

E. STEVENS.
AMALGAMATOR.

APPLICATION FILED AUG. 19, 1907.

2 SHEETS—SHEET 1.

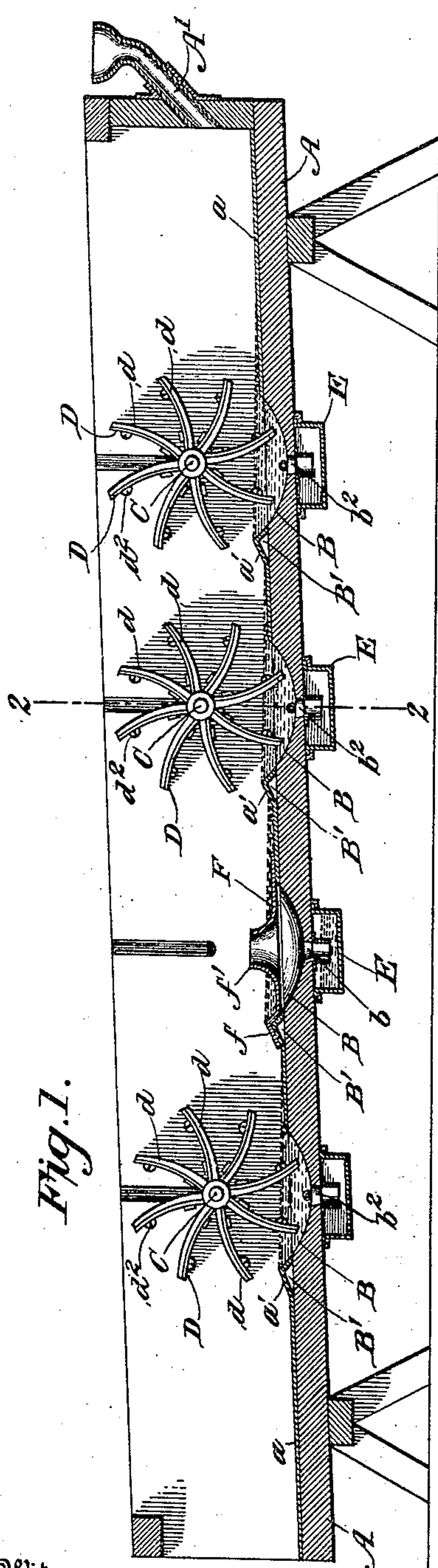


Fig. 1.

