

(No Model.)

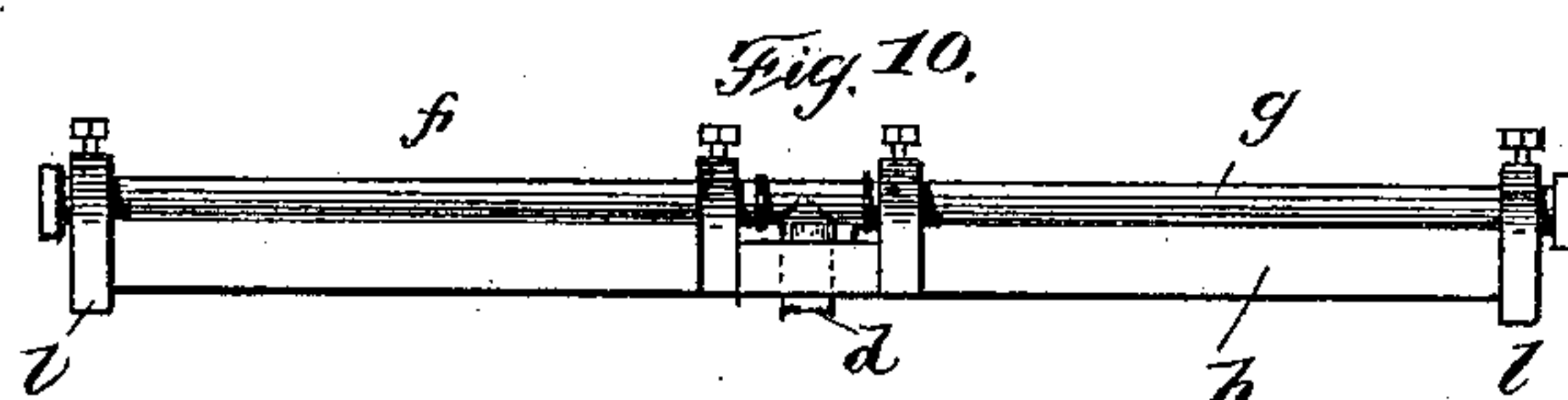
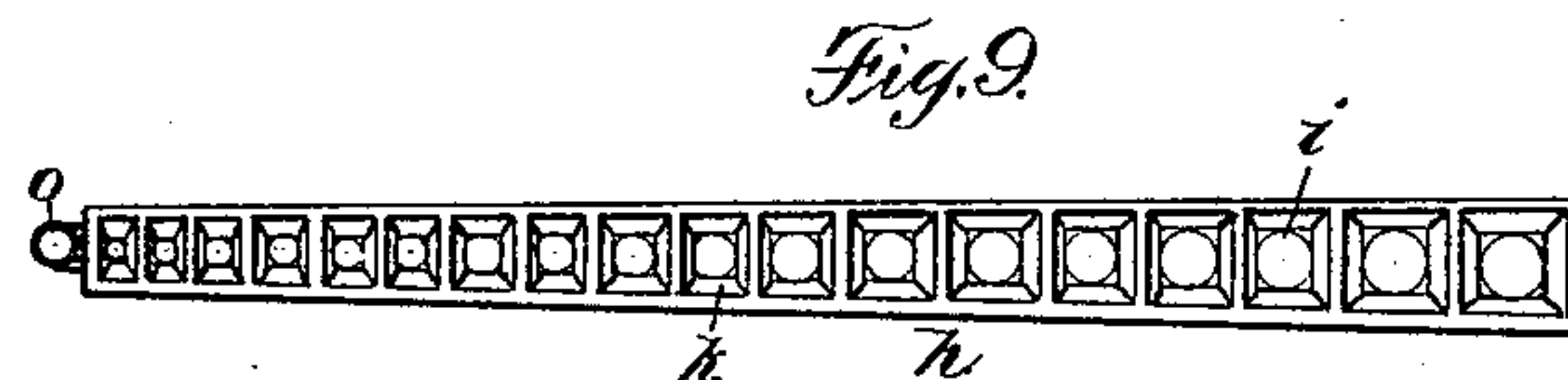
