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R. C. HAGEMAN & G. C. BRODERSON.

STEAM DRIER.

APPLICATION FILED FEB. 18, 1907.

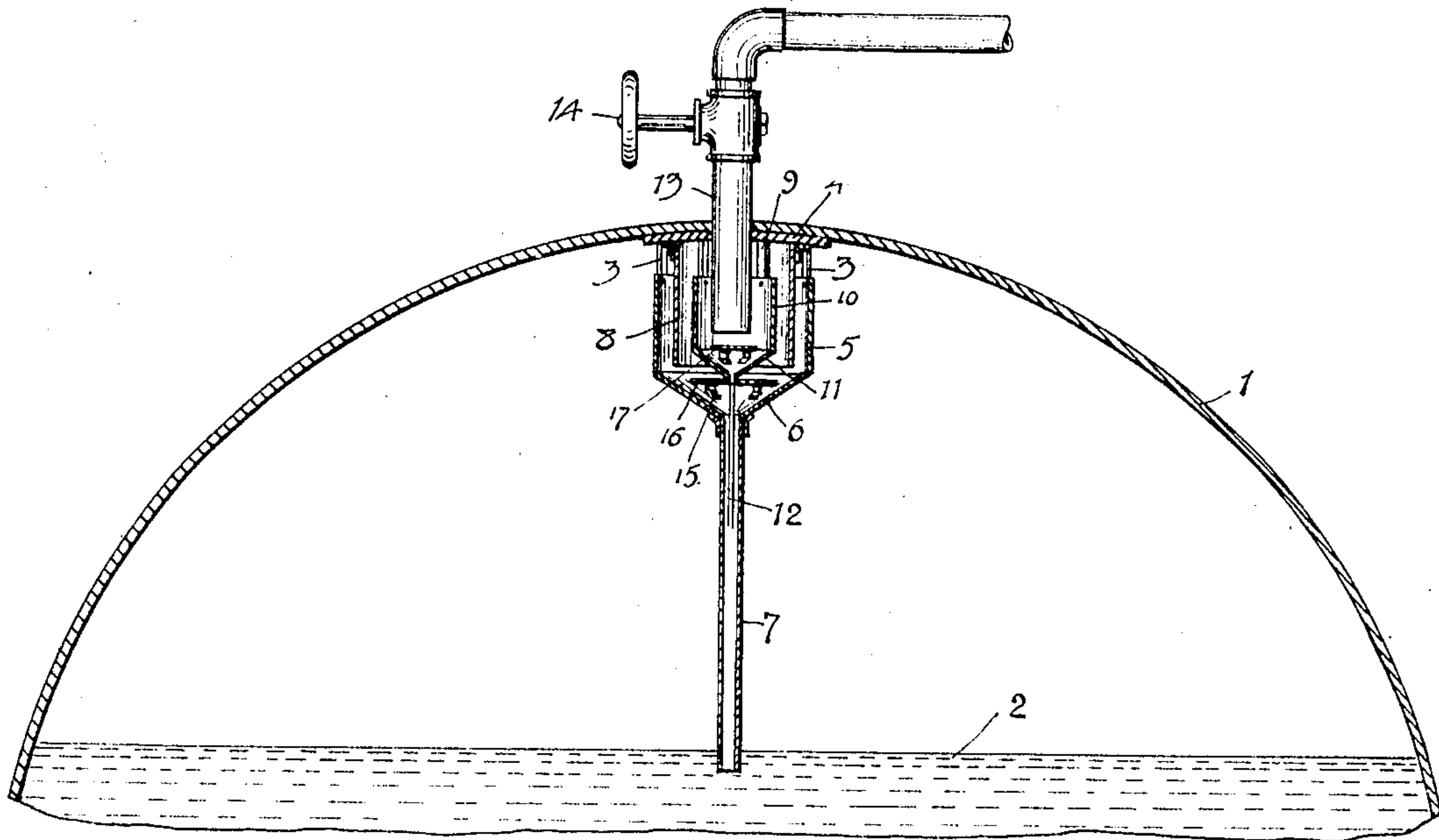


Fig. 1

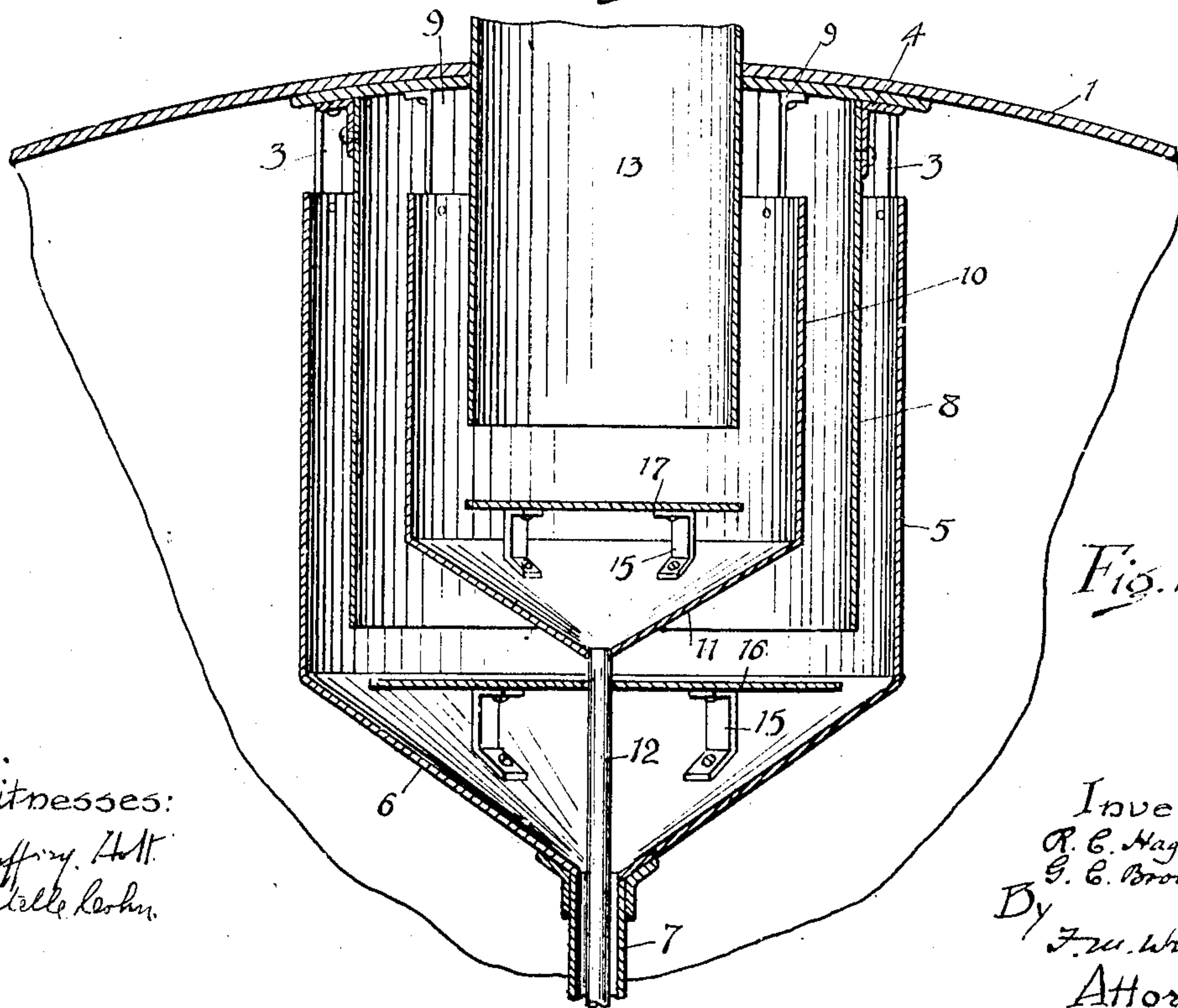


Fig. 2

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# UNITED STATES PATENT OFFICE.

ROBERT C. HAGEMAN AND GEORGE C. BRODERSON, OF SAN FRANCISCO, CALIFORNIA

## STEAM-DRIER.

No. 876,347.

Specification of Letters Patent.

Patented Jan. 14, 1908.

Application filed February 18, 1907. Serial No. 357,847

*To all whom it may concern:*

Be it known that we, ROBERT C. HAGEMAN and GEORGE C. BRODERSON, citizens of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Steam-Driers, of which the following is a specification.

The object of the present invention is to provide an apparatus for use with steam boilers, which will separate the moisture from the steam and permit only dry steam to escape from the boiler.

In the accompanying drawing, Figure 1 is a sectional view of the upper portion of a boiler equipped with our improved steam drier, Fig. 2 is an enlarged vertical section of the drier.

