No. 689,682. Patented Dec. 24, 1901.

S. G. MERRICK.

SMOKE OR VAPOR CONDENSER.

(Application filed Feb. 17, 1898. Renewed May 31, 1901.)

(No Model.)

Fig. 1.

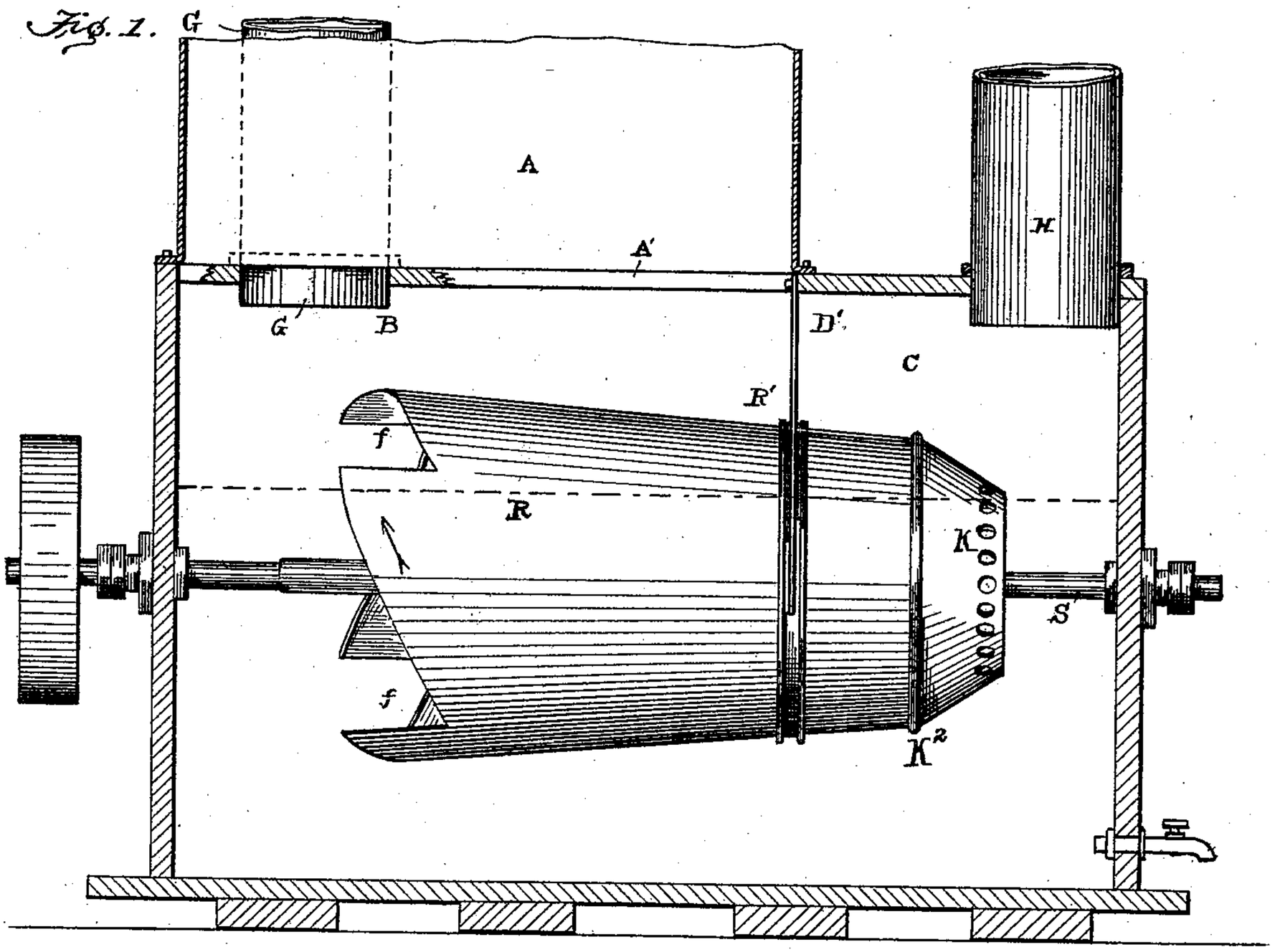


Fig. 2.