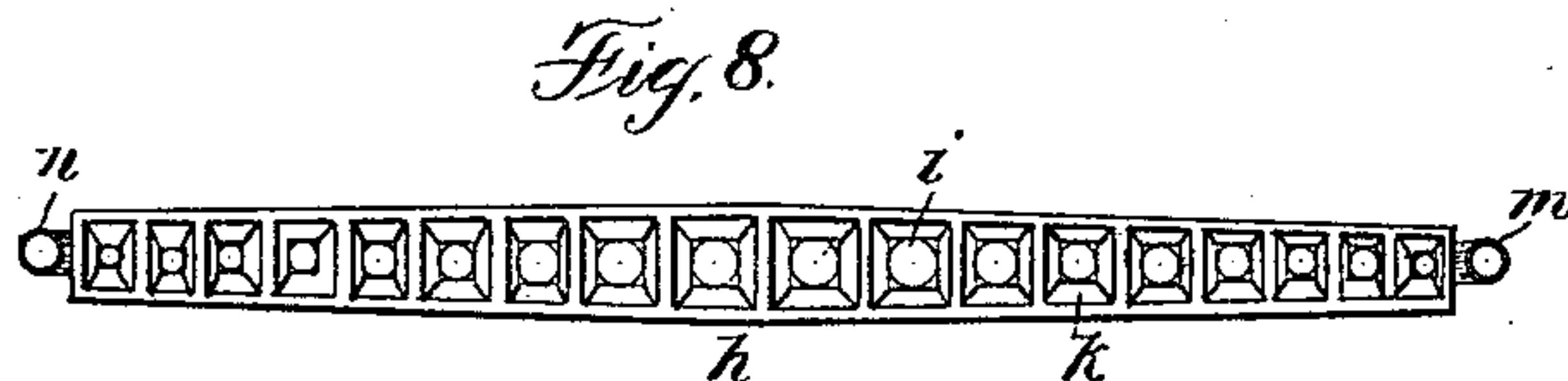
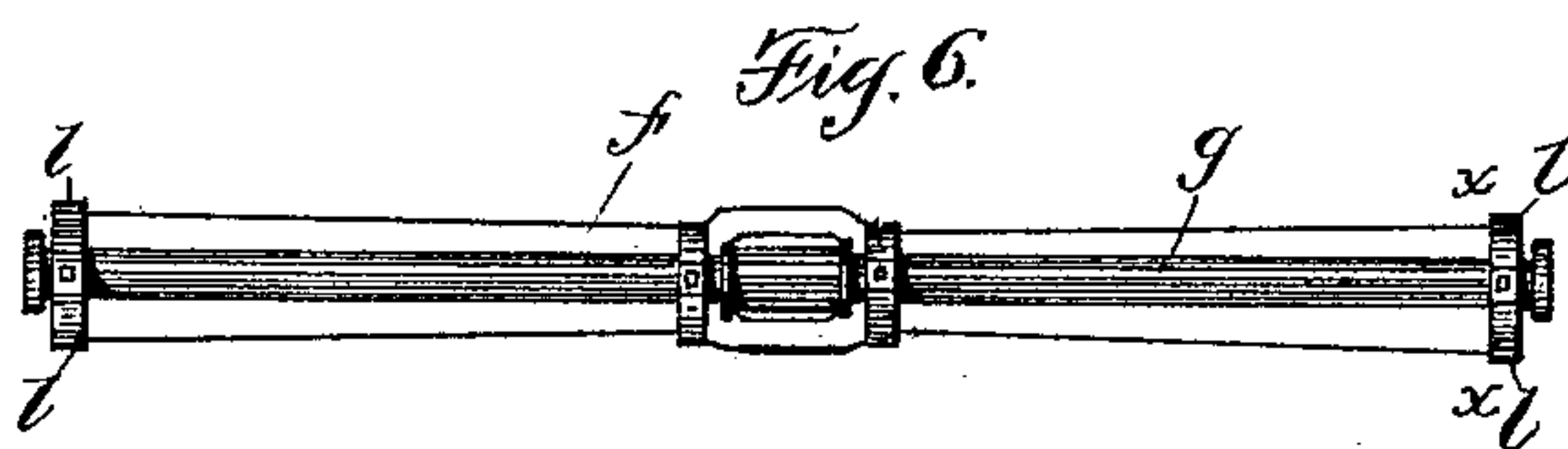
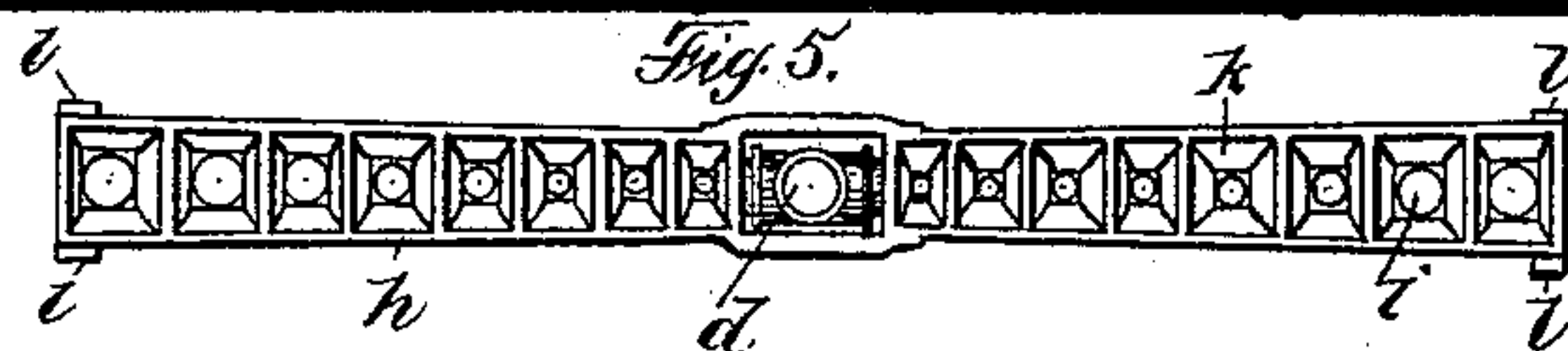
