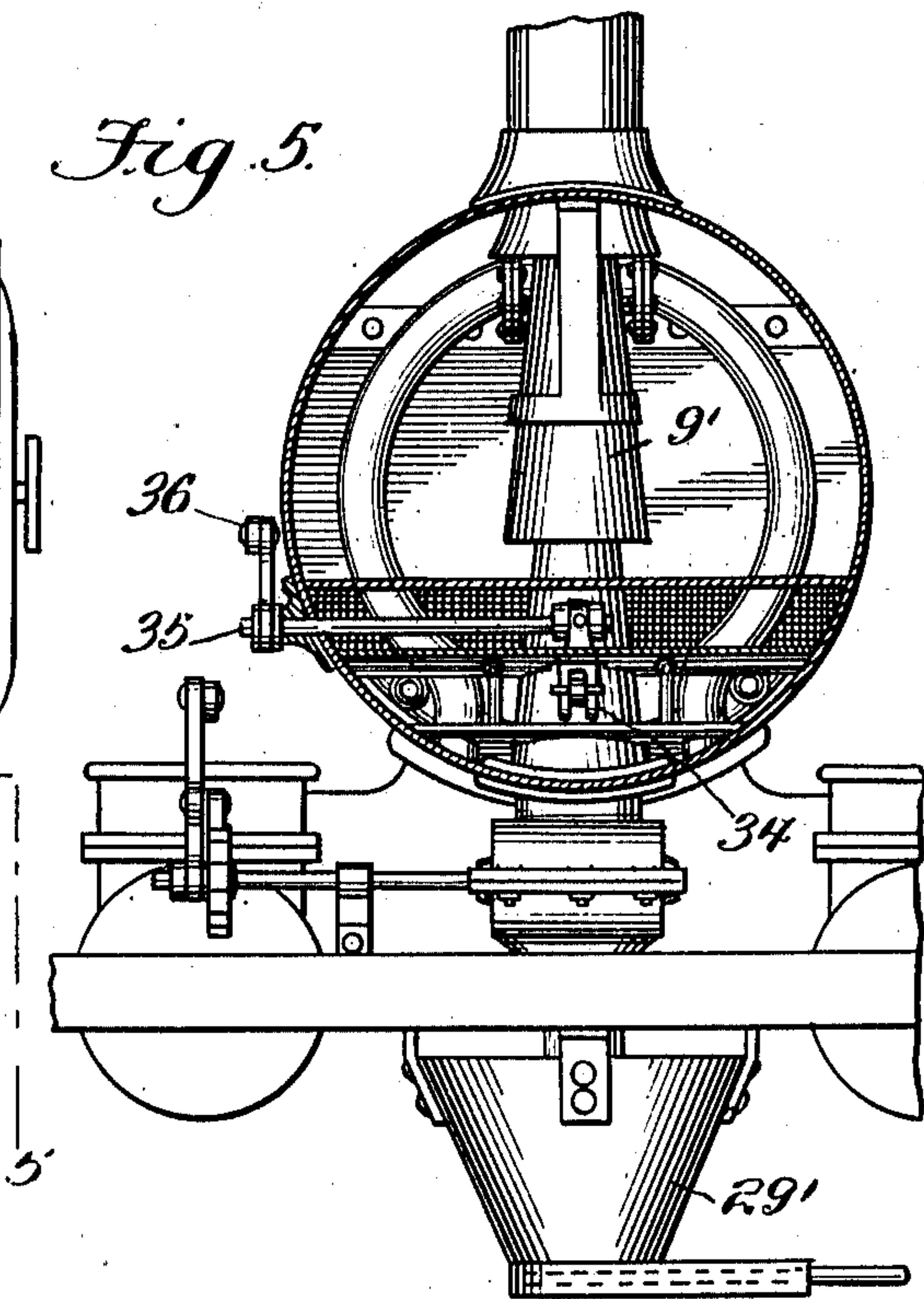


Fig. 6.

Fig. 7.