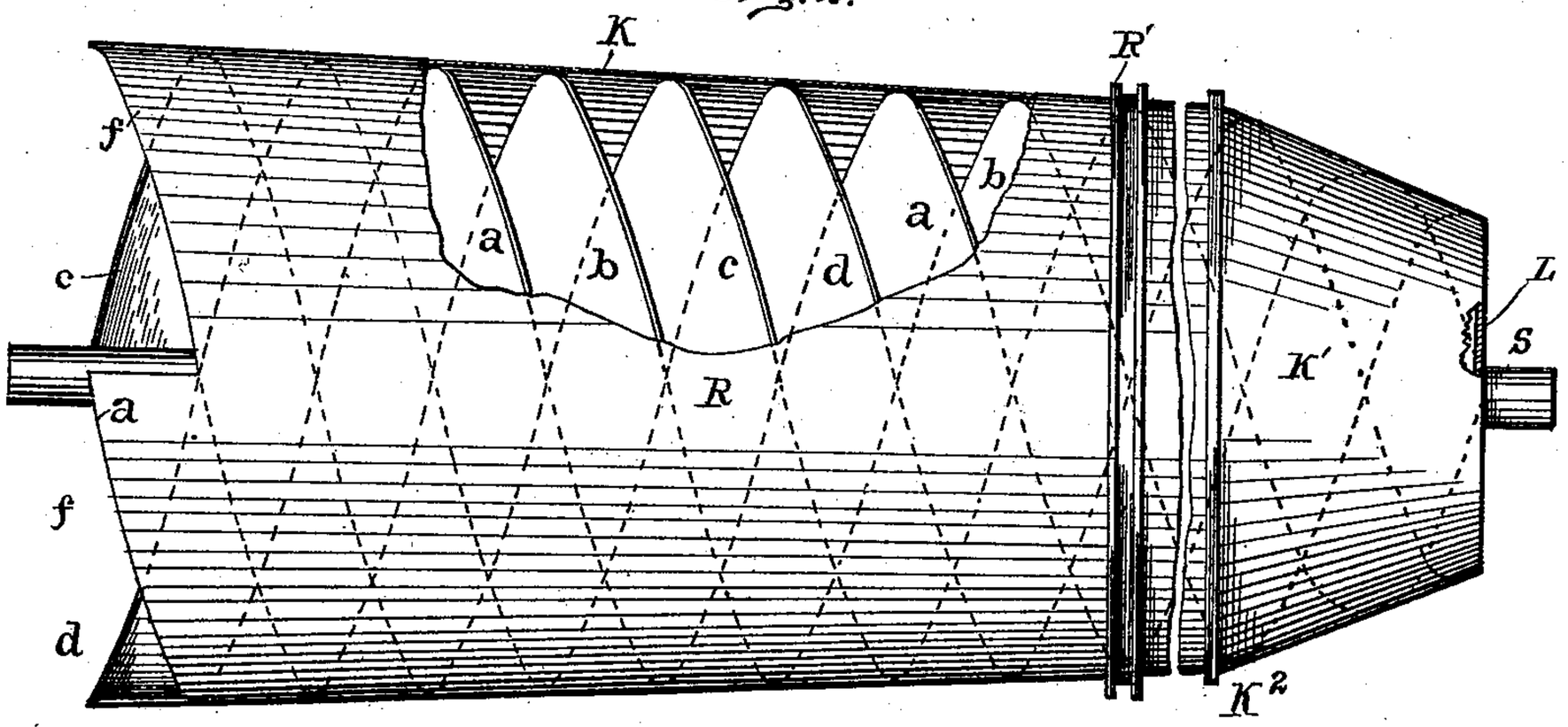
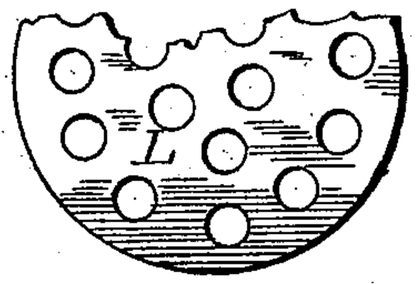


Fig. 3.