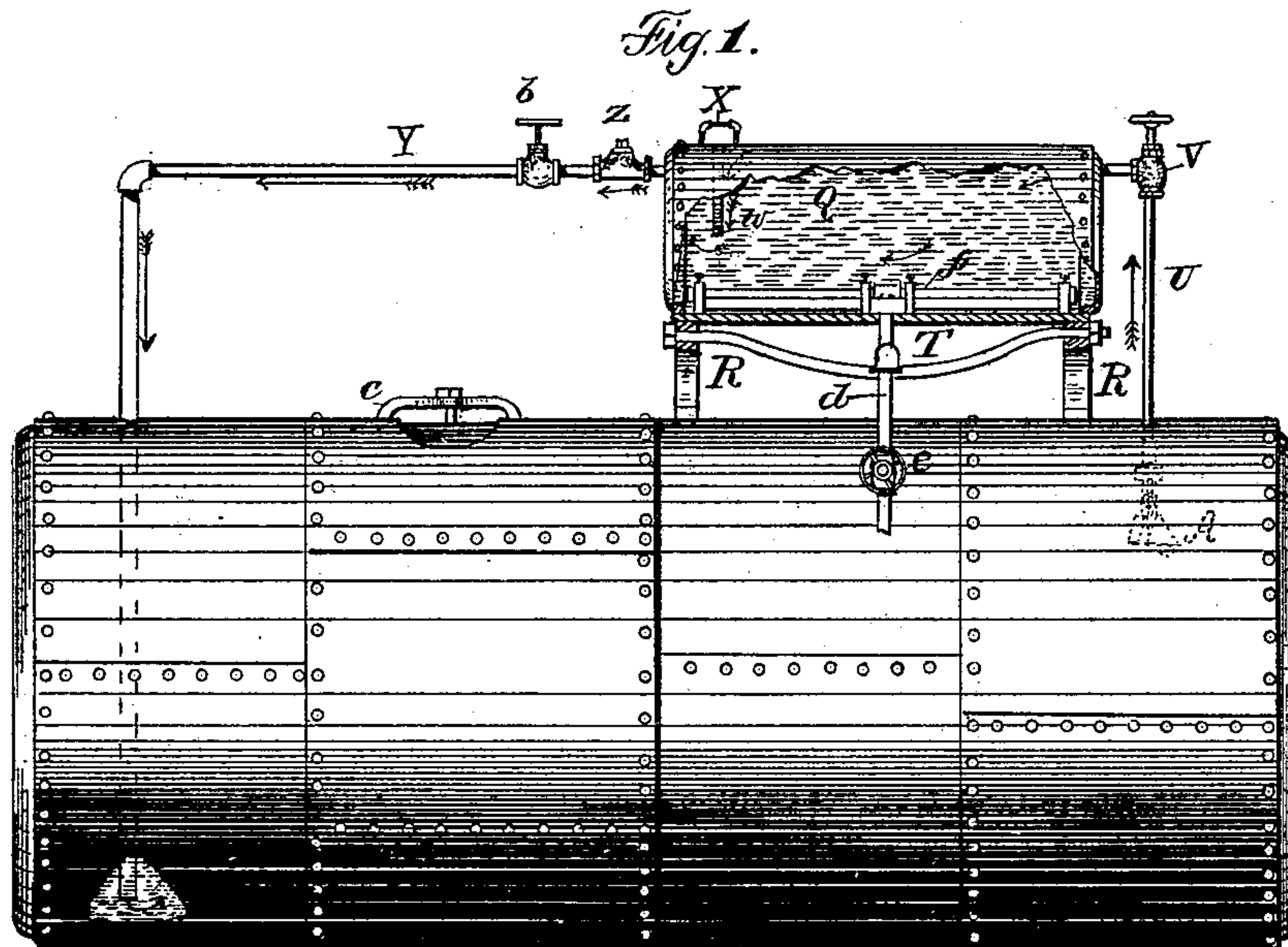
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F. W. HORNISH.