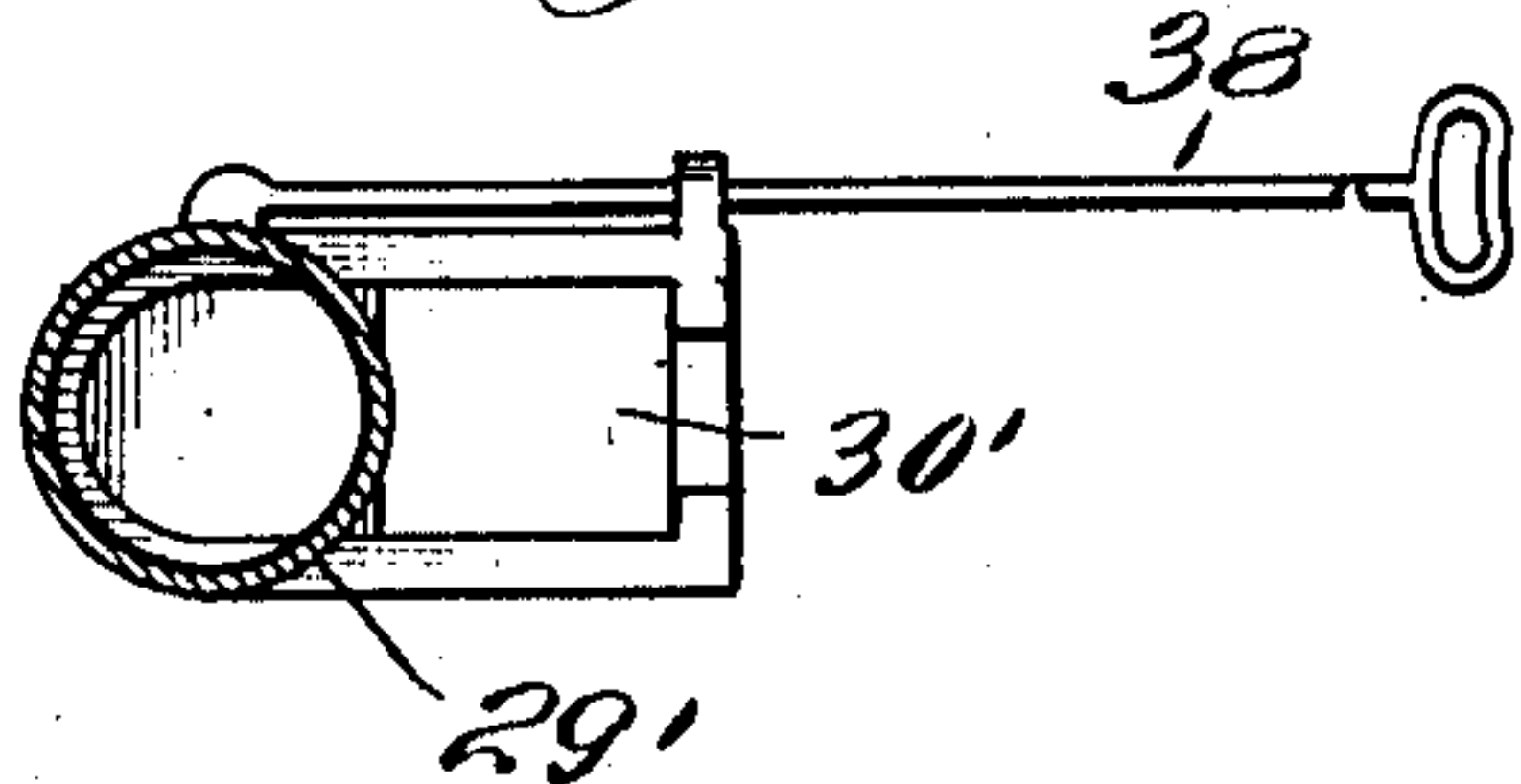
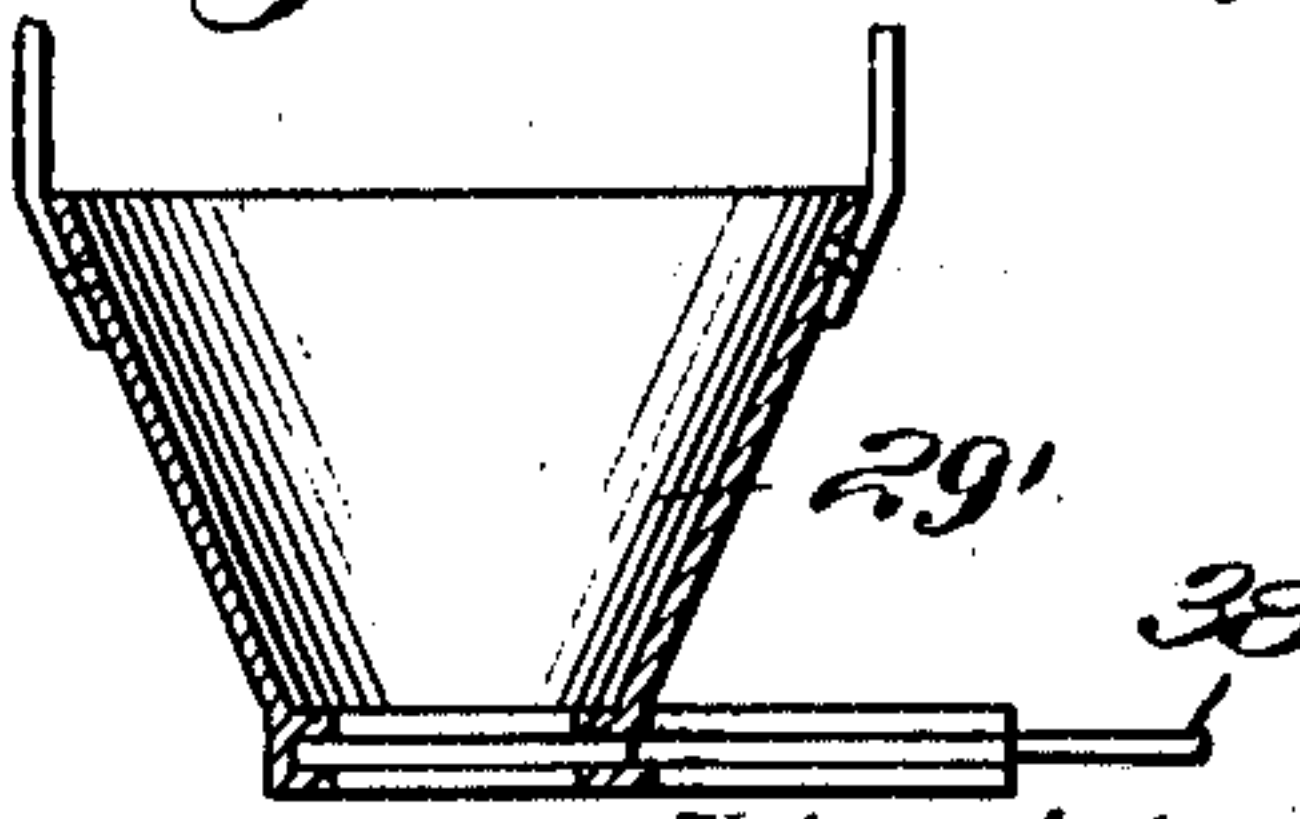