Witnesses

M. E. Fowler
James D. Mansfield

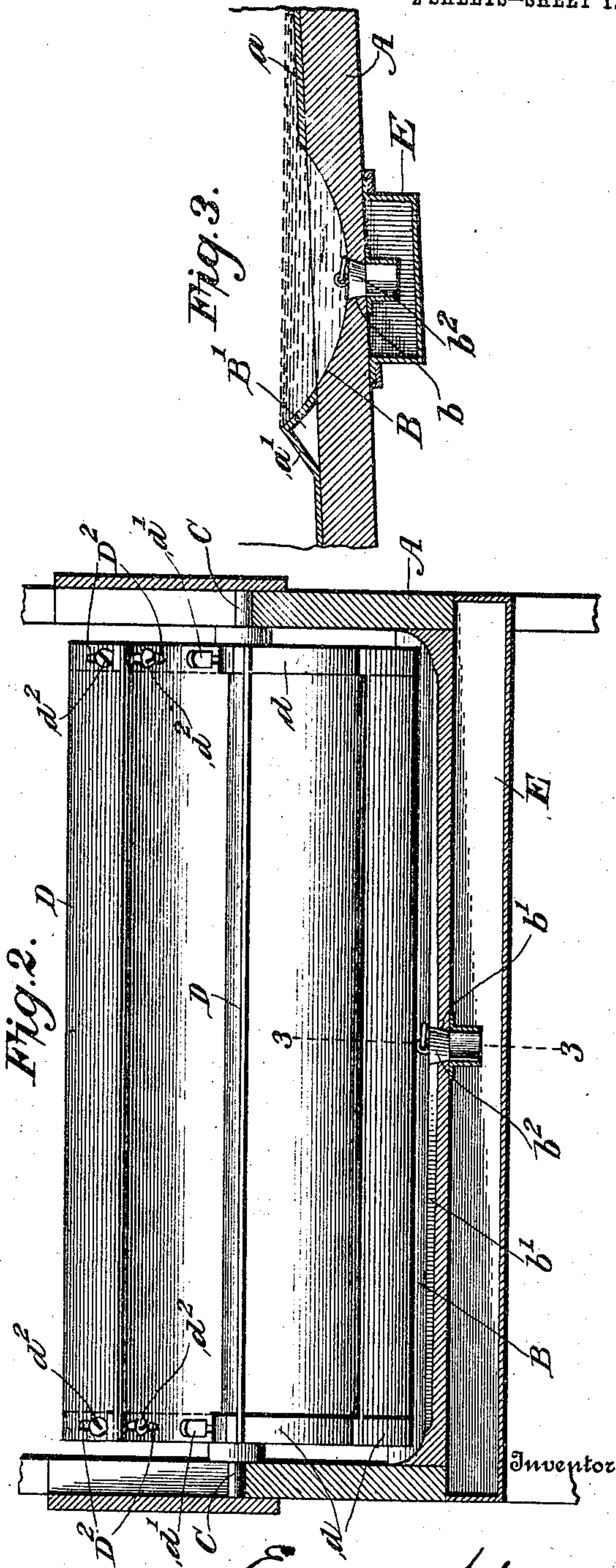
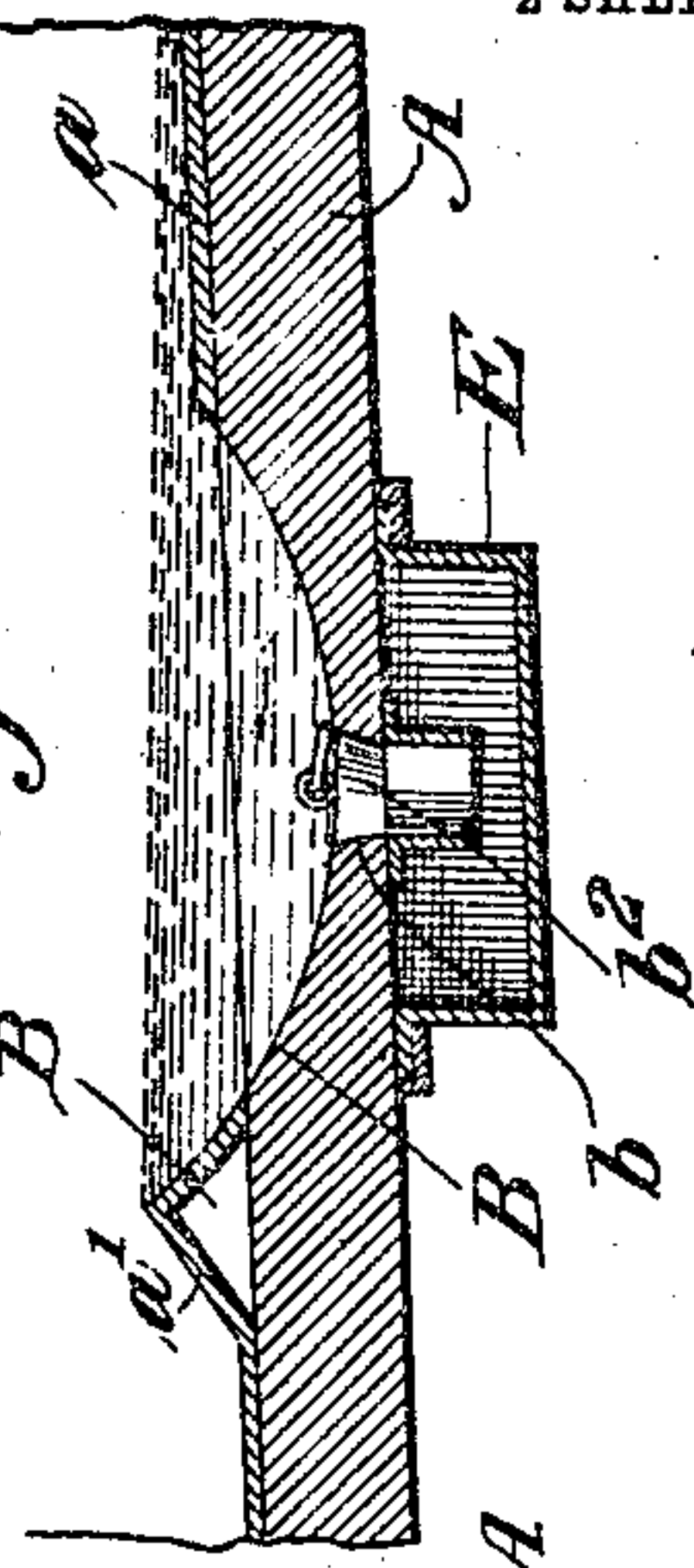


