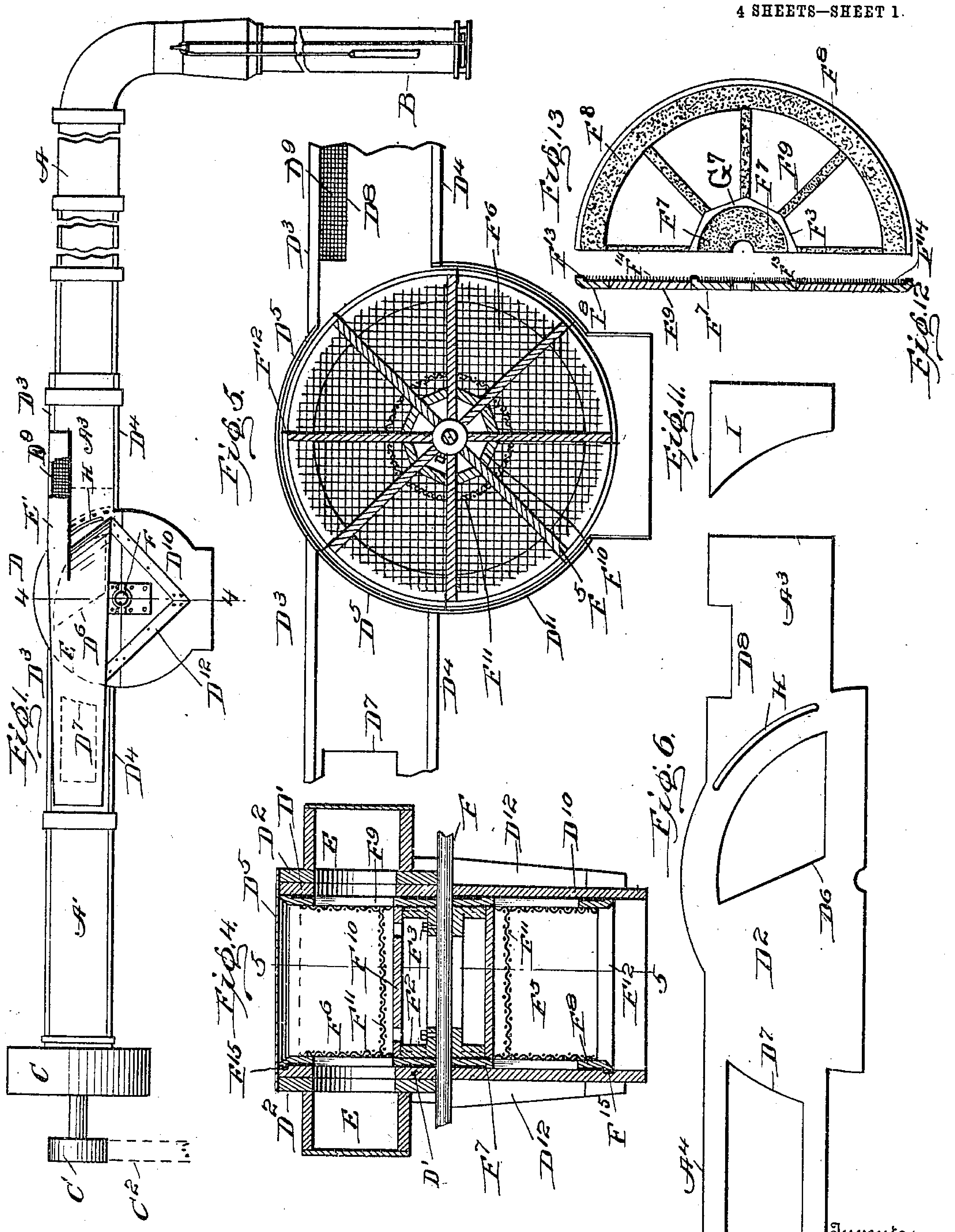
No. 837,205. PATENTED NOV. 27, 1906.

W. E. ELAM.

COTTON CONVEYING AND CLEANING APPARATUS.

APPLICATION FILED SEPT. 11, 1906.

4 SHEETS—SHEET 1.



Inventor

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Attorney.

Witnesses

~~Jeanne Lightfoot~~

Chas Jenkins

THE NORRIS PETERS CO., WASHINGTON, D. C.

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4 SHEETS—SHEET 2.