In this invention advantage is taken of the greater momentum possessed by the moist particles carried by the steam than that of the dry steam, to separate the moisture from the steam, and this is accomplished by the following construction.

1 indicates the shell of a steam boiler, in which the line marked 2 represents the water line. Depending by means of hangers 3 secured to a reinforced plate 4 in the top of said shell is a cylindrical wall 5, to the lower edge of which is secured a conical or funnel-shaped receiver 6, connected at the bottom to a drain tube 7, which descends to the water level. Secured to said reinforcing plate 4 and depending therefrom within the wall 5 is a cylindrical wall 8, the lower edge of which is free, and considerably below the upper edge of the wall 5. Depending from hangers 9 secured to the reinforcing plate 4 is a third cylindrical wall 10 within the wall 8, and to the lower edge of said wall 10 is attached a conical or funnel-shaped receiver 11 converging to a drain tube 12 extending down within the tube 7 to the water line of the boiler. Through the reinforcing plate 4 of said shell and centrally within the wall 10 extends a steam pipe 13 leading to a distant point and controlled by a valve 14. Upon the funnels or receivers 6 and 11 are supported, by means of posts 15, baffle plates 16 and 17, the edge of the baffle plate 16 registering vertically with the wall 8, and the edge of the baffle plate 17 registering vertically with the edge of the steam pipe.

It is to be remembered that the steam escaping from a boiler has considerable ve-

locity, and it is in order to take advantage of this fact that the above construction is provided. When the steam has passed over the upper edge of the wall 5, it descends between the walls 5 and 8 with considerable velocity. In order to escape to a region of lower pressure the steam has to make a quick turn around the lower edge of the wall 8. The dry steam, having less momentum than the moist particles, is able to make this turn with comparative ease, but the moist particles, having greater momentum than the dry steam, are carried downwards into the space beneath the baffle plate 16, and into the annular space between the tubes 7 and 12. The dry steam which has escaped upwards past the lower edge of the wall 8 now passes over the upper edge of the wall 10 and down between said wall and the steam pipe, and the operation of wringing the moisture from the steam by means of its greater momentum is now repeated.

Inasmuch as the operation of this invention is dependent upon the velocity of the steam, it is important that this velocity should be properly regulated at the several points in the path of the steam. It is desirable that the velocity in its upward path after turning the lower edge of either the wall 8 or the steam pipe 13 should be not greater than the velocity before turning said edge, otherwise there would be a tendency to carry moisture with the steam and the object of the invention would be defeated. For this purpose the cross sectional area of the annular space between the walls 8 and 10 is not less than that between the walls 5 and 8, and in the same manner the cross sectional area of the steam pipe is not less than that of the annular space between the wall 10 and the steam pipe.

When this apparatus is in operation there will always be a sufficient quantity of water in the tubes 5 and 8 to provide a downward pressure in said tubes and prevent any upward passage of the water in the boiler through said tubes in the separator. But should there be any such passage, said water will be thrown back by striking the under surface of the baffle plates.

I claim:—

In a steam drier, in combination with a boiler shell, and a steam pipe extending upward therefrom, a wall around said pipe, its upper edge extending above the lower edge of the steam pipe, but open at the top to per-



mit the steam to pass thereover to said pipe,  
 a funnel-shaped receiver connected to the  
 lower edge of said wall and having a drain  
 tube extending downwards therefrom toward  
 5 the water line of the boiler, a baffle plate sup-  
 ported above the upper end of said tube, and  
 beneath the steam pipe, a second wall ex-  
 tending around the first wall closed at the top  
 to prevent the passage of steam thereover, a  
 10 third wall supported around the second wall,  
 open at the top to permit the passage of  
 steam thereover to the lower part of the sec-  
 ond wall, a funnel-shaped receiver connected  
 to the lower edge of the third wall, a tube  
 15 leading therefrom down toward the water  
 line of the boiler, and a baffle plate supported

between the upper end of said tube and the  
 lower portion of the second wall, the cross-  
 sectional areas of the steam pipe being not  
 less than that of the annular space between 20  
 said pipe into the first wall, and the cross-  
 sectional area of the annular space between  
 the first and second walls being not less than  
 that between the second and third walls.

In testimony whereof we have hereunto 25  
 set our hands in the presence of two sub-  
 scribing witnesses:

ROBERT C. HAGEMAN.  
 GEORGE C. BRODERSON.

Witnesses:

FRANCIS M. WRIGHT,  
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