Fig. 2.

Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

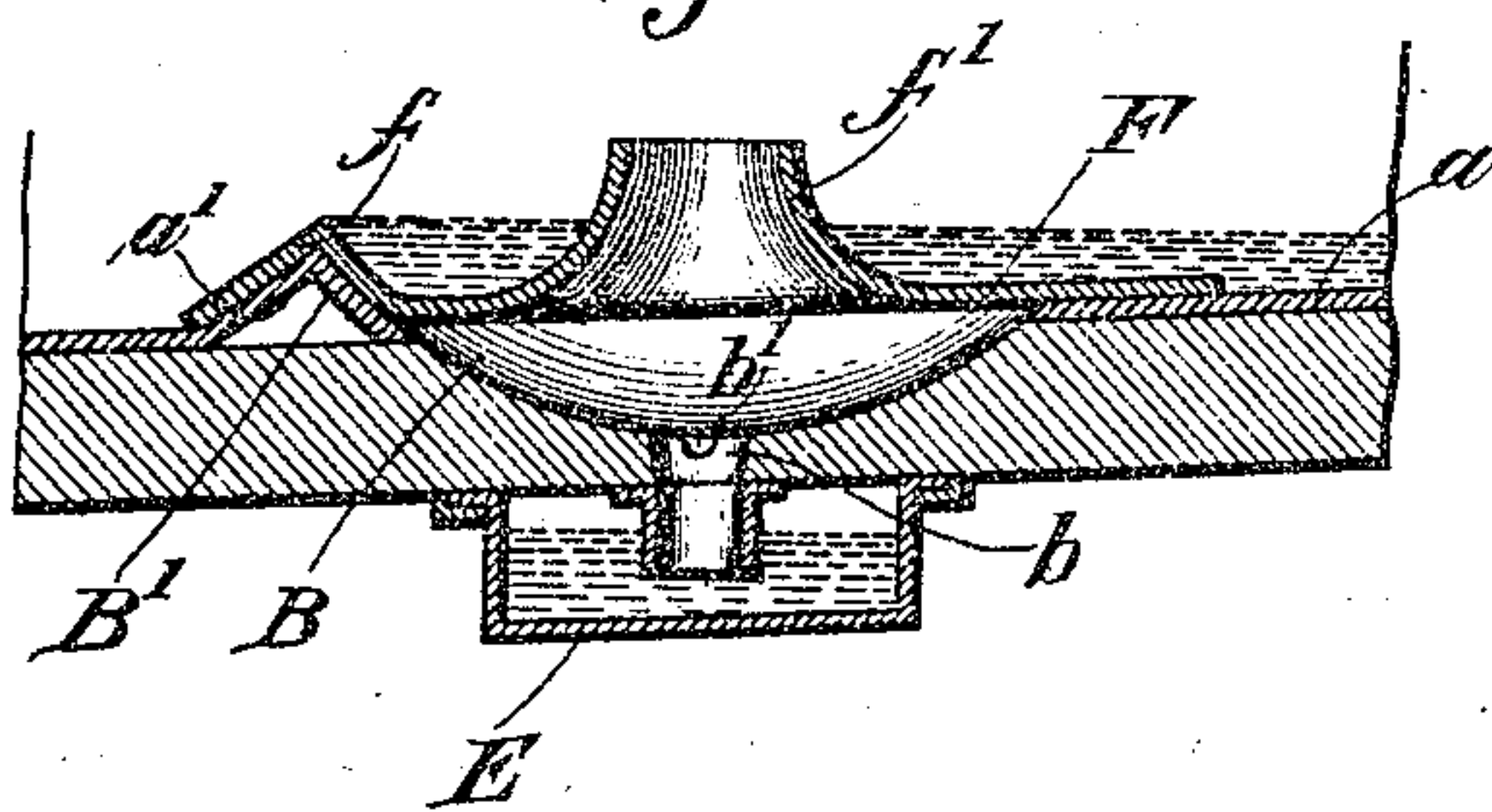


Fig. 5.