Fig. 2

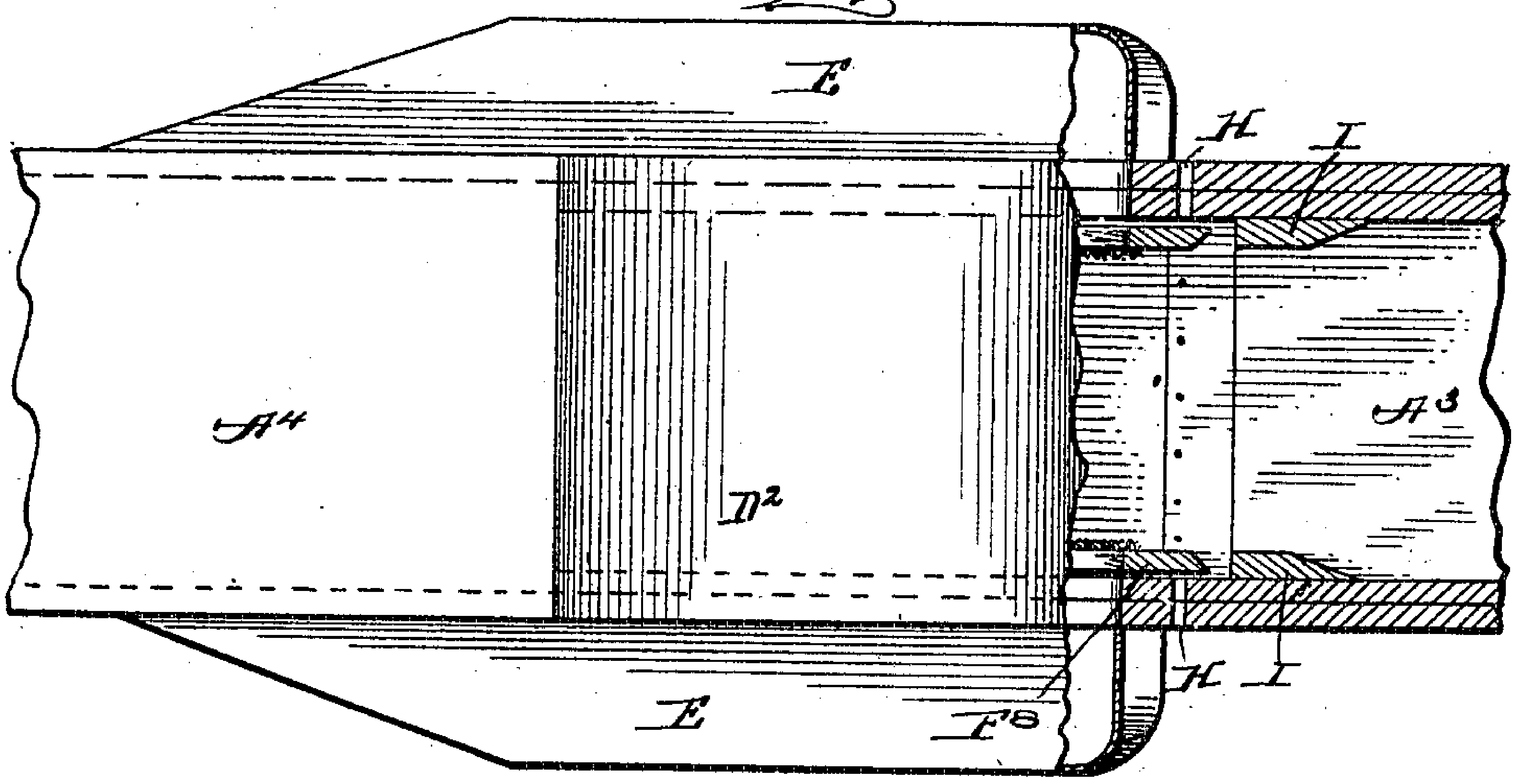


Fig. 3

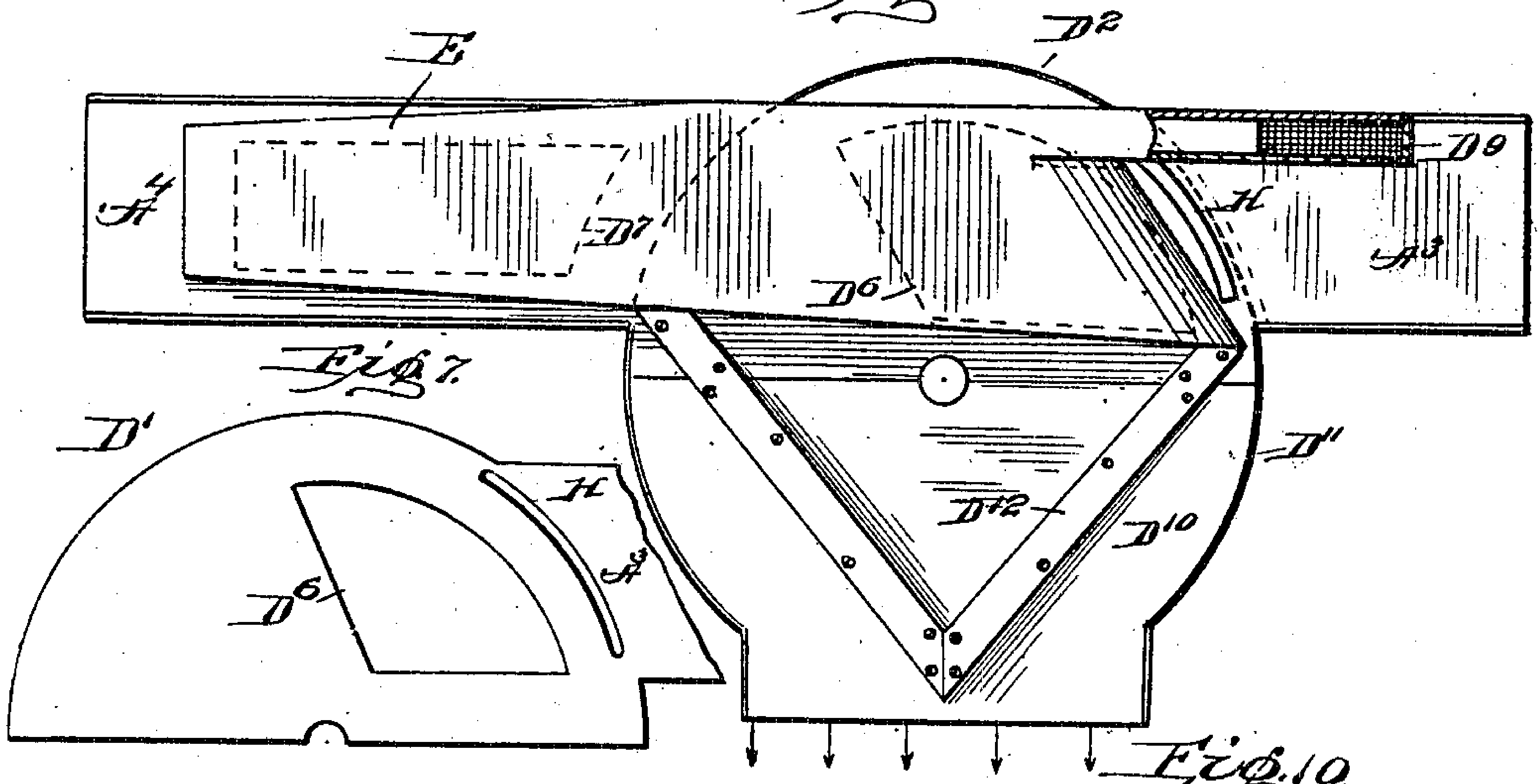


Fig. 7

Fig. 10

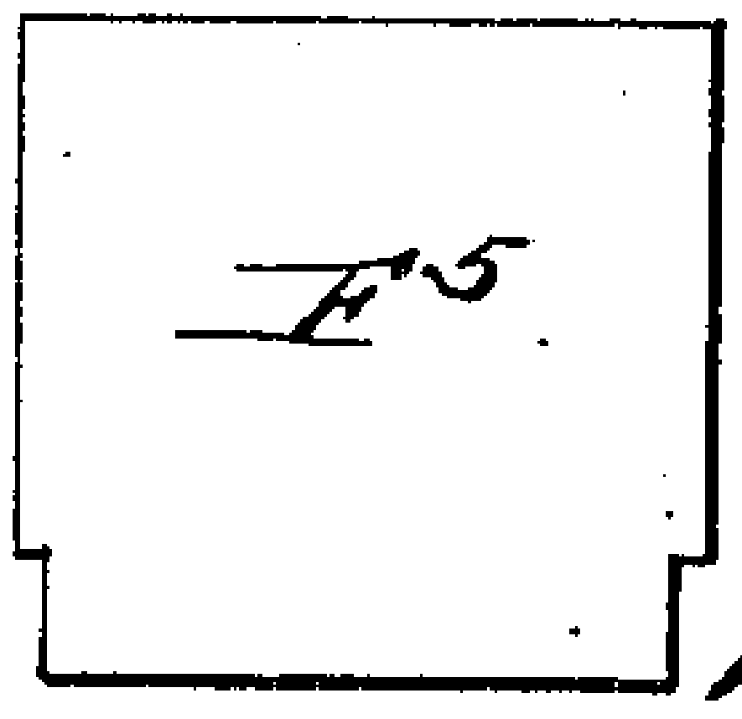


Fig. 8.