Fig. 8.



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4 SHEETS—SHEET 3.

Fig. 9.

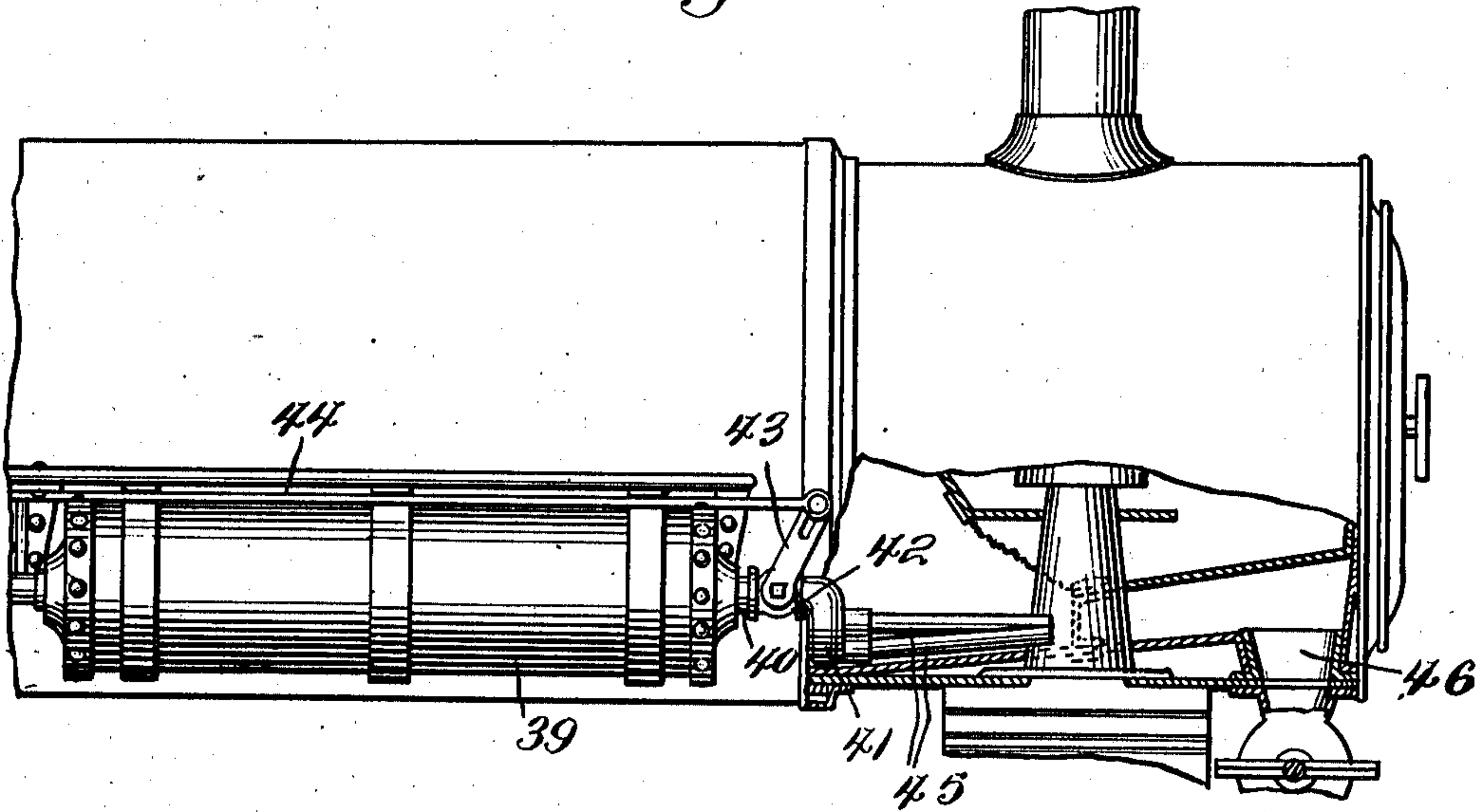


Fig. 10.