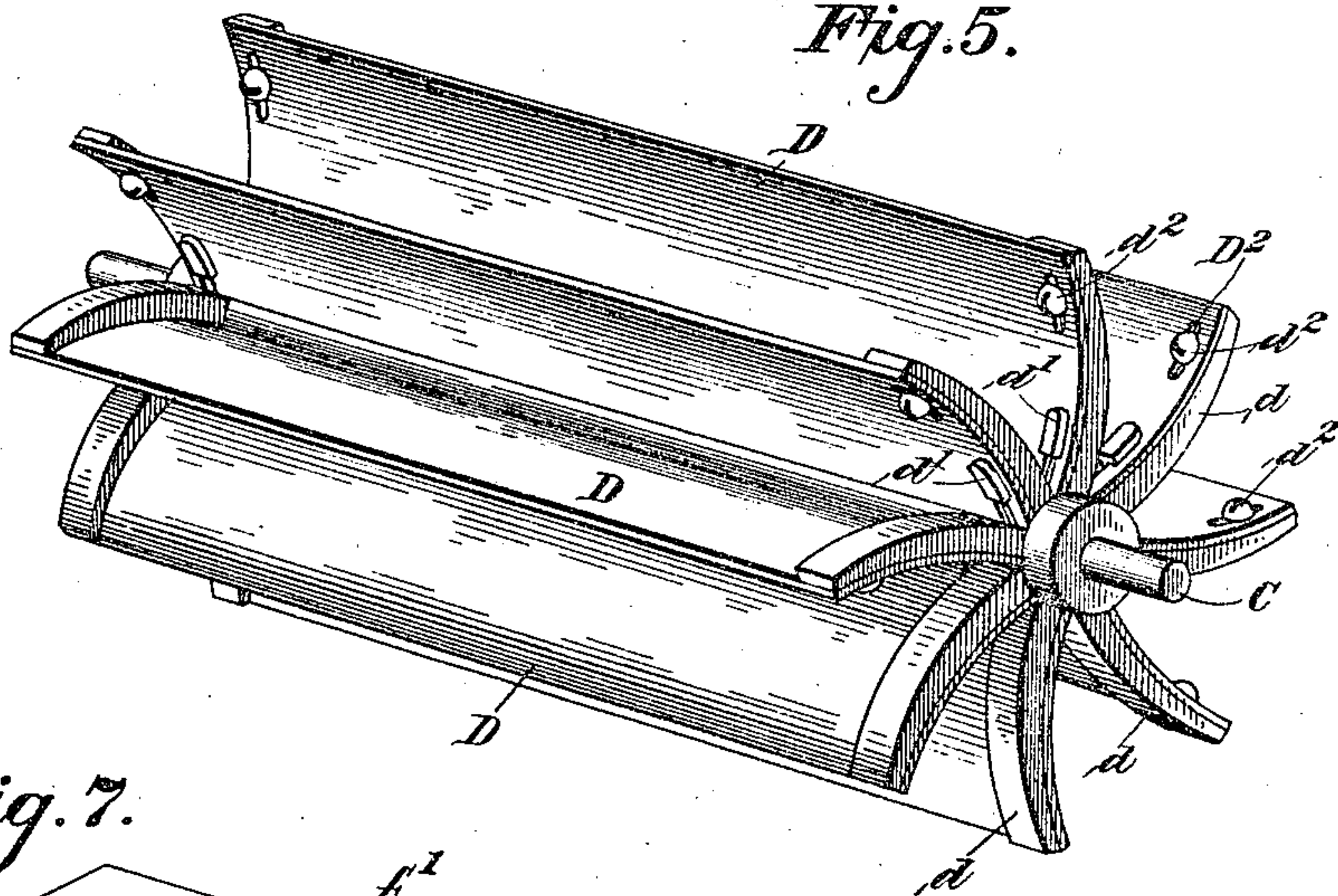


Fig. 7.