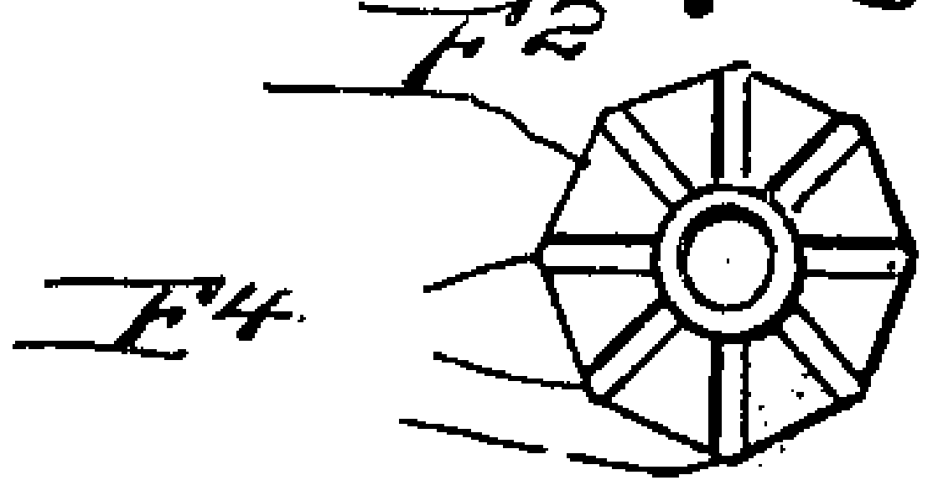
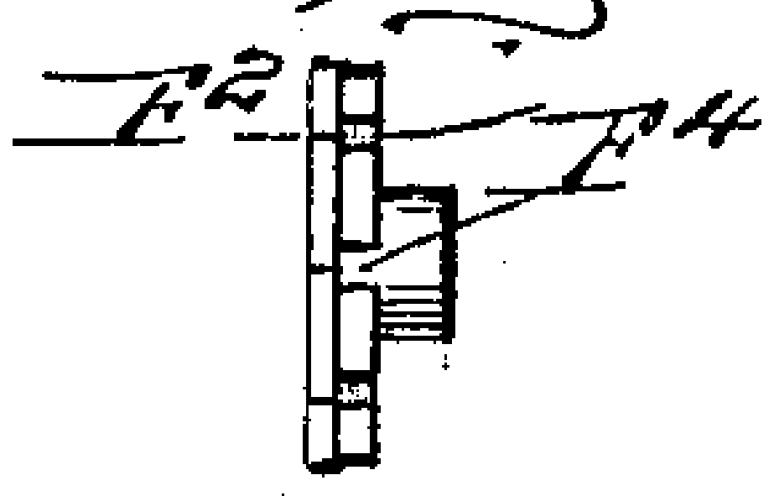


Fig. 9.



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4 SHEETS—SHEET 3.

Fig. 14.

