

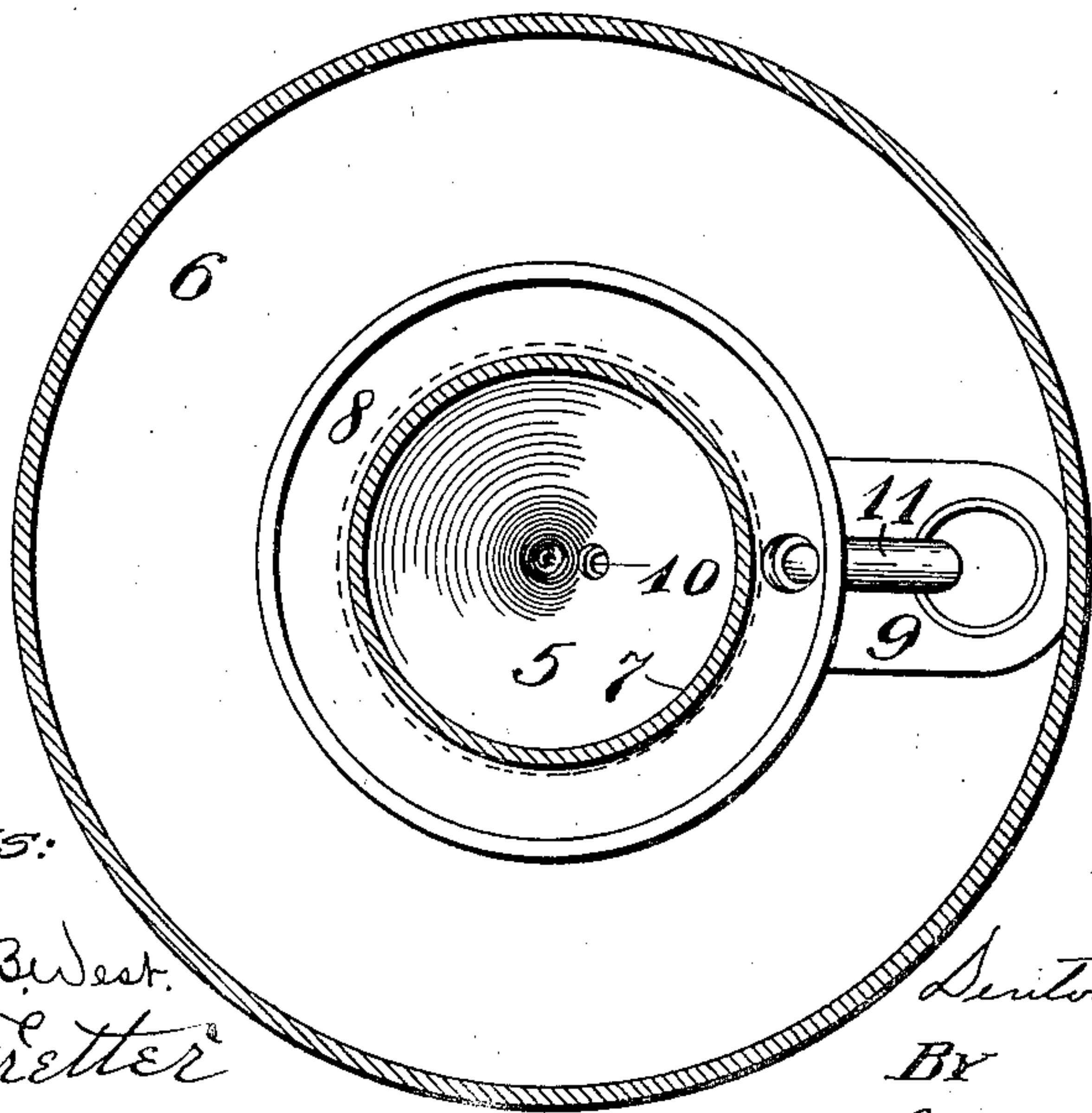
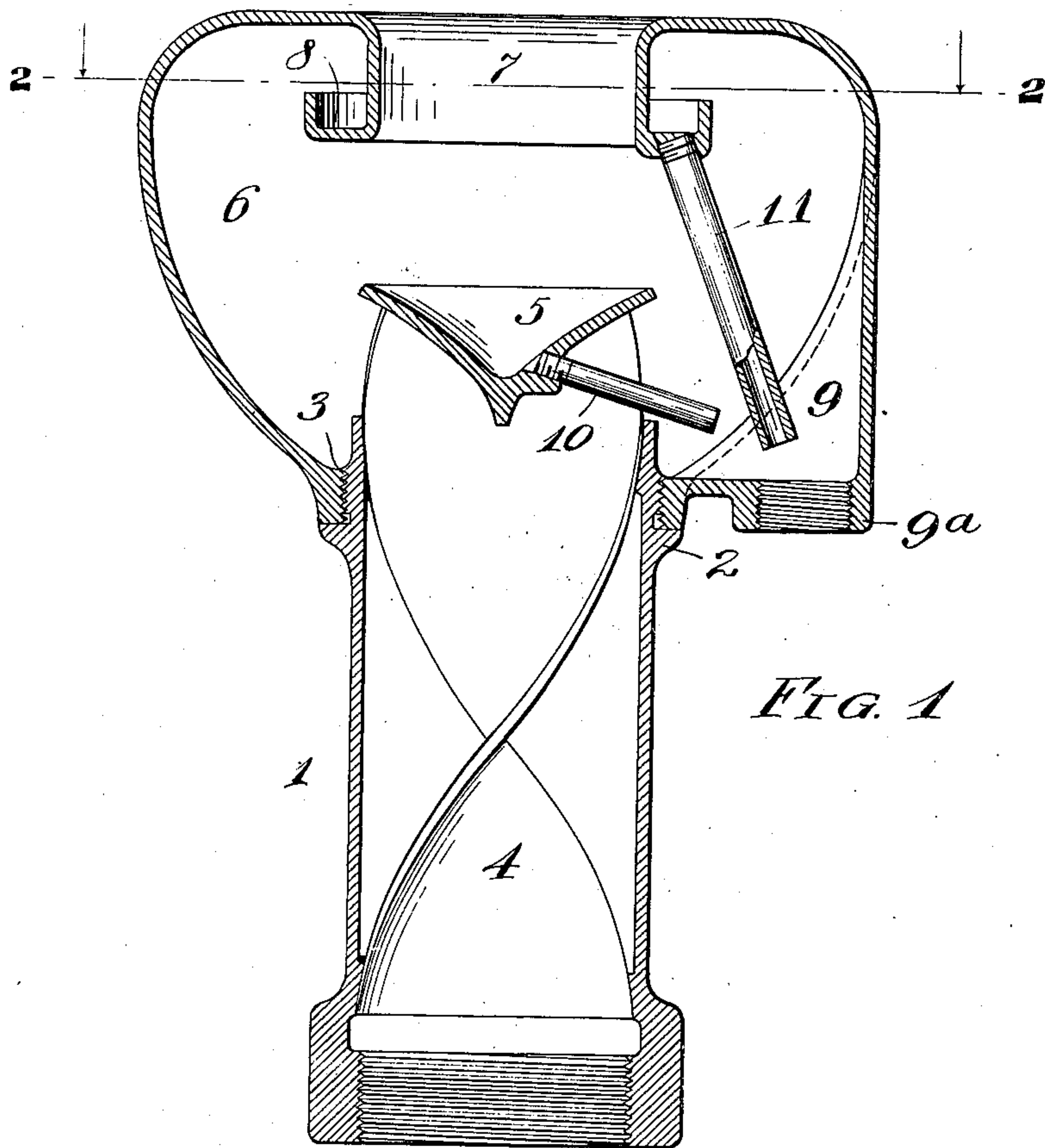
D. K. SWARTWOUT.