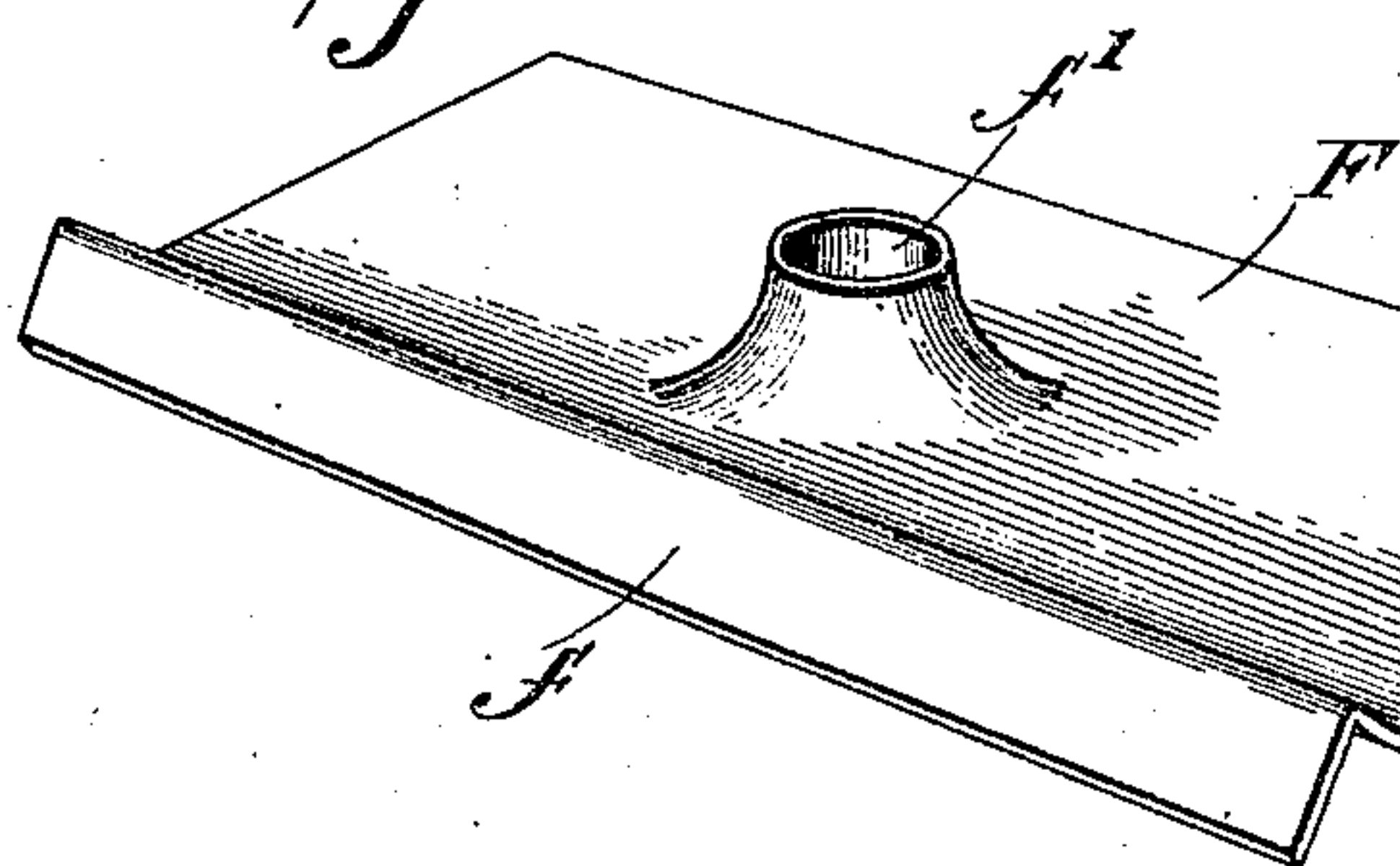