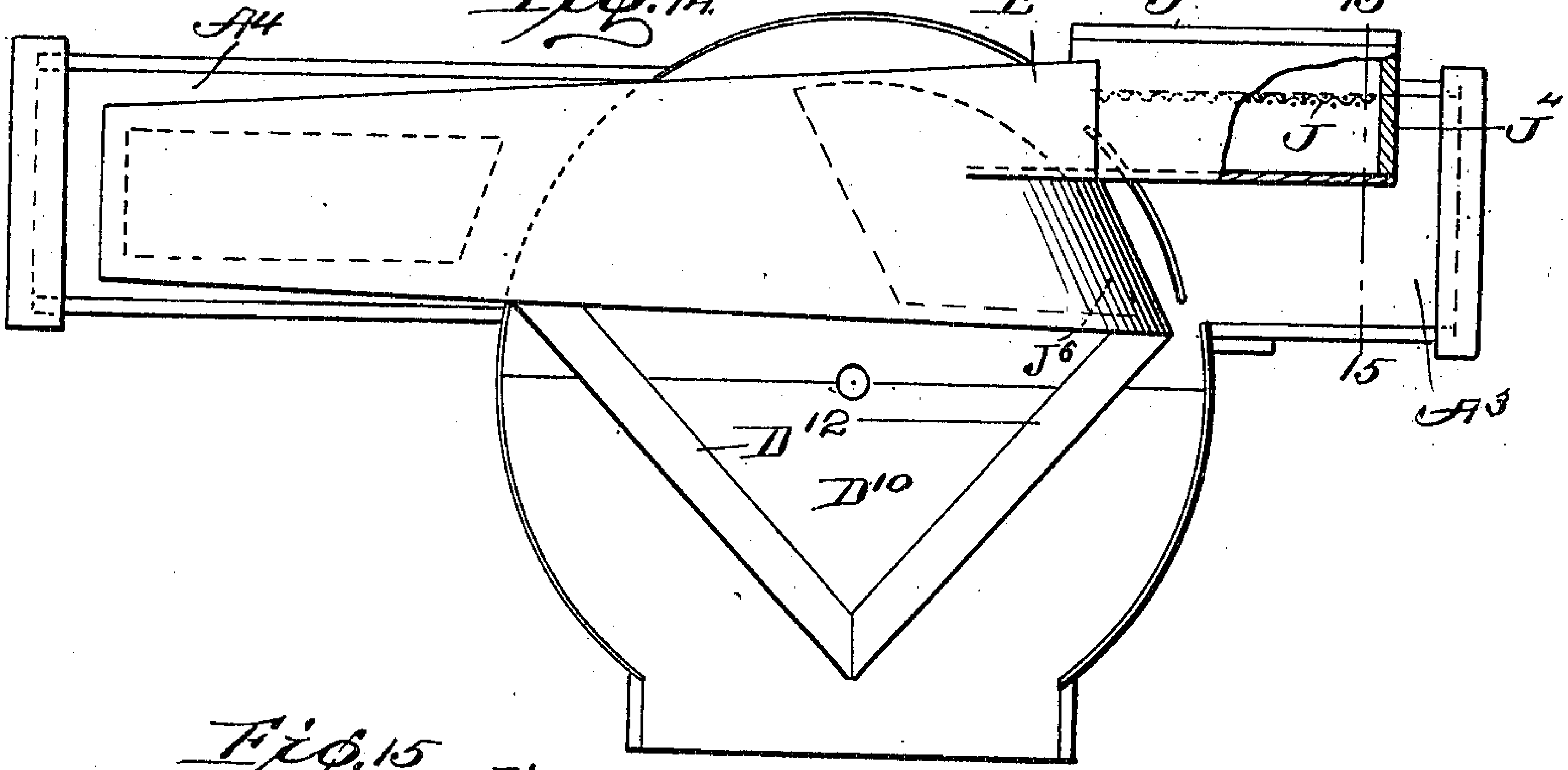


Fig. 15

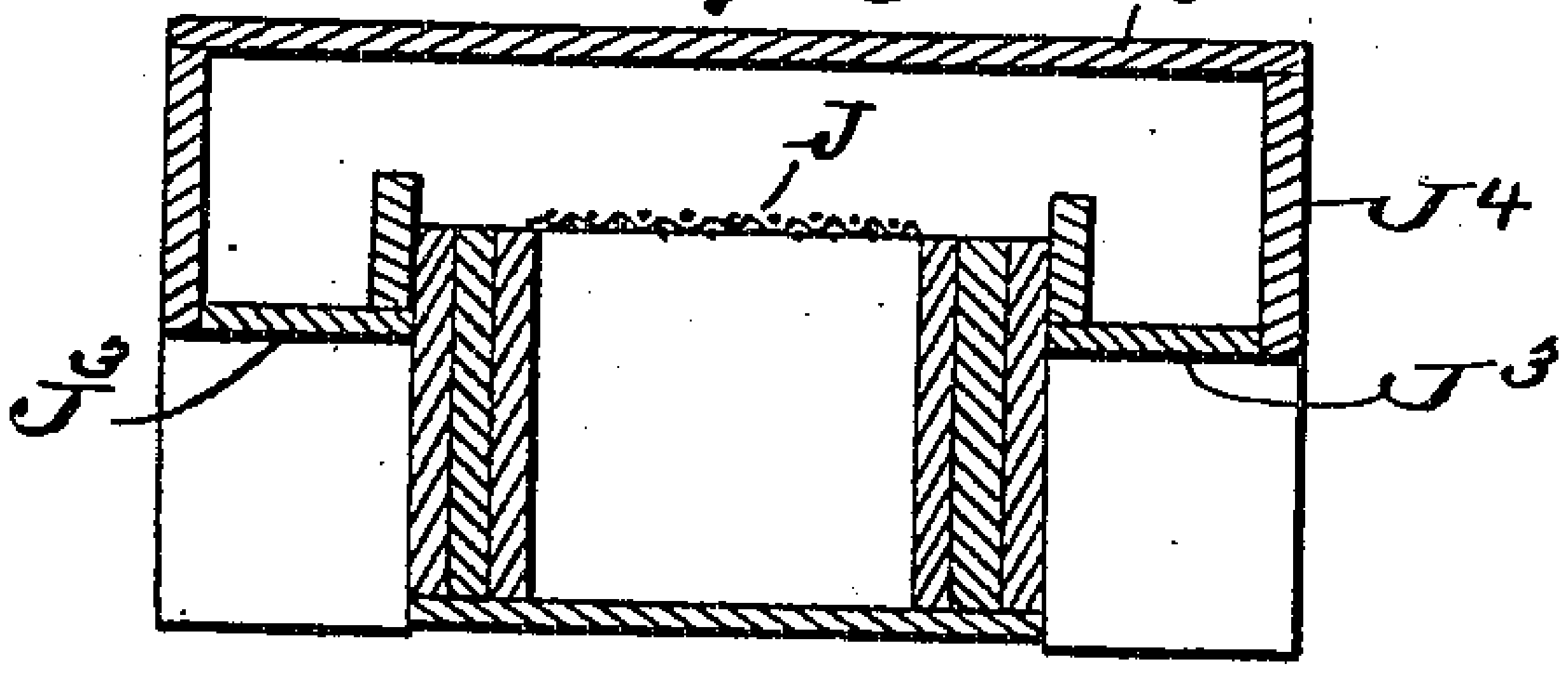


Fig. 16

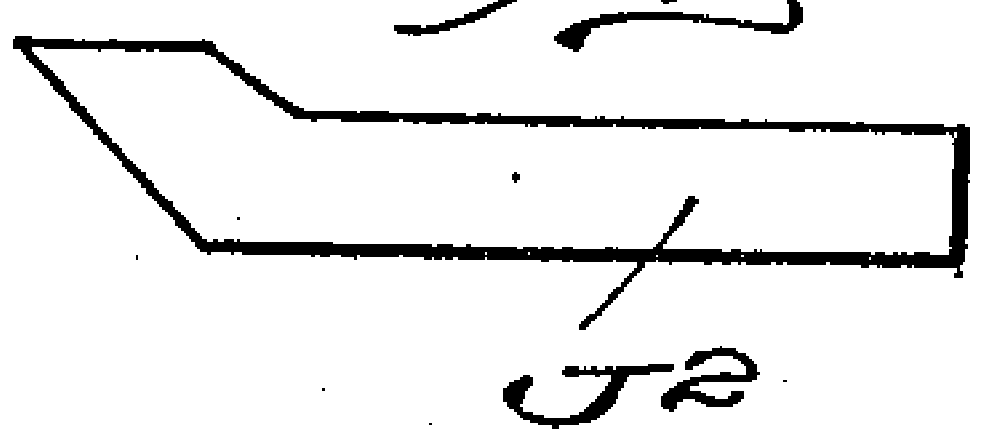


Fig. 17

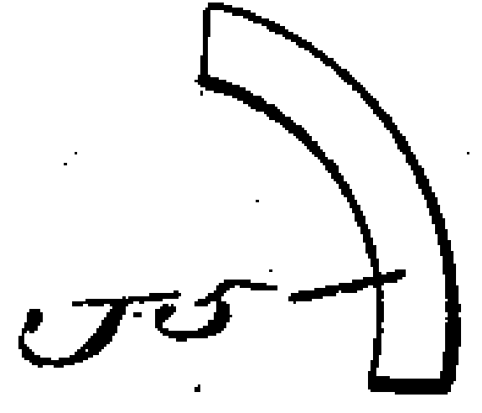


Fig. 18

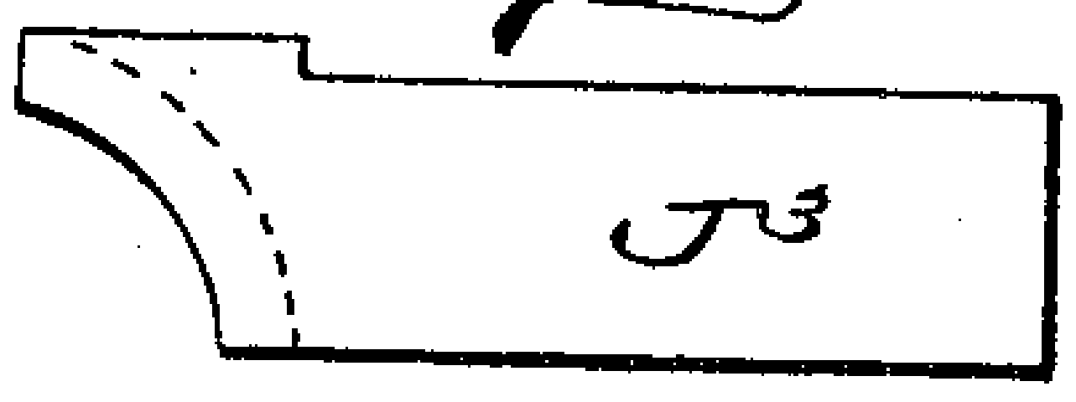
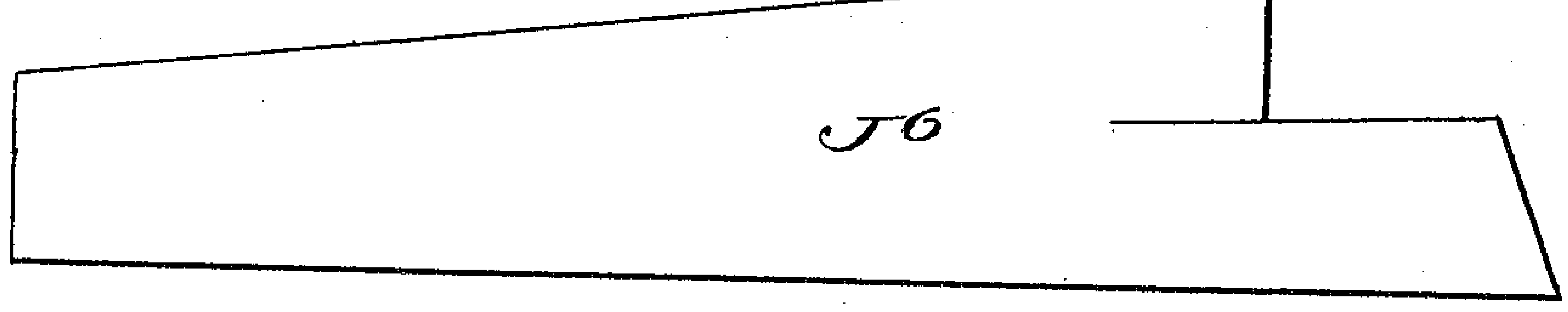