SEPARATOR.

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WITNESSES:

Brennan B. West.
Nathan F. Fretter

INVENTOR,

Denton K. Swartwout.

BY

Dates, Fouts & Hull,
ATTYS.

UNITED STATES PATENT OFFICE.

DENTON K. SWARTWOUT, OF CLEVELAND, OHIO.

SEPARATOR.

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To all whom it may concern:

Be it known that I, DENTON K. SWARTWOUT, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Separators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

10 This invention relates to separators, and more particularly to a separator, in the form of an exhaust head, for removing water of condensation from steam.

15 The object of the invention is to provide a construction whereby this result may be secured in such manner as to collect substantially all of the liquid particles that may be present in exhaust steam and prevent their discharge into the atmosphere. I accomplish these results by the construction illustrated in the drawing forming part hereof, wherein—

25 Figure 1 represents a central vertical sectional view taken through a device constructed in accordance with my invention, the drain pipes being shown in elevation, and Fig. 2 represents a transverse sectional view on a corresponding line of Fig. 1.

30 Generally speaking, the invention may be defined as consisting of the combinations of elements embodied in the claims hereto annexed.

35 Describing the parts by reference characters, 1 denotes a cylindrical body, the same comprising a tube having the lower end thereof provided with an internal thread for attachment to the exhaust pipe and having near and below the top thereof a ledge 2, the body being provided with an external thread 3 between said ledge and the upper end thereof.

45 Within the body 1 there is located a plate 4, said plate being twisted to form a spiral of comparatively steep pitch. This spiral extends from near the bottom of the tubular body 1 to a point above the outlet end thereof and supports at its upper end a conical receptacle 5, said receptacle being arranged with the apex in line with the axis of the body 1 and projecting downwardly. The spiral and receptacle 5 may be cast integral with each other and the tubular body 1 then cast around the spiral plate.