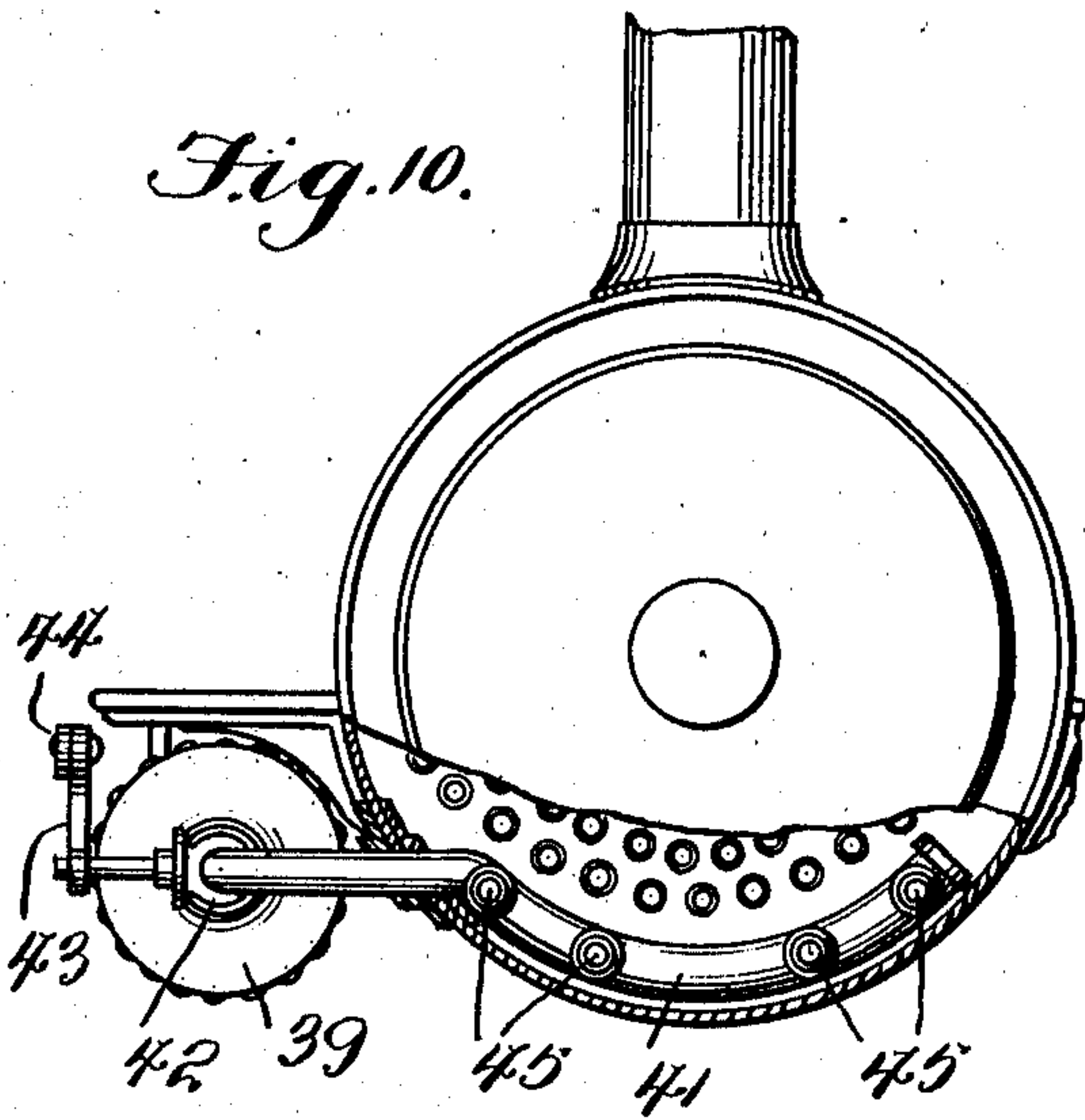
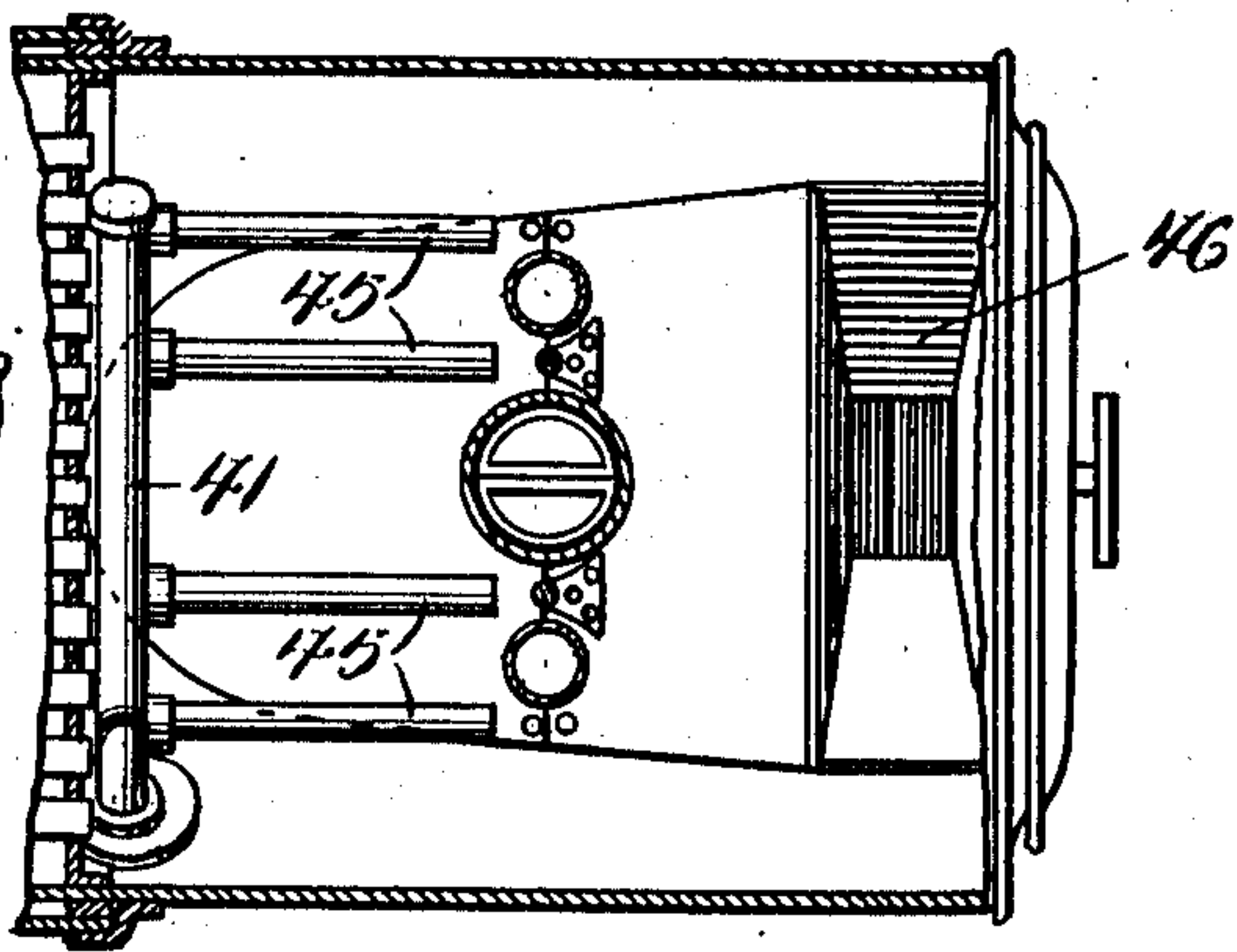