Fig. 19.



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4 SHEETS—SHEET 4.

Fig. 20.

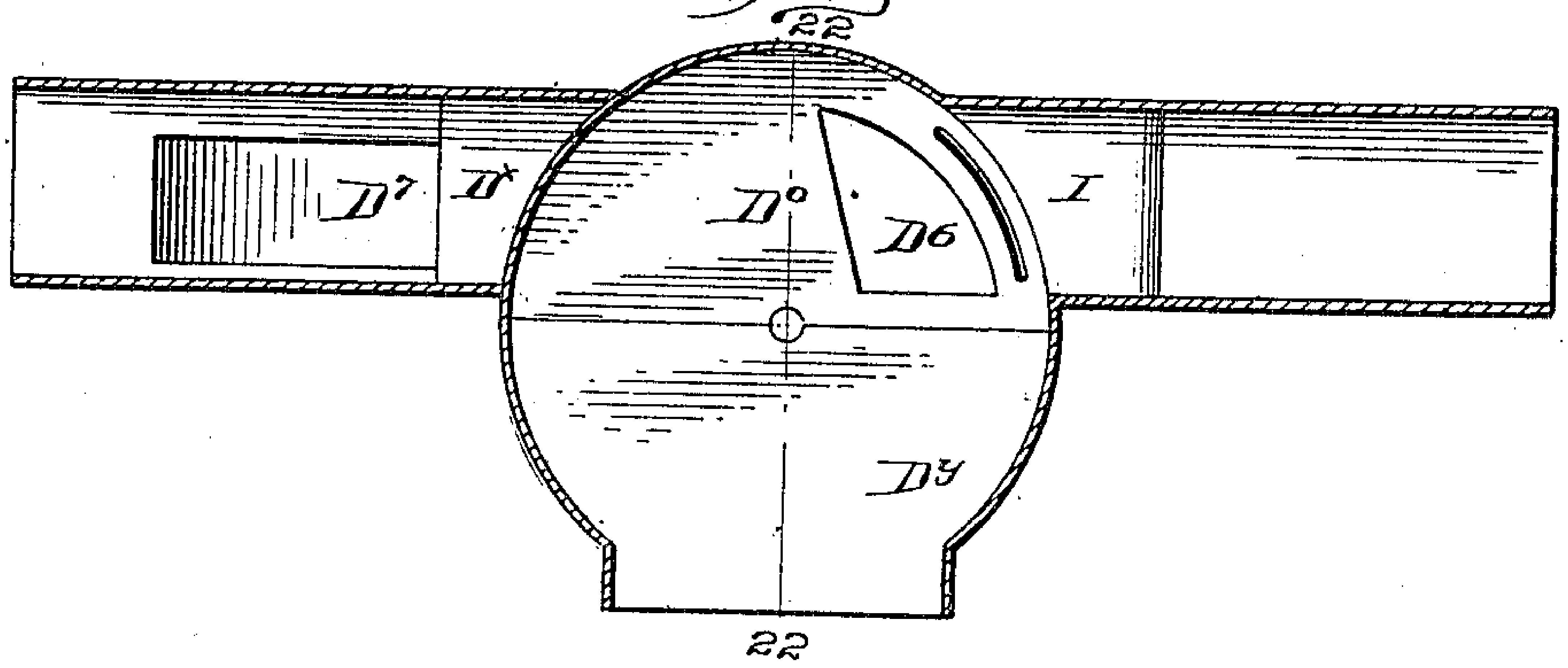


Fig. 21.