BOILER CLEANER.

No. 370,060.

Patented Sept. 20, 1887.



Witnesses:
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M. L. Williams.

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Frank W. Hornish
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att'y

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2 Sheets—Sheet 2.

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Fig. 3.

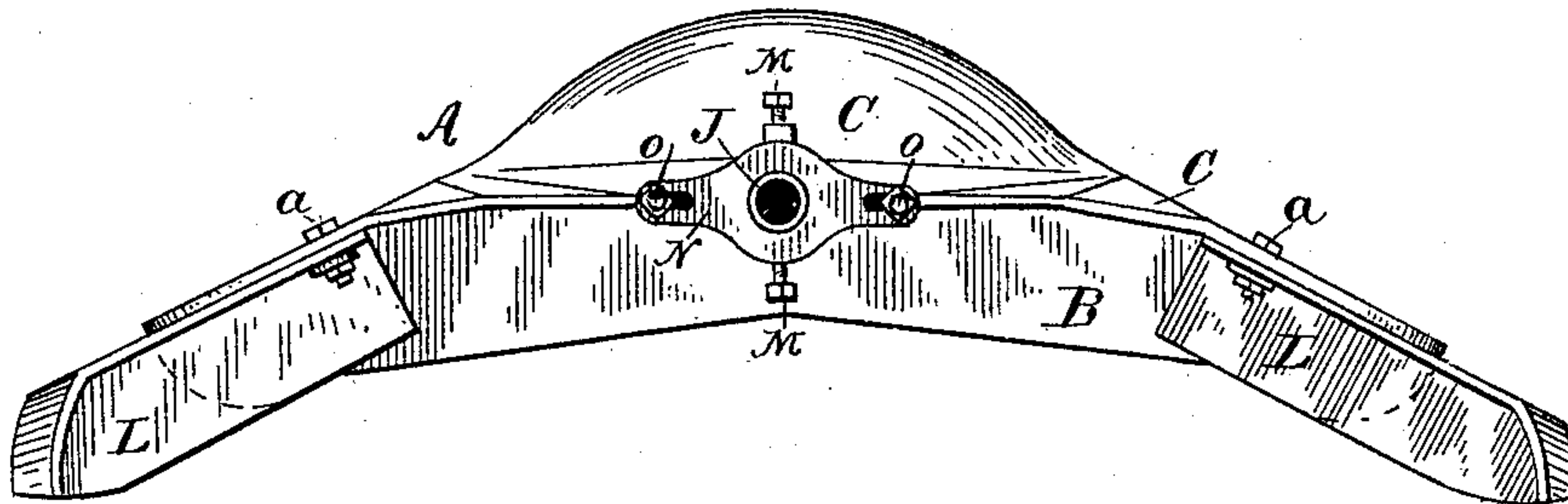


Fig. 2.

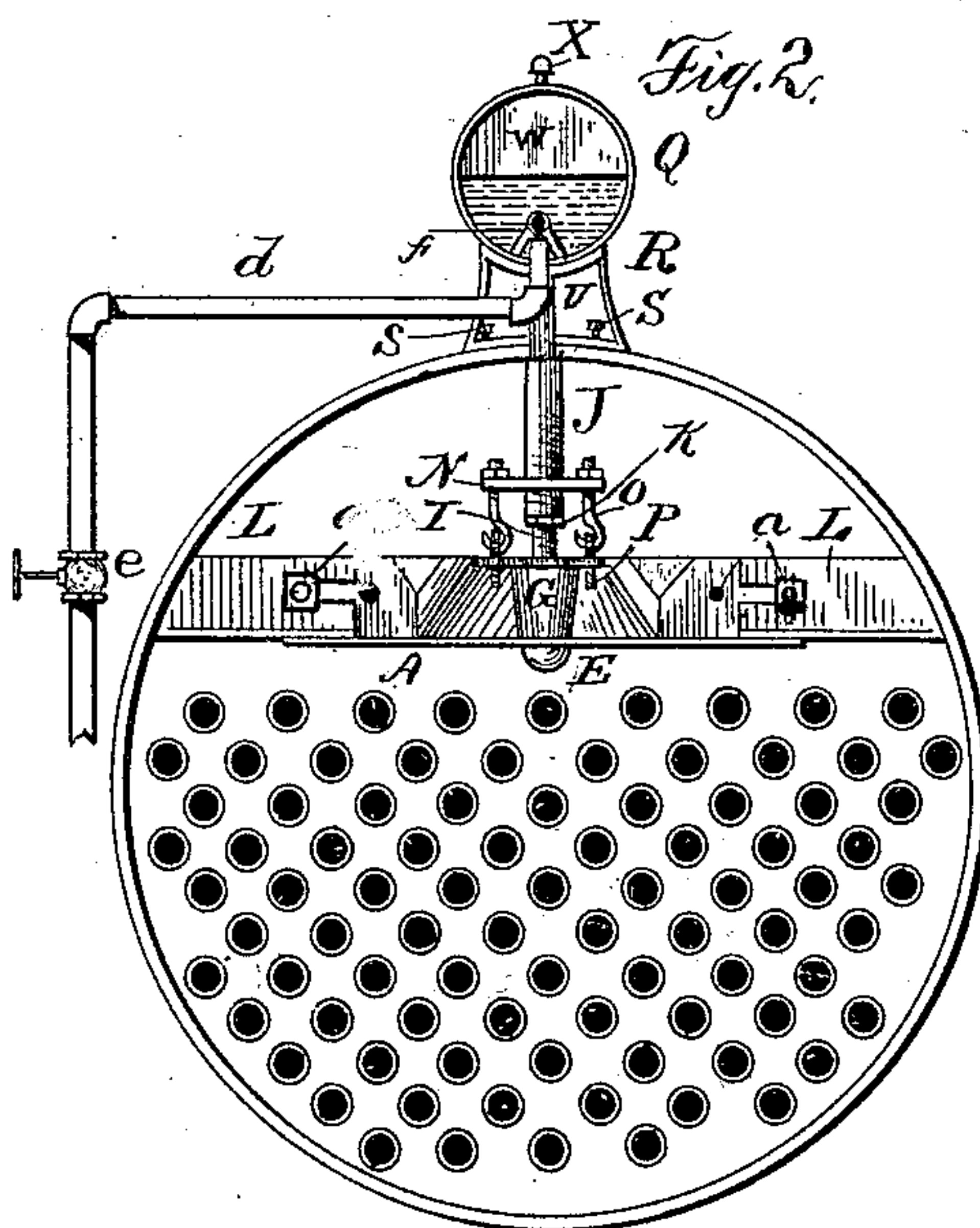


Fig. 11.