Fig. 11.



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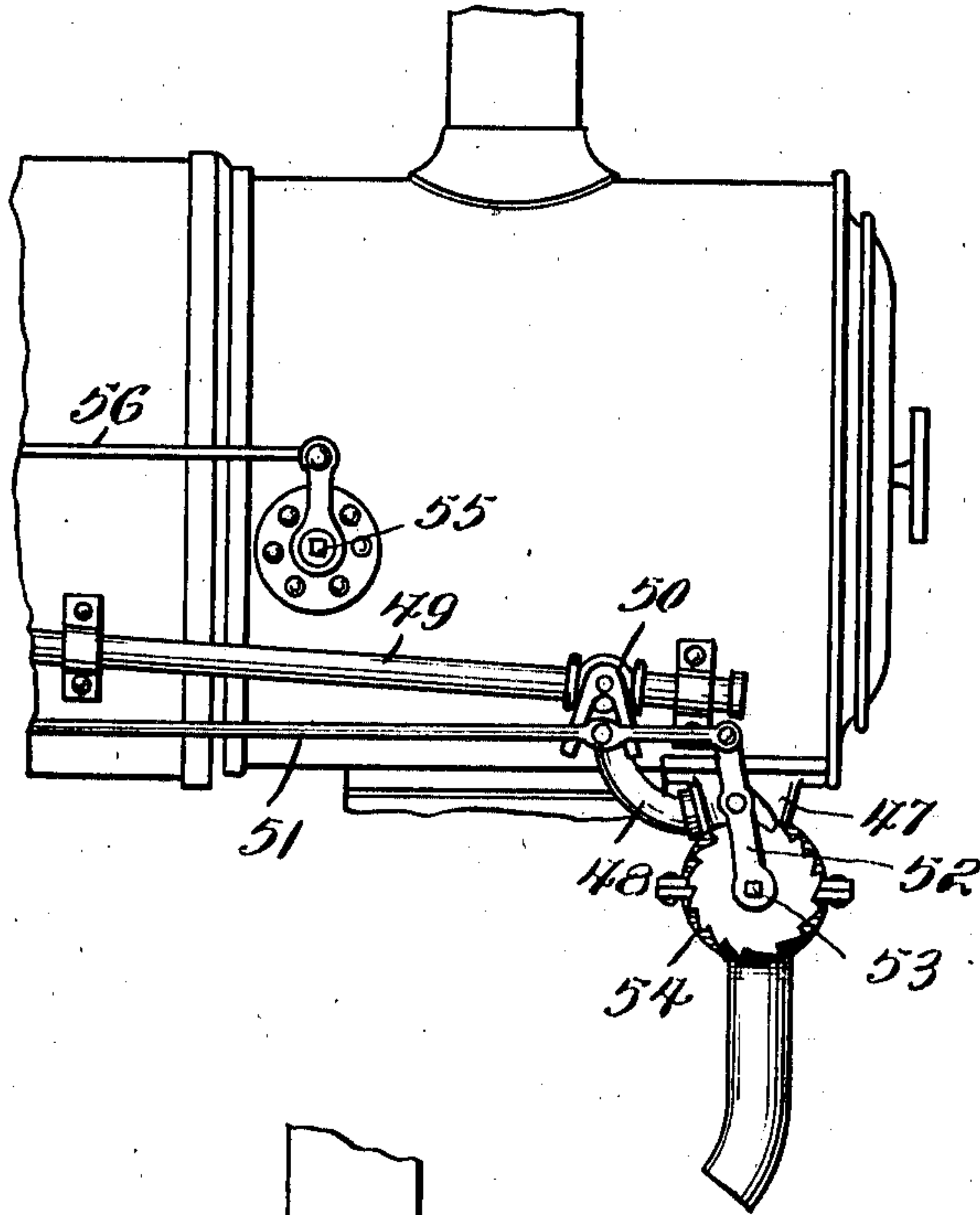
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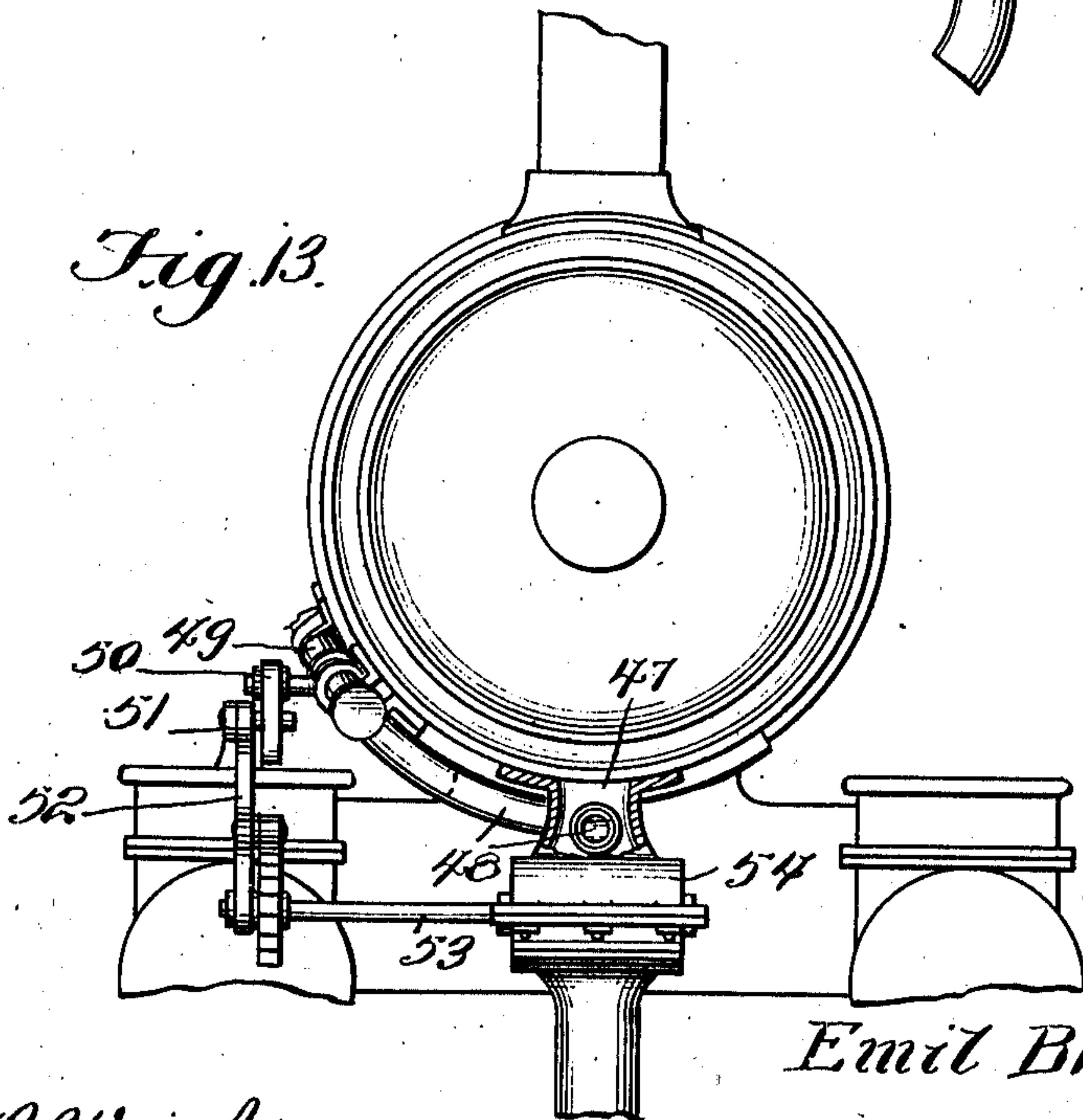
Patented Dec. 13, 1910.

4 SHEETS-SHEET 4.

*Fig. 12.*



*Fig. 13.*



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# UNITED STATES PATENT OFFICE.

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SPARK-ARRESTER.

978,132.

Specification of Letters Patent.