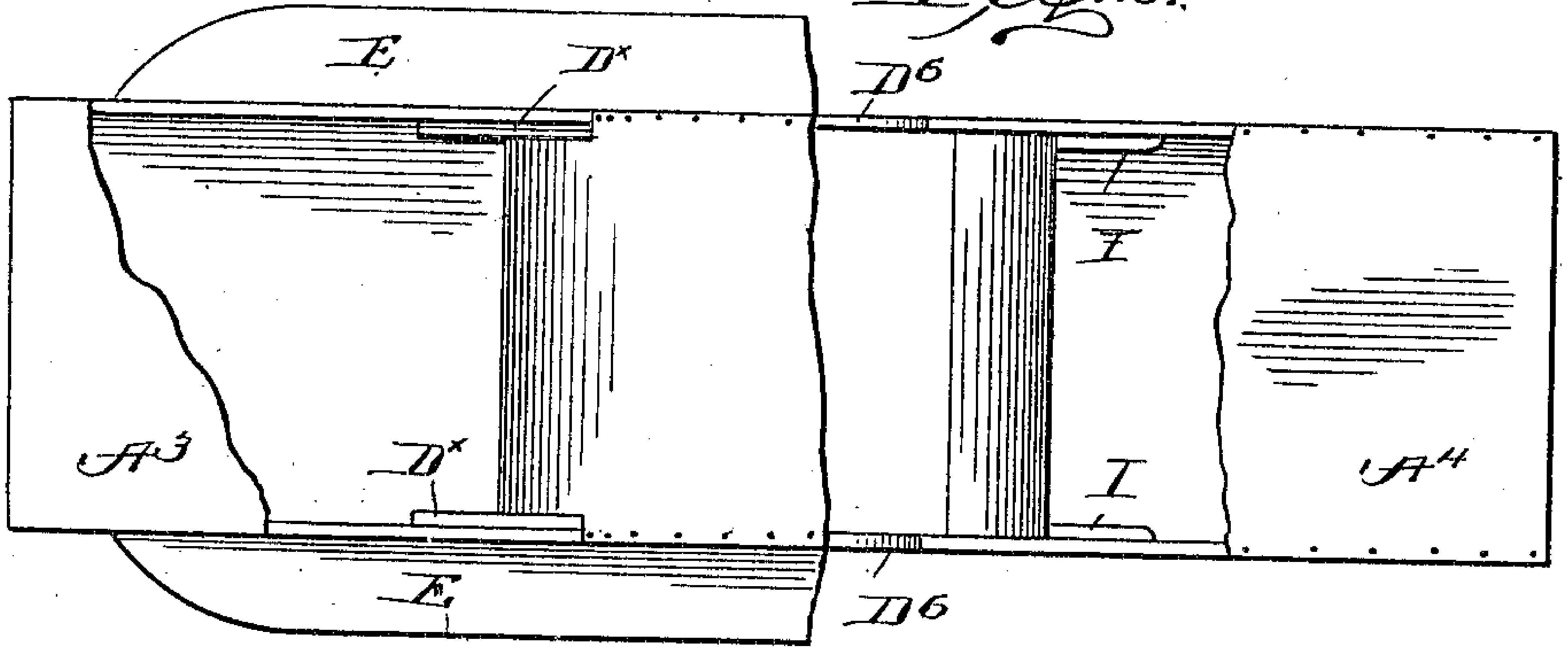
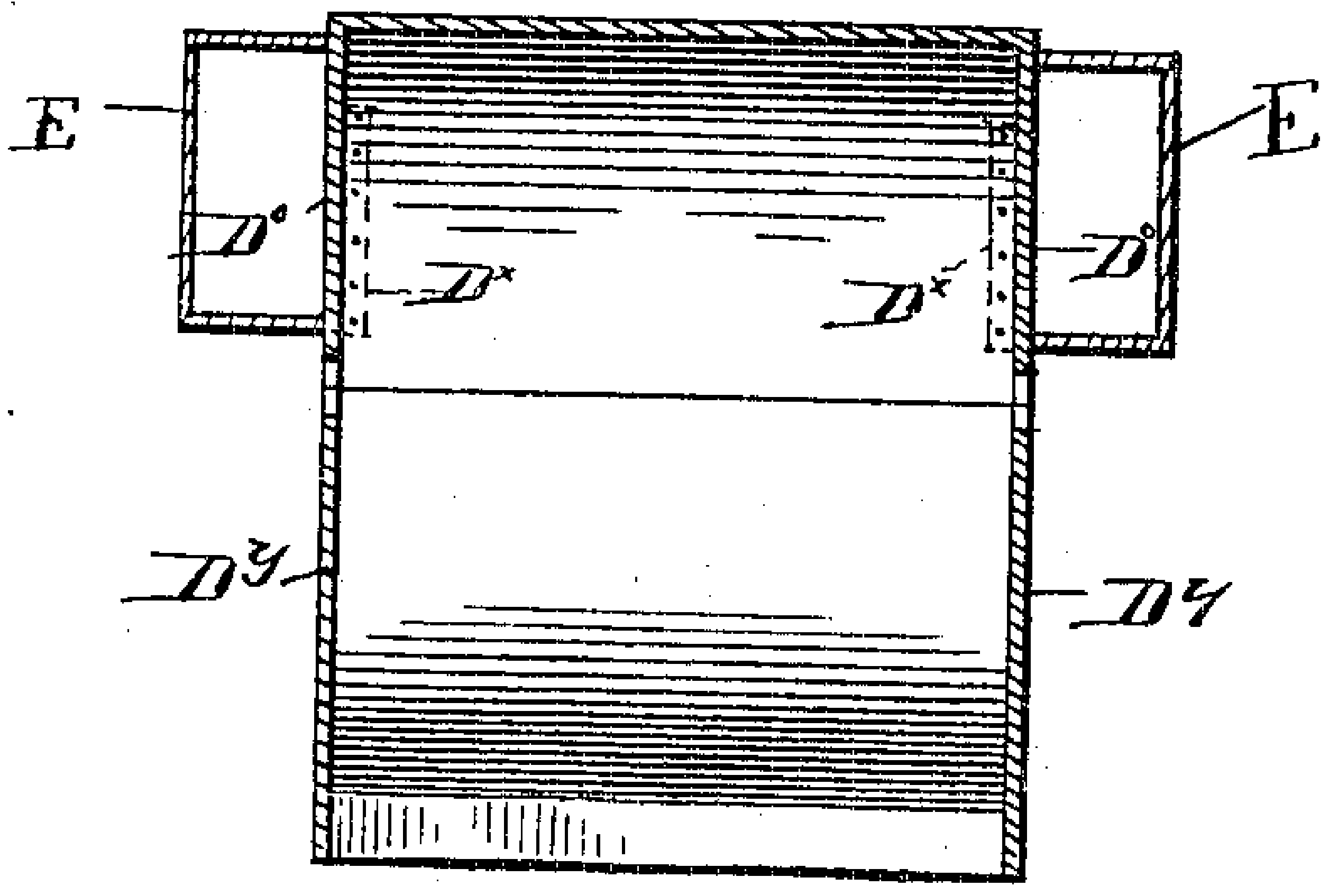


Fig. 22.



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COTTON CONVEYING AND CLEANING APPARATUS.

No. 837,205. Specification of Letters Patent. Patented Nov. 27, 1906.

Application filed September 11, 1905. Serial No. 277,936.

To all whom it may concern:

Be it known that I, WILLIAM E. ELAM, a citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented certain new and useful Improvements in Cotton Conveying and Cleaning Apparatus, of which the following is a specification.

For conveying and cleaning seed-cotton a rotary screen-wheel provided with peripheral pockets has been interposed in a pneumatic conduit to receive cotton in its pockets and by its rotation carry the same out of the current and discharge it, the apparatus being also provided with a by-pass over the wheel and this by-pass having its entrance screened, so that cotton could not enter it. The by-pass was supposed to be necessary because a dense mass of cotton filling a pocket partly or wholly prevented the passage of air, and a succession of pockets thus filled might lead to bringing the cotton in the conduit to rest, particularly if the conduit had many and abrupt turns, and for the additional reason that it took a material amount of dust from the loose passing cotton without materially detracting from the cleaning effect of the current through the wheel. It was further advantageous in that it added to the total screen-surface and took air from the conduit after that air had exerted its full effect in moving the cotton and abstracted it at a point where the swiftly-moving cotton had a tendency to keep the by-pass screen unobstructed. It is obvious that so long as the by-pass was unobstructed a current would be maintained even if no air whatever passed through the wheel. Such a by-pass has, however, serious disadvantages in adding largely to the size, cost, and complication of the apparatus, which in many cases must be small, inexpensive, and simple, or it will not be used. It is to be noted that the separator is usually above a gin and gin-feeder, where the available space is often small.

To provide successful apparatus that shall occupy unusually small space, whether or not it is provided with a by-pass, or that shall have largely-increased capacity when the same space is used and in either case to materially lessen the cost are among the objects of this invention.

In the accompanying drawings, Figure 1 is a side elevation of the preferred form of my apparatus. Fig. 2 is an enlarged plan view of a portion of the same devices. Fig. 3 is an enlarged side elevation of parts seen also in Fig. 1. Fig. 4 is a section on the line 4 4, Fig. 1. Fig. 5 is a section made by a plane whose location is indicated by the line 5 5, Fig. 4. Figs. 6, 7, 8, 9, 10, and 11 are detached views of parts or elements of the wheel, casing, and conduit. Figs. 12 and 13 are respectively a diametrical section of one side of the screen-wheel and a side view of one-half the wheel. Fig. 14 is a view similar to Fig. 1, showing a modification. Fig. 15 is a section on the line 15 15, Fig. 14. Figs. 16, 17, 18, and 19 are detached views of parts seen also in Figs. 14 and 15. Figs. 20, 21, and 22 are respectively a sectional elevation, a plan view, and a section on the line 22 22, Fig. 20, all showing a modified construction wherein all by-passes are eliminated.