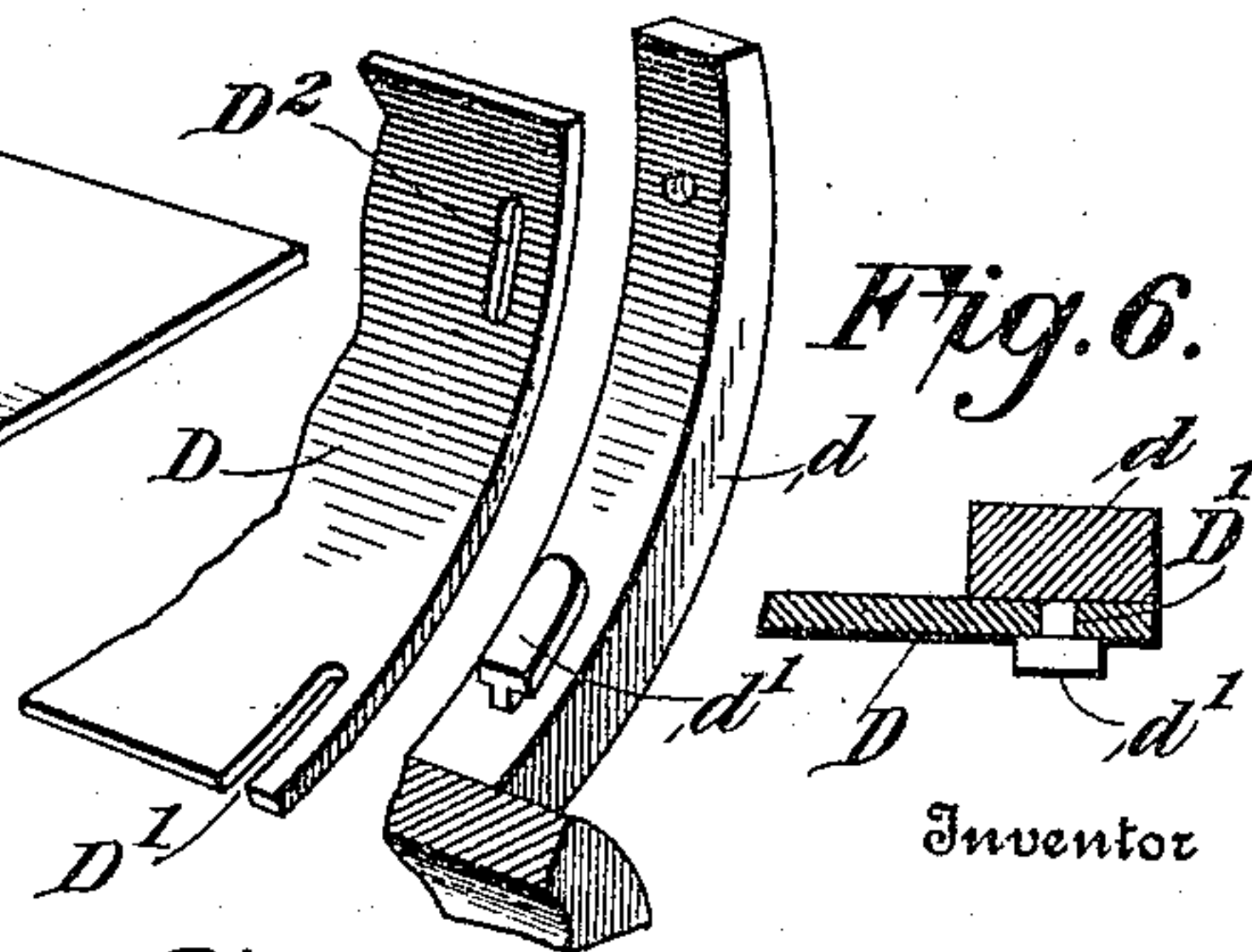


Fig. 6.