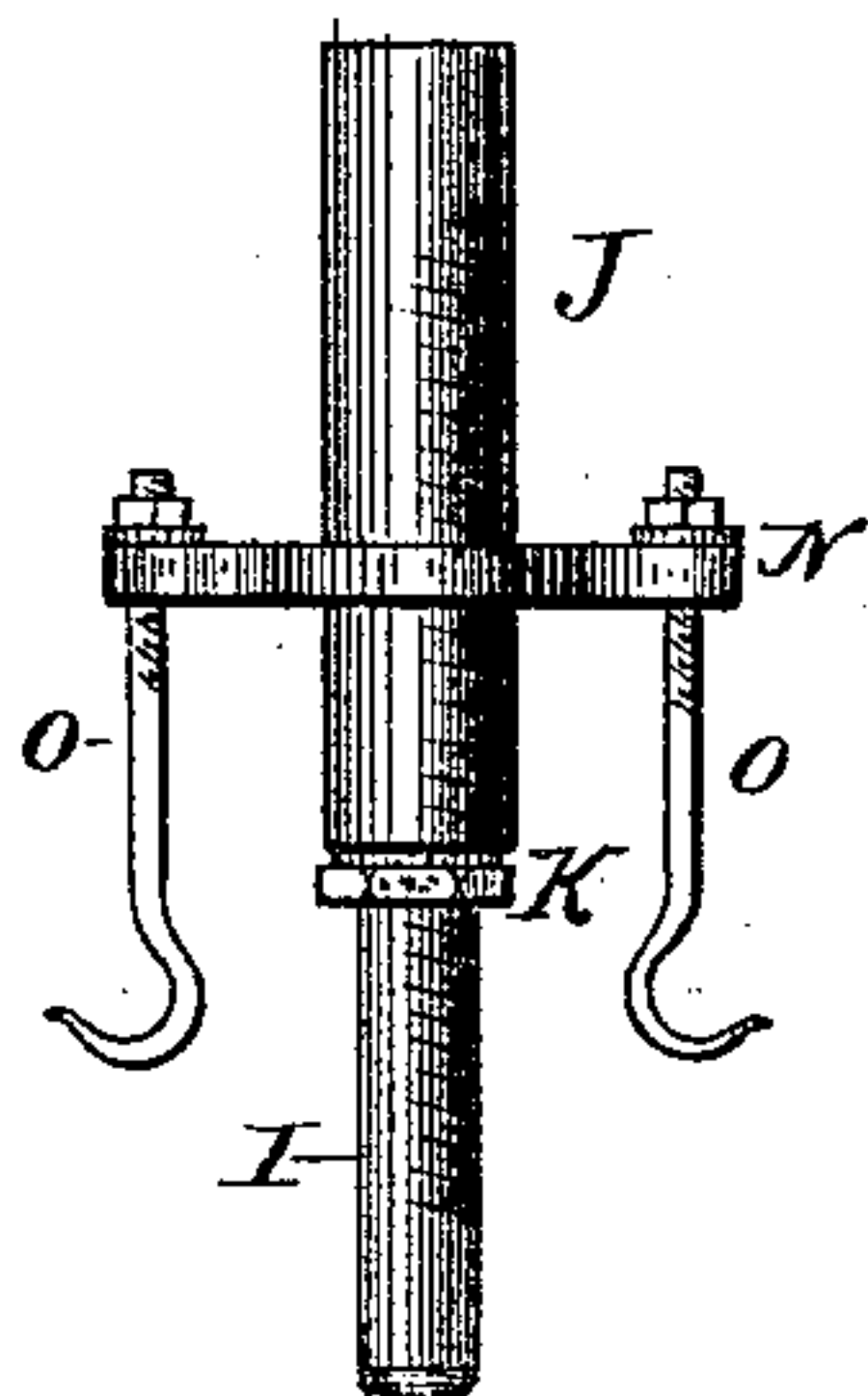
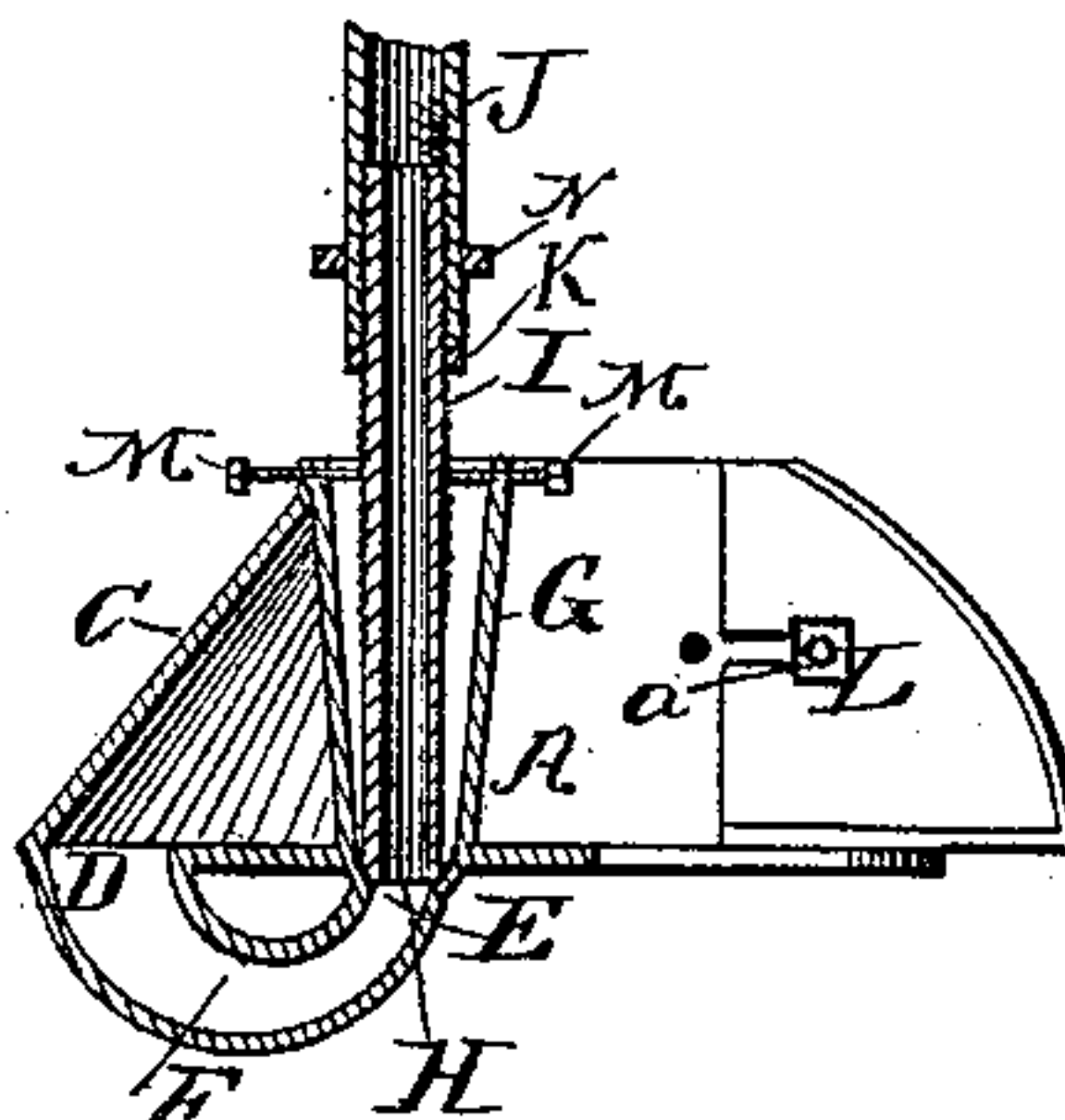


Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANK W. HORNISH, OF MATTOON, ILLINOIS.

BOILER-CLEANER.

SPECIFICATION forming part of Letters Patent No. 370,060, dated September 20, 1887.

Application filed November 3, 1886. Renewed August 24, 1887. Serial No. 247,777. (No model.)

To all whom it may concern:

Be it known that I, FRANK W. HORNISH, a citizen of the United States, residing at Mattoon, in the county of Coles and State of Illinois, have invented certain new and useful Improvements in Boiler-Cleaners; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Figure 1 represents a steam-boiler shell to which I have applied my improvements. Fig. 2 is a transverse section of a boiler-shell having my improvements. Fig. 3 is a plan of the boiler-skimmer, and Fig. 4 a transverse section of the same. Figs. 5 and 6 are respectively a bottom and top view of the draw-off head located in the settling-drum. Fig. 7 is a transverse section through line *xx* of Fig. 5. Figs. 8 and 9 are bottom views of modified forms of the draw-off head, hereinafter referred to. Fig. 10 is a side elevation of the draw-off head. Fig. 11 is a detail elevation of the boiler-skimmer connections.

My invention relates to boiler-cleaners.

The objects of my improvements are to produce a surface-skimmer for insertion through the man-hole of a steam-boiler having certain hereinafter-described advantages of construction; also an improved form of settling-drum, with a novel draw-off and pipe-connections for connecting the skimmer and settling-drum with the boiler.

To effect these advantages and improvements my invention consists in the following construction and arrangement of the parts, which will first be fully described in detail, and the points of novelty then set forth in the claims.

In the drawings, A represents the skimmer. It is of substantially the relative width and length as shown, for the purpose of readily inserting the skimmer into the man-hole of any ordinary boiler.

B is the bottom of the skimmer, which is set in the boiler just below the usual water-level.

C is the back wall of the skimmer, which is preferably curved inwardly. Mid-length of the skimmer I generally prefer to increase its width, in order to provide increased space in

which to suck up the impurities, and also for the pipe-connections. This increased width is always less than that of the boiler man-hole through which the skimmer is inserted.

D is an opening in the bottom near the rear wall or back C, and E is a preferably somewhat smaller opening in the bottom on a line therewith. These two openings are connected by a goose-neck or curved conduit, F, arranged beneath the bottom of the skimmer. The goose-neck, which leads from the eduction opening in the skimmer-plate to the eduction-pipe, is contracted, so as to form a nozzle having an ejector action. Moreover, the peculiar shape of this goose-neck serves to collect and discharge the impurities of the water in a very efficient and thorough manner.

G is a flared pipe connecting the goose-neck F with the bottom B through the opening D.

H is a ball-socket at the lower end of the flared pipe G below the bottom B.

L L are extension-pieces upon both ends of the surface-skimmer A. These extensions are of the same general shape as the ends of the skimmer itself. I prefer to provide them with upturned curved ends which are adapted to set out against the inner surface of the boiler-shell from side to side, so as to intercept and exhaust all impurities on the surface of the water. The extensions L L are adjustable inwardly and outwardly. To effect this purpose a series of holes are formed in the back C of the skimmer at either end, and an open slot registering therewith is made in the extensions L, through which a bolt, *a*, passes.