Patented Dec. 13, 1910.

Application filed November 3, 1909. Serial No. 526,098.

*To all whom it may concern:*

Be it known that I, EMIL BROMBACHER, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Spark-Arresters, of which the following is a specification.

This invention relates to spark arresters, and has for an object to provide an apparatus of this character that can be applied to the forward end of the boiler of a locomotive, means being provided whereby the sparks will be effectively conveyed to a collecting and discharging member.

Another object is to provide means for extinguishing the fire in the sparks before they are finally discharged from the boiler, hence obviating their contact with the ties of a track structure and their burning or injuring the ties.

The above mentioned and other objects are attained by the construction, combination and arrangement of parts, as disclosed on the drawings, set forth in this specification, and particularly pointed out in the appended claims.

In the drawings, forming a portion of this specification and in which like numerals of reference indicate similar parts in the several views:—Figure 1 is a side elevation of a portion of a locomotive showing my improved spark arrester applied thereto, parts being in section to clearly disclose the invention. Fig. 2 is a sectional elevation through a portion of the locomotive and through a portion of my improved spark arrester. Fig. 3 is a section taken on the line 3—3 of Fig. 2. Fig. 4 is a view similar to Fig. 2 showing a slightly modified form of my invention. Fig. 5 is a detail transverse section taken on the line 5—5 of Fig. 4. Fig. 6 is a detail vertical section taken through the controlling valve of the exhaust steam connection. Fig. 7 is a sectional plan view of the receiver. Fig. 8 is a detail vertical section taken therethrough. Fig. 9 is a view similar to Fig. 1 showing a still further modified form of my invention. Fig. 10 is a front elevation of a portion of the boiler showing parts broken away to clearly disclose the modified form of my invention shown in Fig. 9. Fig. 11 is a detail horizontal section taken through a portion of the boiler shown in Fig. 9. Fig. 12 is a detail side elevation

of a portion of the boiler showing a still further modified form of my invention. Fig. 13 is a front elevation of the same.

With particular reference to Figs. 1 to 3 inclusive of the drawings, it will be noted that the invention is used in connection with the boiler A of a locomotive and is located within the forward end of the boiler at a point immediately beneath the smoke stack B.

The invention consists of a trough 1 which opens at its upper end directly into the boiler and at its lower end directly into the reduced neck 2 of a casing 3. This casing has revolubly mounted therein a collector 4 which is formed with a plurality of pockets 5 which are adapted to communicate with the trough 1 for a purpose to be hereinafter described. The trough 1 is disposed at the front end of a downwardly and rearwardly inclined platform or plate 6, the said plate or platform having a central aperture formed therein for receiving the vertical exhaust nozzle 7. This nozzle extends upwardly into the enlarged end 8 of a conical member 9, the upper reduced end of the said conical member being disposed in the lower portion of the stack B. The member 9 extends through a screen or suitable foraminous sheet of material 10, one end of the said material being secured to the rear end of an upwardly and outwardly inclined plate 11, the rear end of the foraminous sheet being secured to the lower end of a deflector 12.

The live steam pipe C of the locomotive is provided with a steam discharge connection 13 which extends downwardly to the bottom of the boiler, it being provided with a header 14 at its lower end whose discharge pipes or nozzles 15 extend toward the trough 1. The steam discharge connection 13 carries a valve 16 whose operating rod 17 extends outwardly at one side of the boiler and is journaled in a suitable bearing 18. This rod carries a crank arm 19 which is operatively connected with a controlling rod 20. This controlling rod may terminate in the cab of the locomotive or at any suitable convenient point where it may be accurately manipulated by the engineer to open the valve 16 to permit the desired charge of steam to be discharged from the nozzle.

The shaft 21 of the collector 4 is provided with a ratchet wheel 22 whose teeth



are engaged by a pivoted pawl 23 upon an operating lever 24. This lever is pivoted at its upper end to the forward end of an actuating member 25, the rear end of the said  
 5 actuating member being operatively connected with the slide valve rod 26 so that upon reciprocatory movement of the rod a corresponding movement of the member 25  
 10 movement to the collector. The casing 3 is provided with a depending discharge nozzle 27 whose lower end extends through the foraminous top portion 28 of a receptacle 29. The receptacle 29 is supported in any suitable  
 15 manner by the locomotive and at the bottom the receptacle is formed with a sliding gate 30. This gate normally closes the lower end of the receptacle and is adapted for operation whereby the lower end of the  
 20 receptacle can be opened to permit the discharge of the cinders. If it should be desired the gate 30 may be held open at all times and the cinders discharged directly from the casing 3. By providing a plurality  
 25 of revoluble pockets in the collector it will be understood that the cinders will be held in the pockets sufficiently long to extinguish all fire and by the time the cinders are discharged into the nozzle 27 all fire will be  
 30 extinguished therefrom and the cinders may be dropped if desired upon the road-bed of the track structure.

The foraminous sheet 10 extends downwardly and forwardly at an angle from the  
 35 deflector 12 and when the cinders are discharged into the smoke box or forward end of the boiler they will be deflected downwardly and beneath the foraminous sheet 10, whereupon, they will be subjected to the  
 40 blast of steam from the nozzle 15. This blast of steam against the cinders will effectively carry them to the trough 1. Besides acting as a conveyer for discharging the cinders into the trough the steam will act  
 45 sufficiently against the cinders to extinguish all fire therefrom.