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UNITED STATES PATENT OFFICE

EUGENE STEVENS, OF BOULDER, COLORADO.

AMALGAMATOR.

No. 896,169.

Specification of Letters Patent.

Patented Aug, 18, 1908.

Application filed August 19, 1907. Serial No. 389,173.

To all whom it may concern:

Be it known that I, EUGENE STEVENS, of Boulder, in the county of Boulder and State of Colorado, have invented certain new and useful Improvements in Amalgamators; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improvement in amalgamating machines for use in reclaiming or separating gold and other precious metals from powdered ores, by the use of mercury or quicksilver, after the ores have been pulped or powdered by suitable stamping or grinding machinery; and the machine is useful for amalgamating placer-gravel, and sand and beach ore deposits.

The object of my invention is to produce a thorough commingling of the ores and mercury, automatically, the stream of water carrying the pulp or ores through the machine affording sufficient power to operate the amalgamating plates, which are arranged in rotative series, something like paddle wheels, and are adapted to cause the submergence of the ores in the mercury baths, and to catch and retain the "float" gold or fine light particles of the metals which remain mechanically suspended in water and will pass therewith through the ordinary amalgamators.

The invention consists in the novel construction and combinations of parts herein-after described and claimed, and the accompanying drawings illustrate an amalgamator embodying the invention which I will now describe with reference thereto.

In the drawings—Figure 1 is a longitudinal section through an amalgamating machine embodying my invention. Fig. 2 is an enlarged cross-section on line 2—2, Fig. 1. Fig. 3 is an enlarged detail section on line 3—3 Fig. 2. Fig. 4 is a similar view showing the covering plate in position. Fig. 5 is an enlarged detail view of one of the amalgamating wheels. Fig. 6 is an enlarged detail view of the devices for removably attaching the amalgamating blades to the wheel spiders. Fig. 7 is a detail view of the shield.

A represents a sluice-way or trough into which the pulp, powdered ores, gravel etc., containing the metals to be recovered are introduced together with a small stream of water, through the pipe A', or in other suit-

able manner. In the bottom of the sluice are a series of transverse depressions or troughs B, preferably concave in cross section, as shown, and each adapted to contain a quantity of quicksilver or amalgamating material.

At the lower side of each trough B is a riffle B', which deepens the troughs and retards the passage of ores therethrough. Above each trough is a rotary amalgamating wheel, removably supported in bearings on or in the sides of the sluice-way, so that any wheel can be bodily removed if desired by lifting it vertically out of the sluice-way and can be as readily replaced. Each wheel comprises an axial shaft C, having spiders near its ends, and amalgamating plates attached to the spiders. The spiders have radially disposed curved arms d , provided with T-headed lugs d' near their hubs (see Fig. 6), and with removable screws d^2 near their outer ends; and the amalgamating plates D are concavo-convex in cross section, and adapted to fit against the spider-arms, said plates having notches D' to engage the lugs d' , and apertures D^2 for the passage of screws d^2 . By these means the plates can be removably, but securely, fastened to the spiders. Each wheel resembles a long paddle-wheel or flutter-wheel, and when in position in the sluice-way the outer edges of the lowermost plates D will depend into the adjacent trough B, as indicated in the drawings.

The plates D are preferably made of copper, then silver plated, and finally coated with quicksilver. The bottom of the sluice-way and the riffles are also covered with metal plates a, a' , similarly treated.