55 6 denotes a hollow body or casing which is generally frusto-conical in shape, having its larger base presented upwardly and having

the lower end open and provided with an external thread adapted to be threaded onto the thread 3 at the end of tubular body 1. The upper or exit end of 6 is provided with an outwardly projecting tubular outlet 7 of smaller diameter than the diameter of the body 1 and in axial alinement therewith, and the inner end of 7 is bent outwardly and upwardly to form an outwardly projecting trough 8 within the body 6 and spaced from the top of said body.

At one side and at the bottom or inner end of 6, there is provided a chamber 9 below the bottom thereof having a connection 9^a provided with an internal thread whereinto a pipe may be fitted. From the lower end of conical receptacle 5 there projects a drain tube 10, the outer end of which is within chamber 9 in proximity to the threaded connection 9^a. Trough 8 is provided with a similar drain tube 11, which is threaded into the bottom thereof, the lower end of tube 11 being located above the outlet 9^a.

80 In operation, the fluid (for instance, steam) discharged through tubular body 1, has a whirling motion imparted thereto by means of the spiral plate 4. This causes the heavier particles, as water of condensation, to move outwardly by centrifugal action against the inner wall of 1. The bottom of receptacle 5 serves as a conical deflector to throw outwardly the fluid which impinges thereagainst, and this fluid whirls around within the hollow body 6 and in contact with the walls thereof. Any heavier particles therein, that may be collected on the inner wall of 6 will flow into chamber 9 and thence be discharged through connection 9^a. The heavier particles, or water of condensation, that adhere to the upper wall of 6 will collect within the trough 8 and be discharged through pipe 11 into outlet 9^a, and any such particles or water of condensation that may collect within the receptacle 5, owing to the impingement of the fluid thereupon prior to its escape through 7, will be discharged through pipe 10 into outlet 9^a.

105 It will be observed that receptacle 5 is of greater diameter than outlet 7, thereby insuring that the fluid discharged into body 6 will whirl around into contact with the inner walls thereof prior to its escape through said outlet. Furthermore, any heavier particles, as water of condensation, that may collect

within the outlet 7 will be caught by the open conical deflector 5 and discharged by pipe 10 through the outlet 9^a.

By the construction described, I have provided means whereby the separation of the heavier particles may be accomplished with practically no discharge thereof into the atmosphere through outlet 7. In the case of steam, for which my device is specially adapted, all the particles or water of condensation of any material size are entirely collected within my separator, the escape of such particles into the atmosphere being practically negligible.

The extension of the spiral 4 into the body of the casing 6 and the mounting of the conical deflector 5 thereon enable me to shorten the body 1 without sacrificing any of the efficiency of the apparatus.

While my separating device will probably find its main field of usefulness in connection with steam, the features and principles of construction thereof will be applicable to the removal of heavier articles from other fluids.

I claim:

1. A separating device comprising, in combination, a tubular body, a spiral deflector therein and projecting beyond the outlet end of said body, a casing inclosing the outlet end of said tubular body and having an outlet beyond the said body, and a conical deflector carried by the spiral deflector beyond the outlet end of said body, substantially as specified.

2. In a separating device, the combination of a tubular body, a casing inclosing the outlet end of said body, said casing having an outlet beyond the said body and having a drain outlet, an open hollow conical deflector located beyond the outlet end of the tubular body, and a drain pipe extending from said conical deflector and delivering the contents of said deflector to said drain outlet, substantially as specified.

3. In a separating device, the combination of a tubular body, a casing inclosing the outlet end of said body, said casing having an outlet beyond the said body and having a drain outlet, an open hollow conical deflector located beyond the outlet end of the tubular body, a drain pipe extending from said conical deflector and delivering the contents of the deflector to the drain outlet, and means for imparting a whirling motion to the fluid passing through said tubular body, substantially as specified.

4. In a separating device, the combination of a tubular body, a spiral deflector therein, and a casing inclosing the upper end of said body and provided with a discharge outlet in the lower portion thereof and with a tubular outlet beyond said tubular body, said tubular outlet being provided with a trough, and a drain pipe communicating with said

trough and delivering the contents thereof to said discharge outlet, substantially as specified.

5. In a separating device, the combination of a tubular body, a casing inclosing the upper end of said body and provided with a tubular outlet and with a drain outlet in the lower portion thereof, an outwardly projecting trough carried by the lower end of said tubular outlet, and a drain pipe communicating with said trough and delivering the contents thereof to said drain outlet, substantially as specified.

6. In a separating device, the combination of a tubular body, a casing inclosing the upper end of said body and having an outlet substantially in line therewith and also provided with a drain outlet in the lower portion thereof, a conical deflector interposed between said body and the former outlet, and extending beyond the edges of said former outlet with the apex directed downwardly, said deflector being hollow to form a receptacle, and a drain pipe communicating with the interior of said receptacle and adapted to discharge the contents thereof into said drain outlet, substantially as specified.