I is a short section of pipe, rounded at the lower end, so as to fit the ball-socket H in the lower end of pipe G. It is provided with a screw-thread, upon which a long sleeve, J, screws. The sleeve J has both an exterior and interior thread.

K is a nut on the pipe I below the sleeve J, between which and said sleeve is arranged a packing-ring or gasket.

M are two set-screws arranged in front and rear of the pipe I, and pass through threaded holes in the skimmer at the upper end of the flared pipe G.

N is a threaded spanner, which screws on a sleeve, J.

O are two hooked screw-rods secured in the

spanner N. The holes through which the screw-rods O pass are elongated, so that the hooked ends of the screw-rods O may pass therethrough without removing the nuts on the bolt.

P are two screw-threaded hook or eye bolts, which pass through holes in the skimmer and engage with the hook-bolts O O.

Q is the settling-drum, located upon top of the boiler-shell, it being supported thereon by two saddle-pieces, R R, provided with set-screws S for adjusting it, and a tie-rod, T, for holding them in position. The skimmer A connects with the settling-drum by means of a pipe, U, which passes down through the boiler-shell and screws into the sleeve J. Pipe U is provided with valve V.

W is a vertical diaphragm located in the settling-chamber.

X is a pipe-connection around the diaphragm at the top, to prevent air-binding.

Y is a pipe leading from the settling-chamber to the boiler near the bottom of the shell.

Z is a check-valve in pipe Y, opening outwardly from the drum Q, but closing against any back-pressure.

b is a stop-valve, also in pipe Y.

c is the man-hole in the boiler-shell, through which the skimmer is inserted.

d is a pipe for drawing or blowing off the sediment deposited in the settling-drum Q. e is a valve in said pipe.

f is the draw-off head, located in the bottom of the settling-drum and connected with the pipe d. The draw-off f is shown in detail in Figs. 5, 6, 7, and 10. It comprises a pipe, g, closed at both ends, and provided with a T-connection at the center communicating with the draw-off pipe d. A casting, h, provided on its bottom with a series of openings or "suckers," i, is arranged under the pipe g, which is similarly drilled with a series of openings registering with those in the casting. The form of this casting is clearly shown in the figures referred to. The openings are of gradually-increasing diameter from the center toward both ends, and below each opening are flared inverted cells k, which lie in close proximity to the bottom of the settling-drum. The cells or suckers are prevented from lying upon the bottom of the drum Q by means of projecting studs l l, which lie below the bottom of the cells.

In Figs. 8 and 9 are shown bottom views of modified forms of arranging the cells or suckers. In Fig. 8 the openings in the cells gradually increase from each end toward the common center. In this form of draw-off two pipes, m and n, are used, connecting each end of the draw-off through opposite ends of the settling-drum. In Fig. 9 the sucker-openings increase in diameter from one end to the other, and a single pipe, o, serves to draw off through one end of the settling-drum.

In providing a boiler with my improved apparatus the skimmer A is put through the

man-hole of the boiler and set in position, as shown in Fig. 2. A large range of vertical adjustment is secured by means of the exteriorly and interiorly threaded sleeve J, which screws up and down upon the pipe I. In addition, also, the screw-threaded spanner N, adjustable upon sleeve J, and the threaded eye and hook bolts O and P, complete this system of adjustment. The pipe U, connecting the skimmer, is screwed directly into the sleeve J; but, should the sleeve J not prove long enough in some cases, a nipple may be screwed into J and a coupling used to connect it with the pipe U. The ball-joint H is arranged below the bottom of the skimmer, so that the water covers it and provides a packing, thereby preventing any leaks at that point.

The skimmer A has a universal adjustment. The end extensions, L, move in and out, so as to set the ends of the skimmer out against the boiler-shell, if desired. The skimmer may be tilted backward or forward by means of the set-screws M. The skimmer may be adjusted so as to throw either end up or down by the adjustment of the screw and eye bolts O and P, lengthening or shortening the bolts on either side, as the case may be. The skimmer may be further adjusted vertically by means of the sleeve J, spanner N, and bolts O and P.

In setting the skimmer in the boiler the screw-sleeve J is screwed upwardly until its upper end strikes the boiler-shell. The spanner N and the series of bolts O and P and the screw-pipe I are then all adjusted so as to bring the skimmer to the desired vertical height, after which the extension ends are set out.

The set screws S in the saddle-pieces R serve to adjust the latter so as to bring the settling-drum Q directly over the skimmer.

When the valve e of the blow-off pipe d is opened, the suckers k of the draw-off head f take up the sediment along the whole length of the drum Q. The pipe d being arranged in the center of the draw-off, and the sucker-openings gradually increasing from the center outwardly toward the ends, a uniform suction action is produced throughout the length of the drum. In other words, a suctional action of the draw-off f at any one point is equal to that at any other point. In Fig. 8 a similar action is obtained by using two blow-off pipes, m and n, at either end of the drum. Fig. 9 shows a single blow-off pipe, o, at one end of the draw-off head.