Provision should be made for withdrawing the mercury and amalgam from the troughs when desired; for this purpose I make a central opening b in the bottom of each trough B,—which opening is closed by a removable stopple b^2 . Drain grooves b' may be formed in the bottom of the trough leading to such opening, as indicated in Fig. 2. Below each trough I arrange a receiver or drawer E, into which the contents of the trough can be discharged as desired, and after a fresh charge of amalgamating fluid is placed in the trough, the receiver can be removed and its contents subjected to further treatment to recover the metals, without delaying the operation of the machine.

When a trough is to be emptied it is de-

5 sirable to remove the co-acting wheel, by lifting it vertically out of its bearings, and then the trough may be covered by a removable cover F, see Figs. 1, 4 and 7, which is preferably formed of sheet metal, and has an angle or bend f at its lower side or edge to fit over the riffle B', and is provided with a central opening surrounded by a high flange f' , so that when this cover is in place the machine does not have to be stopped, the water and ores passing over the cover instead of into the underlying trough.

10 The stopples b^2 can be removed and replaced through the opening in the cover, and the trough refilled therethrough. Then the cover can be removed and the amalgamating wheel replaced. Thus provision is made for emptying the troughs and renewing the amalgamating material, without stopping the operation of the machine as a whole.

Any of the plates D can be readily removed and replaced on the wheels at will, with little trouble and without stopping other parts of the machine.

25 Operation: The troughs B being filled with mercury or other suitable amalgamating material, and the plates a , a' , and D, having been prepared as described, and the wheels being in position;—the pulp or ore to be treated is mixed with a small stream of water and admitted onto the upper end of the sluice and flows downward therethrough. In its passage it contacts with the mercury in the troughs and with the blades of the wheels, causing the latter to rotate, the blades momentarily checking the flow of the material therepast. The peculiar curvature of the blades causes the water and ores to contact with a large extent of their surface, and the wheels are so adjusted that in revolving each blade dips into the mercury in the troughs sufficiently to cause every particle of the material to come in contact either with the mercury on the sides of the blades, or in the trough. The heavier particles of the metals are trapped in the troughs and retained by the mercury, while the lighter or "float" particles, which remain ordinarily suspended in the water, are caught on the surfaces of the blades; thus the machine takes up all the valuable mineral substances passing therethrough. The machine may have any desired number of troughs and wheels, and its capacity will be determined by the length and size of the wheels and troughs, and the number thereof.

Having described my invention what I

claim as new and desire to secure by Letters Patent is:

1. In combination, a sluice or box having transverse amalgamating pockets adapted to contain mercury, and draw-off outlets in said pockets; with a removable cover adapted to cover any pocket to permit the latter to be emptied, said cover having an opening in it to permit access to the pocket covered thereby, substantially as described. 60 65

2. In combination, a sluice or box, a transverse trough therein adapted to contain mercury, and an amalgamating wheel above the trough composed of a shaft, spiders thereon having T-headed lugs, and removable curved amalgamating plates having notches engaging the lugs on said spiders, substantially as described. 70 75

3. In an amalgamator the combination of a sluice or box having transverse amalgamating troughs, and rotary amalgamating wheels above and co-acting with the troughs; with a removable and adjustable cover adapted to be placed over and close any one of the troughs, after its co-acting wheel is removed, to enable such trough to be emptied without stopping the operation of the remaining parts of the machine, substantially as described. 80 85

4. In an amalgamator the combination of a sluice or box having transverse amalgamating troughs; with a removable cover adapted to close any one of the troughs, to enable the latter to be emptied without stopping other parts of the machine, said cover having an opening in it to permit access to the pocket covered thereby, substantially as described. 90

5. An amalgamating machine consisting of a sluice box having a series of fixed transversely arranged amalgamating pockets, a like series of removable rotary wheels having amalgamating plates, said plates being adapted to extend deeply in the pockets as the wheels rotate, a riffle at the lower side of each pocket, a series of draw-off receptacles communicating with the bottom of the troughs, and a removable shield adapted to close any one of the troughs after its co-acting wheel is removed, all substantially as herein set forth. 100 105

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

EUGENE STEVENS.

Witnesses:

E. L. MERRIMAN,
J. A. CLEMMER.