In the form of my invention shown in Figs. 4 to 8 inclusive, the smoke box or forward  
 50 end of the boiler A' is provided with an exhaust steam nozzle 31 whose upper end extends into the conical member 9'. This exhaust steam nozzle may receive its steam from the exhaust pipe of the cylinder of the locomotive as in the ordinary manner. The  
 55 said nozzle is provided therein with a pivoted gate valve 32 which normally closes communication between the nozzle and a connection 33. The valve is operatively connected with a crank 34 which is mounted  
 60 upon an operating shaft 35. This shaft is similar to the shaft 17 in the preferred form of my invention and it is controlled by an operating rod 36 which may be extended to the cab of the locomotive or to any other  
 65 convenient point thereof where it may be

readily manipulated by the engineer. The connection 33 is provided with steam discharge nozzles or pipes 37 which, when the valve 32 is open, receive steam and convey it to the smoke box as in the manner described  
 70 in the preferred form of the invention. The remaining elements forming the spark arrester in the modified form of my invention disclosed in Figs. 4 to 8 are substantially identical with those described in detail in  
 75 the preferred form. In this instance, however, the receptacle 29' has its gate 30' operatively connected with a rod 38 which may be actuated to open the lower end of the receptacle.  
 80

In the form shown in Figs. 9 to 11 inclusive, I provide a compressed air reservoir 39 which may be attached to the boiler of the locomotive in any convenient manner. This reservoir is connected to the header 41 by a  
 85 pipe 40, the said pipe being provided with a controlling valve 42 whose stem has secured thereto a crank arm 43. A controlling rod 44 is connected with the crank arm 43 whereby the valve can be actuated to permit a discharge of compressed air to be conveyed to  
 90 the header 41. The header 41 is somewhat similar to the header described in the preferred form of my invention, and as shown, it carries a series of discharge pipes or nozzles 45 which extend toward the discharge  
 95 trough 46 in the smoke box.

In Figs. 12 and 13, the trough 47 receives one end of a pipe 48, the other end of the  
 100 said pipe being connected to a water discharge pipe 49. This pipe is provided with a valve 50 which may be actuated by the controlling rod 51 to permit water to be discharged into the pipe 48. The controlling  
 105 rod 51 besides being operatively connected with the valve 50 for actuating the same is connected at its outer extremity with the crank arm 52. The crank arm 52 is carried by the shaft 53 which is mounted in the collector receptacle 54. The valve rod 55  
 110 which is operatively connected with the steam discharge pipe, (not shown), is operated by a rod 56 which is identical with the valve controlling rod described in the preferred form of the invention.  
 115

In all forms of my invention it will be understood that novel and simple means are employed whereby cinders in the smoke box of the locomotive can be discharged to a  
 120 trough, fluid means being employed in all forms whereby the cinders will be effectively carried to the desired point in the smoke box.

The construction of the spark arrester herein shown and described is such that the smoke box of the locomotive is divided into  
 125 an upper smoke compartment and a lower cinder compartment, the said compartments being separated from each other by the foraminous material hereinbefore described so that when smoke is discharged from the fire  
 130



tubes of the boiler it can make its escape from the lower compartment and to be discharged into the upper or smoke compartment where it may be finally discharged from the stack. The fluid means described is such that a fluid blast can be created in the lower compartment, the said blast serving as conveying means to discharge the cinders into the collector.

10 I claim:—

1. The combination with a locomotive, of a spark arrester mounted in the smoke box thereof and comprising a discharge trough, a revoluble collector located beneath the 15 trough and provided with a series of pockets, the said smoke box divided to form upper and lower compartments, a foraminous sheet of material for establishing communication between the compartments, the lower 20 compartment having a platform which extends upwardly and outwardly at an angle from the bottom of the smoke box toward the discharge trough, fluid conveying nozzles mounted upon the platform and extending 25 toward the forward end thereof, connections between the nozzles and the steam pipe of the locomotive cylinders, a valve located in said connections, a controlling rod operatively connected with the valve, and 30 a reciprocating rod operatively connected with the said revoluble collector and with a movable part of the locomotive so that in

movements of the latter rotary motion will be imparted to the collector.

2. The combination with a locomotive and its reciprocating valve rod, of a spark arrester mounted in the smoke box of the locomotive and comprising a trough located in advance of the fire tubes, a deflector forwardly of the fire tubes and extending downwardly and outwardly toward the trough, a revoluble collector located beneath the trough, and means operatively connecting the collector with the valve rod to revolve the same. 35 40 45

3. The combination with a locomotive and its reciprocating valve rod, of a spark arrester mounted in the smoke box of the locomotive and comprising a trough located in advance of the fire tubes, a deflector forwardly of the fire tubes and extending downwardly and outwardly toward the trough, a revoluble collector located beneath the trough, means operatively connecting the collector with the valve rod to revolve the same, and a receptacle communicating with the collector. 50 55

In testimony whereof I affix my signature in presence of two witnesses.

EMIL BROMBACHER.

Witnesses:

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