In the views, A A′ represent a pneumatic cotton-conveying conduit leading from an ordinary telescopic intake-pipe B to a distant air-exhausting device, usually a fan, at C, driven by a belt-pulley C′ and a belt C^2 from any suitable source of power. The upper half of the horizontally-divided casing D for the wheel is formed by placing duplicate boards D′, Fig. 7, in registry and in position to form continuations of the side walls of the conduit A A′, doubling their thickness by securing to their outer sides boards D^2, Fig. 6, of like contour, except that they have an extension A^4 opposite the extension A^3, and then connecting the said walls thus formed by top and bottom boards D^3 D^4 and curved sheets D^5, preferably of metal, the latter connecting the curved portions of the margins, as shown in Fig. 5, and entirely cutting off the conduit upon the side nearest the fan while leaving the interior of the casing in full communication with the conduit upon the opposite side. Through the side walls of the casing are cut openings D^6, communicating with that portion of the interior nearest the intake, and through the corresponding walls of the conduit and upon opposite sides of the casing are formed openings D^7 D^8, the latter opening being covered by a screen D^9. Over each pair of openings D^6 D^7 is placed a pipe E, which forms a conduit through which air may pass out at the side of the casing and enter the main conduit again between the screen-wheel casing and the fan. A branch E′ extends from each pipe E in the opposite direction (away from the fan) alongside the main conduit and communicates with its interior through one of the screened openings D^8, thereby forming, with the pipe E, a channel through which a part of the air entering at the intake may pass to the fan without going through the screen-wheel casing. The lower half of the separable casing consists of the side walls D^{10} in the planes of the boards D', and like them joined by curved metal sheets D^{11}. This lower half is suspended from the parts above by cleats D^{12}, secured to both parts and readily detachable from at least one of them. The lower half supports in suitable bearings a screen-wheel shaft F, rotated by devices not shown.

Within the casing closely fits a separator or screen-wheel mounted upon the shaft F. To form the wheel, two polygonal disks F^2 are secured to the shaft at the proper distance apart by set-screws F^3 and provided upon their inner faces with radial grooves F^4, in which are held radial partitions F^5. Upon the lateral edges of the partitions are fixed annular screens F^6, and upon the outer faces of these are placed a central disk F^7 and an annular plate or ring F^8 of the same thickness, both concentric with the shaft F. Upon the edges of the partitions are secured strips F^9, making them flush with the parts F^7 F^8. Plates F^{10}, Figs. 4, 5, parallel to the axis are then fitted between the partitions to rest upon the disks F^2 and form bottoms for the several pockets. Each pocket is also provided with a false screen-bottom F^{11}, cutting off a small space between the two bottoms, from which space air may pass out through the inner portion of the annular screen F^6. By this construction we have a series of pockets which do not communicate, but each of which has three foraminous walls.

Each free or peripheral edge of each partition is provided with a flexible flap F^{12} to press against the inner cylindrical face of the casing and prevent air from passing these edges. The wheel thus formed has its plane faces turned out or cut away to leave two annular ribs F^{13}, and the portions thus sunken below the ribs are faced with sheepskin F^{14}, having its wool rather closely sheared, so as to project but slightly beyond the ribs. The ribs may be faced with metal, and in the contiguous walls of the casing may be placed coacting rings F^{15}, Fig. 4, preferably of metal or rawhide. By this construction the wool effectively excludes the air without being pressed with much force at any point, and hence it wears very slowly. In time, however, even this wheel will wear to such an extent that air and a material amount of cotton will pass across the faces of the wheel from the conduit A to the pipes E. When this happens, the apparatus must be repaired, causing delay and expense. I practically obviate this difficulty by cutting openings H through the sides of the casing over the paths which air must take in passing across the faces of the wheel in the manner suggested. Obviously there can be no suction across these openings, and hence wear does no harm in this respect, unless the external air entering through the openings is sufficient in volume to form a material fraction of that withdrawn by the fan, which is never permitted by the construction.

The swiftly-moving cotton arriving from the intake is deflected from the joints at the edges of the wheel by beveled shield-pieces I, fixed to the side walls of the conduit in close proximity to the wheel.

It is plain that if the wheel be rotated while the fan is exhausting air cotton presented at the intake will be rapidly delivered in the pockets of the wheel and by the rotation of the latter will be carried around out of the air-current and discharged through the open lower side of the casing, the greater portion of the air being carried on through the screen-bottoms and sides of the pockets into the pipes E and thence to the fan, since the screen-walls of the wheel are so located that each space between consecutive partitions registers momentarily as the wheel rotates with the openings D^6 in the walls of the casing. Meantime some part of the current after having aided in bringing cotton to the wheel passes through the screens D^9, branch pipes E', pipes E, and conduit A' to the fan, taking with it dust and the like. The side pipes then serve as by-passes, adding nothing to the height of the apparatus and practically little to its cost. Moreover, we may not only install the apparatus where it was not practicable to use the larger construction, but where it is not necessary to reduce the size we may make the wheel and its screen-surface perhaps fifty per cent. larger, thereby allowing a much more rapid movement of the cotton without danger of clogging. Still further, by thus increasing the size of the wheel and its screen-surface we may have a successfully-operating apparatus if we wholly discard the by-pass.

Instead of the construction described for allowing a current in the conduit independently of the passage through the wheel I may use the forms shown in Figs. 14 to 19, inclusive. In this form instead of overlapping the pipe E' upon the side of the main conduit an opening is formed in the upper side of the latter and covered by a screen J, and over this is placed a closed box J', which extends down upon each side of the main conduit, as seen in Fig. 15, and communicates directly with a short branch pipe E^2. In this way a very large screen-surface is secured, so that cotton is not drawn against the netting with much force at any point, and at the same time a greater part of the cotton is directly acted upon to remove dust which it may carry. In this construction pieces J^2, Fig. 16, are fixed to the outside faces of the main conduit to support bottoms J^3 and the front end pieces J^4 of the box, and to the bottom pieces are secured curved blocks J^5 to receive the curved portions of the sheet-metal walls J^6.

In small plants where even greater economy is required the by-pass is entirely eliminated and the cost is in other respects reduced. The outer boards of the side walls of the casing, Figs. 20, 21, 22, are made as before, except that they are not cut away for the by-pass and the inner board is omitted, the curved walls being fixed to the edges of the boards D^0 and to the concave edges of blocks D^x within the casing. The side walls D^y of the lower half of the casing are in the planes of the walls D^0, and the pipes E have no branches, but merely lead from the opening D^6 to the opening D^7. This construction reduces cost, weight, bulk, and complexity to a minimum.