By means of my improved draw-off head I can insure a thorough discharge of the sediment in the drum Q by the use of a minimum quantity of water and exhaust from all parts of the drum uniformly. In practice I may keep the skimmer in constant operation by opening the valves V and b and inducing a gentle current from the skimmer through the drum back into the boiler again by the pipe Y. A natural circulation is maintained in

this direction because of the comparatively colder water in the drum being discharged into the bottom of the boiler and the hot water from the boiler, of lighter specific gravity, passing through the skimmer to take its place. This action is materially assisted by the operation of the check-valve Z. Heretofore the skimmers in use in connection with boiler-cleaning devices have been inadequately designed in regard to their proper setting when put in place through a man-hole of the boiler. The blow-offs from the settling-drum have also been inefficient in their action and wasteful in the quantity of water necessary to discharge the sediment. No matter how small a surface or depth of water upon the skimmer-plate B, the skimmer will exhaust it, because the outlet-opening D is flush with or below the skimmer-plate. In all other skimmers with which I am acquainted there has to be a considerable depth of water upon the skimmer-plate in order that the suction-pipe may operate.

The flared pipe G is preferably cast in one piece with the skimmer A; but it may be a separate pipe fitted therein. It may be dispensed with, if desired.

The shape of the skimmer, as shown by the drawings, Fig. 3, is of a converging form, so that the suctional action is toward a common center from both sides. The water, owing to the peculiar shape of the back of the skimmer, is deflected upon striking the back at an obtuse angle and forced toward the central suction-pipe. The skimmer may be made straight, so as to lie at right angles to the boiler-shell sides; but the operation would not be so efficient. Moreover, the peculiar shape of the skimmer enables me to insert it through a man-hole, where it would be impossible to introduce a straight skimmer of equal length.

When the boiler is blown off by opening valve e, the check-valve Z immediately closes and prevents any pure water being drawn in from the bottom of the boiler through the pipe Y, and induces the current to flow from the surface of the boiler over the skimmer to the settling-drum.

The sleeve J may be omitted in some instances.

I claim—

1. A surface-skimmer of the character described provided with a skimmer-plate of sufficiently shallow depth or width to enable it to pass through the boiler man-hole and having a converging back wall, substantially as described.

2. A skimmer of the character described made of two or more adjustable sections, whereby the length of the skimmer may be increased or diminished.

3. A surface-skimmer mechanism, as described, for elevating one end and depressing the other, and mechanism, as described, for adjusting said skimmer laterally, in combination with an eduction-pipe upon which the skimmer is supported.

4. A V-shaped surface-skimmer having a converging back wall and provided with an eduction-opening located in the apex of said skimmer and on the same level with the skimmer-plate.

5. A surface-skimmer, an eduction-opening located in the skimmer-plate, an inverted goose-neck having a contracted outlet, and an eduction-pipe communicating with said goose-neck, all in combination, as set forth.

6. In a boiler-skimmer, a skimmer-plate having an eduction-opening in said plate and a universal socket in communication with said opening, for the reception of the eduction-pipe.

7. In a boiler-cleaner, a skimmer-plate having an eduction-opening, a goose-neck leading therefrom, and a flared eduction-opening in combination therewith and communicating with the goose-neck.

8. A skimmer-plate, in combination with a flared opening, adjustable devices of the character described, located upon the skimmer, and an eduction-pipe, all substantially as set forth.

9. A V-shaped surface-skimmer having a back wall and an eduction-opening located in the skimmer-plate in the apex of the skimmer, and a goose-neck leading from said opening and communicating with the eduction-pipe.

10. A surface-skimmer provided with a flared eduction-opening and having two oppositely-arranged adjusting-screws projecting into said opening for the purpose of adjustably setting the eduction-pipe upon the skimmer.

11. A boiler surface-skimmer provided with a socket-joint having a water-packing, and in combination an eduction-pipe having a socket-bearing.

12. A surface-skimmer provided with a socket-joint, a threaded universal socket-pipe fitting therein, an internally and externally threaded sleeve upon the socket-pipe, a threaded spanner upon the sleeve, and adjustable screw-bolts connecting the skimmer and spanner, all in combination, as set forth.

13. A boiler-skimmer provided with a flared opening having a universal-joint socket, a threaded socket-pipe fitting therein, an internally and externally threaded sleeve, a threaded spanner, and adjustable threaded screw-bolts connecting the skimmer and spanner, all in combination, as set forth.

14. A boiler-cleaner comprising a skimmer, a settling-drum, pipe-connections between both ends of the drum and the boiler, and a check-valve in the pipe opening outwardly from the drum.

15. A settling-drum having a diaphragm, as described, and a pipe-connection above and around the diaphragm to prevent air-binding.

16. The combination, with a settling-drum, of a draw-off head consisting of a pipe having a series of sucker-openings of gradually increasing area from the center outwardly in both directions, and provided with a draw-off pipe located midway of said head.

17. A draw-off head consisting of a pipe having a series of sucker-openings of gradually-increasing diameter as they recede from the draw-off pipe or pipes, in combination with a
5 single draw-off pipe.

18. A casting composed of a series of varying-sized cells and varying-sized openings connected therewith, in combination with a draw-off head or pipe having corresponding open-

ings registering with the openings in the casting.

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

FRANK W. HORNISH.

Witnesses:

E. P. ROSE,

JOHN HAMILTON.