7. In a separating device, the combination of a tubular body, a casing inclosing the upper end thereof and provided with an inwardly projecting tubular outlet beyond said body, said tubular outlet being provided at the lower end thereof with an outwardly projecting trough, said casing being provided with a discharge outlet at the lower portion thereof, a pipe communicating with said trough and adapted to deliver the contents thereof to said discharge outlet, and a conical receptacle interposed between said body and said outlet and provided with a drain pipe adapted to deliver the contents thereof to said discharge outlet, substantially as specified.

8. In a separating device, the combination of a tubular body, a casing inclosing the upper end thereof and provided with an inwardly projecting tubular outlet beyond said body, said tubular outlet being provided with an outwardly projecting trough, said casing being provided with a discharge outlet at the lower portion thereof, a pipe communicating with said trough and adapted to deliver the contents thereof to said discharge outlet, a conical receptacle interposed between said body and said outlet and provided with a drain pipe adapted to deliver the contents thereof to said discharge outlet, and means for imparting a whirling motion to the fluid passing through said tubular body, substantially as specified.

9. In a separating device, the combination of a tubular body having therein a spiral deflector, a casing inclosing the upper end of said body and having in the lower surface thereof a drain opening, and having an in-

wardly projecting tubular outlet beyond said body, an outwardly projecting trough at the lower end of said tubular outlet, and a pipe communicating with said trough and adapted to discharge into said casing adjacent to the outlet in the lower portion thereof, substantially as specified.

10. In a separating device, the combination of a tubular body, a spiral deflector therein, a casing inclosing the upper end of said body and having a tubular outlet beyond said body and a drain outlet, an outwardly projecting trough carried by the lower end of said tubular outlet, a hollow conical deflector interposed between said tubular body and said tubular outlet, and drain pipes communicating with said trough and the interior of said conical receptacle and adapted to deliver the contents thereof to said drain outlet, substantially as specified.

11. In a separating device, the combination of a tubular body, a spiral deflector therein and projecting beyond the upper end thereof, a casing applied to the upper end of said body and having a tubular outlet beyond said body and a drain outlet, an outwardly projecting trough carried by the lower end of said tubular outlet, a hollow conical deflector of greater diameter than the tubular outlet and carried by the upper end of said spiral deflector, and drain pipes communicating with said trough and the interior of said conical receptacle and adapted to deliver the contents thereof to said drain outlet, substantially as specified.

12. In a separating device, the combination of a tubular body, a casing inclosing the upper end of said body and provided with a discharge outlet in the lower portion thereof and with a tubular outlet beyond said tubular body, said tubular outlet being provided with an outwardly projecting trough, a drain pipe communicating with said trough and delivering the contents thereof to said discharge outlet, and means for imparting a whirling motion to a fluid supplied through said tubular body, substantially as specified.

13. A separating device comprising in combination a body portion, a casing inclosing the outlet of said body portion, said casing having an opening beyond said portion and a drain outlet, a hollow deflector located between the outlet of said body portion and said opening and projecting beyond the edges of said opening, and a drain pipe

extending from said deflector so as to deliver the contents of the deflector to the drain outlet.

14. A separating device comprising in combination a body portion, a casing inclosing the upper end of said body portion, said casing having an outlet opening beyond the said body portion and a drain outlet, a hollow deflector located beyond the outlet end of said body portion and projecting beyond the edges of said opening, a drain pipe extending from the said deflector so as to deliver the contents of the deflector to the drain outlet, and means for imparting a whirling motion to the fluid passing through the tubular body, substantially as specified.

15. In a separating device, the combination of a tubular body, a spiral deflector therein, a casing surrounding the outlet of said body, an open hollow cone beyond such outlet, and a drain pipe for said cone.

16. In a separating device, the combination of a tubular body, a casing surrounding the outlet end thereof, a spiral deflector within the body and extending beyond it, and a conical deflector carried by such extended portion.

17. In a separating device, the combination of a tubular body, means for causing fluid passing through the body to assume a whirling motion, and a member located adjacent to the exit from said body and having the side toward the body in the form of a cone and the opposite side in the form of a receptacle, there being a drain from such receptacle.

18. The combination of a tubular body, means within the body for causing fluid passing through it to assume a whirling motion, an enlarged casing surrounding the exit end of the body, a conical deflector within the casing supported some distance above the exit of the body, said deflector being open on its upper side and thereby constituting a receptacle, and a drain pipe leading from such receptacle across the upper end of the body and discharging into said casing beyond the body.

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

DENTON K. SWARTWOUT.

Witnesses:

H. MILLER,
J. B. HULL.