WITNESSES
Chas. K. Davies.
R. H. Payne.

INVENTOR.
S. G. Merrick
By W. A. Bartlett.
Attorney

UNITED STATES PATENT OFFICE.

SAMUEL G. MERRICK, OF PHILADELPHIA, PENNSYLVANIA.

SMOKE OR VAPOR CONDENSER.

SPECIFICATION forming part of Letters Patent No. 689,682, dated December 24, 1901.

Application filed February 17, 1898. Renewed May 31, 1901. Serial No. 62,636. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL G. MERRICK, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Smoke or Vapor Condensers, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a machine for condensing smoke, vapors, and gases.

The object of the invention is to improve condensing apparatus of the character referred to, and especially such as are shown in my Patent No. 552,133, of December 31, 1895.

Figure 1 is a longitudinal section, nearly central, showing the arrangement of parts of my smoke and vapor condensing apparatus, the partition D′ and case R being shown in elevation. Fig. 2 is a broken side elevation of the conveyer and its shaft. Fig. 3 is a detail of the nozzle-plate.

A indicates the smoke and vapor receiving chamber. This chamber may be a box, tank, cylinder, or room and is a receptacle of a size proportioned to the work to be performed and the vapors or gases to be condensed. The smoke or vapor may be conducted to this chamber A by pipe G, which connects with a smoke-stack, retort, or other place where fumes arise. The chamber A is preferably provided to serve as a storage-place for smoke or gases; but under some circumstances this is unnecessary, and the pipe G may lead directly to chamber B, in which the intake of the conveyer runs, or the partition A′ may be omitted and the two chambers A B thrown into one. The chamber B is the intake or compressing chamber. By preference this chamber B and delivery-chamber C are both contained in a rectangular box, the walls of the box forming the walls of both chambers, save where the parts are separated by a partition D.

The box containing chambers B and C may be of wood, lined with zinc or other material, or the box may be composed of metal or other material, and the end walls of the box support the bearings for the shaft S of the conveyer R. The shaft S is provided with suitable driving means and may be like that of my patent referred to. The conveyer R has a frusto-conical casing K, near the smaller end of which there are external rings R′. The partitions and sometimes the casing of the conveyer can best be made of sheet-copper and mounted on a steel axle, so far as I am able to determine.

The casing K is supported from the shaft S by spirally-coiled ribbons *a b c d*, the inner edge of each of these ribbons being secured to shaft S and the outer edge to the interior of the casing, attachment being made by rivets, by solder, or in other suitable manner. The ribbons *a b c d* (two or more in number) form spiral passages inside the casing and extend from end to end of the casing. The receiving end of the casing is cut or notched, so that the end sections *f f* follow the general lines of the coiled ribbons *a b c d*, &c.

The partition D extends from side to side of the chambers B C and from the top wall of said chambers to the top of casing K, where it rests between the rings R′, and packing may be interposed to make a tight joint, but not so as to prevent the rotation of casing K.

The small or nozzle end of the frusto-conical casing K has a funnel or drawn-in portion K′. The parts are or may be connected by a thimble or seam K^2, and the small end of the conveyer may be covered by a perforated plate L to further break up the currents, or the nozzle K′ may be perforated as well as the plate. (See Fig. 1.) These small openings in the nozzle will distribute and deflect the gases and tend to condense them.

H indicates the discharge or outlet pipe from delivery-chamber C and may lead to a chimney or other escape-passage.