In the preferred construction the openings H are not necessarily at the exact points where they are shown. Were they at the extreme edge of the wheel or even slightly beyond that edge or more distant from the axis they would be effective, for in that case some portion of the air would pass the plane of the joint at the side of the wheel and mingle with the main current, that portion thus forming a shield deflecting the cotton inward from the plane of the joint and perhaps forming in itself an added safeguard.

In any of the constructions set forth the parts or short conduit-segments A^3 A^4 of the casing are not necessarily of the same horizontal width as the conduits A A'.

What I claim is—

1. The combination with a pneumatic cotton-conveying conduit and a screening device interposed in the conduit to remove cotton laterally therefrom while permitting air and dust to pass on, of a by-pass arranged to take a fraction of the air from the conduit before it reaches the screening device and convey it around the latter, approximately in the horizontal plane of the conduit; whereby a current is kept up in the conduit whether or not air passes properly through the screening device.

2. The combination with a pneumatic cotton-conveying conduit and a device interposed therein to remove cotton therefrom while allowing air and dust to pass, of two screened by-passes arranged to take a fraction of the air from the conduit before it reaches said devices and extending around the latter upon opposite sides, respectively, and arranged to carry at all times a portion of the air bringing cotton to said devices.

3. The combination with a cotton-conveying conduit and an interposed wheel-casing continuous therewith, of means for creating an air-current in the conduit, a rotary separating-wheel fitting in said casing and having a foraminous wall, a pipe arranged to take air from the wheel through said foraminous wall and return it to the conduit at a point beyond the wheel, and a branch pipe connecting the pipe before mentioned with that portion of the conduit through which cotton advances to the wheel.

4. The combination with a cylindrical casing, of a wheel fitting the interior of the casing, having foraminous sides and provided with peripheral pockets, a conduit delivering air and cotton in the pockets successively as the wheel rotates, two pipes taking air from said pockets through their foraminous side walls, respectively, and smaller pipes connecting these pipes with said conduit.

5. The combination with a cotton-conveying conduit and means for creating an air-current therein, of transversely-moving screen devices interposed in said conduit to arrest the cotton, the lateral joint or space between the screen devices and the contiguous parts being in free communication with the external air; whereby air-current from one part of the conduit to the other through said space is prevented.

6. The combination with a cotton-conveying conduit, of a rotary wheel provided with peripheral pockets in position to receive, successively, cotton advancing in the conduit and having portions of the pocket-walls foraminous, means for rotating the wheel, a conduit closely covering and registering with said foraminous portions during the time that each pocket, in the rotation, registers with the cotton-bringing conduit, openings putting the joints at the sides of the wheel into communication with the open air, and means for creating an air-current through said conduits and wheel.

7. In apparatus of the class described, the combination with a screen-wheel having peripheral pockets with foraminous bottoms, of means for withdrawing air from the pockets through said bottoms.

8. In apparatus of the class described, the combination with a screen-wheel having peripheral pockets each provided with foraminous lateral and bottom walls, of means for withdrawing air from the pockets through both lateral and bottom walls simultaneously.

9. In apparatus of the class described, the combination with a screen-wheel having upon its lateral faces metal wearing portions and intermediate recesses, of suitable packing secured in said recesses and projecting slightly beyond the wearing-surfaces.

10. The combination with a pneumatic cotton-conveying conduit, of a screen-wheel interposed in the air-channel to remove cotton therefrom, the lateral walls of the channel being provided with apertures adapted to permit a limited volume of the external air to enter, whereby the cotton is prevented from passing into the joints at the sides of the wheel.

11. In apparatus of the class described, the combination with a cylindrical casing, of a screen-wheel closely fitting the interior surface of the outer wall of the casing and provided with peripheral pockets having both sides and bottoms foraminous, a conduit arranged to deliver air and cotton in said pockets, and a conduit for carrying on the air delivered in said pockets.

12. The combination with a rotary wheel provided with peripheral pockets each having an outer foraminous wall, of a conduit in position to deliver cotton in the pockets, successively, as the wheel rotates, a wheel-casing continuous with said conduit and provided with an opening adapted to register momentarily with the foraminous wall of each pocket as the wheel rotates, means for exhausting air through said opening, and means for admitting external air to the lateral space or joint between the wheel and casing.

13. The combination with a wheel-casing having a discharge-opening below, a peripheral inlet-conduit, and two outlet-pipes leading from its sides, respectively, of a wheel fitting the interior of the casing and having peripheral pockets registering, successively, with said conduit as the wheel rotates and all having lateral screened openings each registering with one of the pipes while the corresponding pocket is in registry with said conduit, means for rotating the wheel, means for creating a suction-current through the conduit, wheel and pipes, and means for putting the spaces at the lateral faces of the wheel in communication with the external air.

14. In a separator-wheel having peripheral pockets and a foraminous lateral wall, a foraminous bottom located in each pocket in position to have air drawn through the foraminous wall from the spaces above and below said bottom.

15. The combination with the wheel-shaft, of the grooved disks fixed thereon, the partitions in the grooves, the screen fixed to the edges of the partitions, the disk and ring covering, respectively, the central and outer portions of the screens, and the foraminous pocket-bottoms connecting the uncovered portions of the screens.

16. The combination with the conduit-sections, of the casing-boards connecting the side walls of the conduits and forming the upper portion of the lateral walls of a wheel-casing, boards in the same planes, respectively, forming the side walls of the lower part of the same casing, curved casing-sheets fixed to the margins of the upper and lower portions, respectively, of said boards to complete a cylindrical wheel-casing, and cleats detachably connecting the upper and lower parts of said casing.

17. The combination with an exhaust-fan, of a cotton-conveying conduit leading thereto and having its side walls widened in their own planes to form the side walls of a cylindrical casing, concave blocks fixed to the inner faces of the side walls to continue across the conduit the circular curve of the margins of the side walls, a curved member fixed to the curved margins and curved blocks and cutting off the conduit on that side of the casing nearest the fan, pipes leading laterally from the casing around the cut-off and opening again into the conduit, a screen-wheel closely fitting the interior of the casing and having peripheral pockets with foraminous sides and in position to receive cotton entering the casing upon the side most distant from the fan, and means for rotating the fan.

18. In apparatus of the class described, the screen-wheel casing consisting of conduit side walls centrally widened and having the convex edges of the widened portions curved approximately to the radius of the wheel, blocks fixed to the inner faces of the side walls, respectively, and having concave edges curved to the same radius and connecting the upper and lower parts of said convex edges, and a cylindrically-curved member secured to said convex and concave edges to form an internally-unobstructed cylindrical surface closely fitting around the wheel.

19. The combination with a rotary screen-wheel having peripheral pockets, of a casing closely fitting and inclosing said wheel, a fan, a conduit leading to the fan from a point without said casing, a conduit opening into the casing to deliver air and cotton thereto, a pipe leading from the side of the casing and opening into the conduit first mentioned, and means for admitting external air to the air-channel near the lateral margin of the wheel upon the side most distant from the fan.

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

WILLIAM E. ELAM.

Witnesses:

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WALLACE GREENE.