The general operation of the device is similar to that of my patent referred to; but the present construction has several important advantages. The chambers B C are filled with water or other liquid above the shaft and the lower edge of partition D, and preferably about as high as the open end of funnel K′. The shaft S and the conveyer thereon are rotated in the direction of the arrow in Fig. 1. The intake-openings formed by the junction of the notched ends of the casing with the coiled-ribbon partitions in the casing or conveyer cause the mouths to act something like spiral cutters and cut or draw in from the contents of the chamber B alternate portions of smoke or gas as the mouth is above

water and of water as the mouth is below water, and each of these mouths or openings following acts in a similar manner. The spirally-curved ribbons *a b c d* pass the gas or vapor rapidly along, following the serpentine passages between these ribbons or partitions inside the casing. The greater weight of the water or liquid keeps it from rising to the top of the inside of the casing unless a very high rotary velocity is given to the conveyer; but there is all the time a tendency of the liquid to seek the periphery of the conveyer, due to centrifugal action, and the spiral passages produce a rapid flow and a vertical movement of the gas or smoke and to some extent also of the liquid. As the tapered form of the casing causes the passages to grow smaller toward the delivery end, the liquid being incompressible under any pressure induced in the machine fills more and more of the passages, thus compressing the smoke or gas more and more, and also exposing it to the absorbent action of the liquid, and also, if high speed is maintained, to a spraying or foaming action of the liquid, and when the liquid and uncondensed gas or air escape from the funnel K′ into the chamber C it will be found that the smoke has been entirely condensed and that acid, alkaline, or oleaginous vapors have been absorbed by the water or liquid and may be recovered by distillation or in other manner. The rotation of the conveyer described produces a very strong suction, and there is generally no blower or exhaust-fan needed with this device, the conveyer itself serving to exhaust air or gases from any place with which it may be connected. The liquid conveyed to chamber C flows back by gravity to chamber B; but a speed may be maintained which raises the level of the liquid in chamber C. The peculiar form of the passages between the partitions *a b c d* in the conveyer tends to break the liquid into spray more than is the case where a pipe is used.

The peculiar form of the mouths of the passages causes the conveyer to suck in both gases and water without shock, and the operation of the device is remarkably regular and free from shock or jar.

What I claim is—

1. In a smoke-condensing apparatus, the intake and delivery chambers, and the conveyer having its outer casing in the form of the frustum of a cone, said conveyer having spiral passages from end to end, said conveyer having its ends respectively in the intake and delivery chambers, means for supporting said conveyer, and means for rotating the conveyer, all combined substantially as described.

2. In a smoke-condensing apparatus, an intake and a delivery chamber separated by a partition, a conveyer consisting of a rotating shaft having its opposite ends extending into said chambers and having a frusto-conical casing with a plurality of spirally-coiled partitions within the same and extending from the shaft to the casing, said partition extending against said frusto-conical casing, all combined substantially as described.

3. In a smoke-condensing apparatus, the intake and delivery chambers separated by a partition, the frusto-conical rotating conveyer having its large end in the intake-chamber and its small end in the delivery-chamber, said conveyer having spirally-arranged partitions extending from end to end, the casing being notched at the intake end to follow the spirals of the partitions, all combined substantially as described.

4. In a smoke-condensing apparatus, the intake and delivery chambers having a partition between, a rotating conveyer having its ends in said chambers and having spiral passages from end to end, means for rotating said conveyer, and a funnel or drawn-in portion of the casing at the delivery end, entirely within the delivery-chamber, all combined substantially as described.

5. In a smoke-condensing apparatus, the intake and delivery chambers separated by a partition, the rotating conveyer having opposite ends in said chambers, and having spiral passages from end to end, a funnel or drawn-in portion of said conveyer at the delivery end and entirely within the delivery-chamber, and a perforated end plate at the small end of said nozzle, all combined substantially as described.

6. In a smoke and vapor condenser, the casing having intake and delivery chambers separated by a partition, a frusto-conical conveyer having its large end in the intake-chamber and its small end in the delivery-chamber, said conveyer supported on a rotating shaft and having notches in its intake end and spiral partitions extending to the delivery end, said delivery end having an indrawn funnel, and a perforated flat plate at the termination of said funnel, all combined substantially as described.

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

SAMUEL G. MERRICK.

Witnesses:

WM. B. BUCK,

C. J. KEGEL.