

(No Model.)

R. H. DOUD.

PROCESS OF AND APPARATUS FOR DESTROYING NOXIOUS GASES.

No. 528,718.

Patented Nov. 6, 1894.

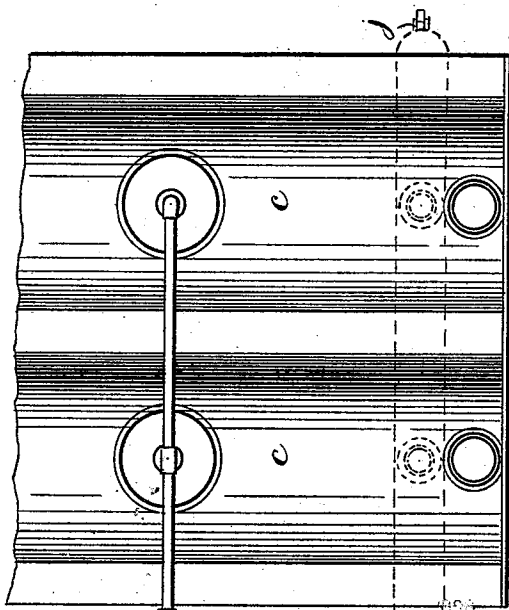


Fig. 1.

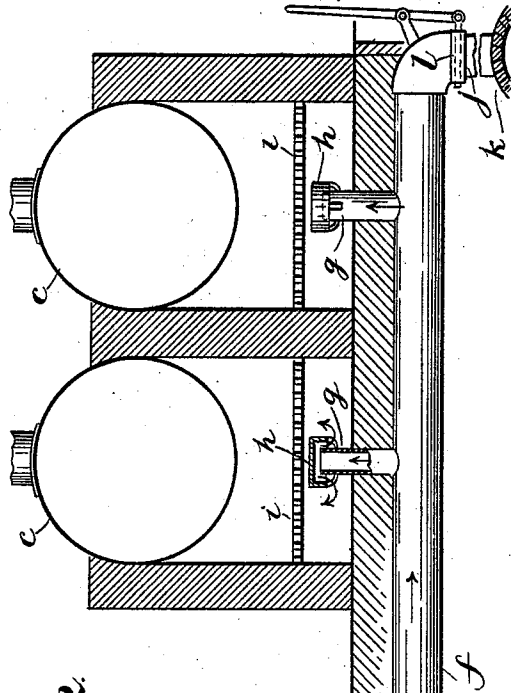
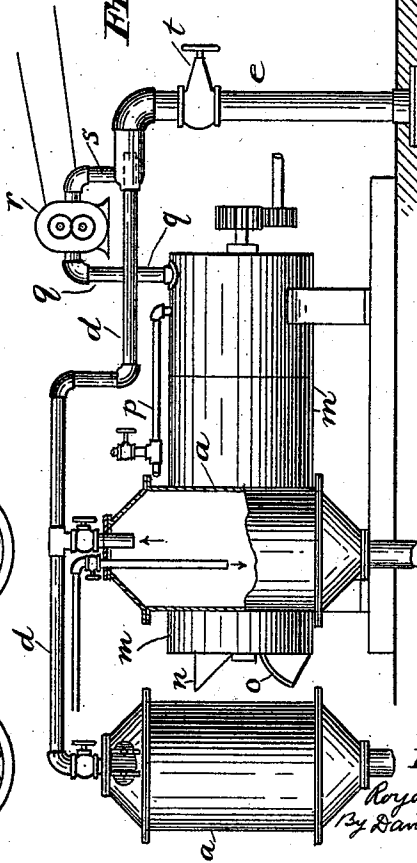
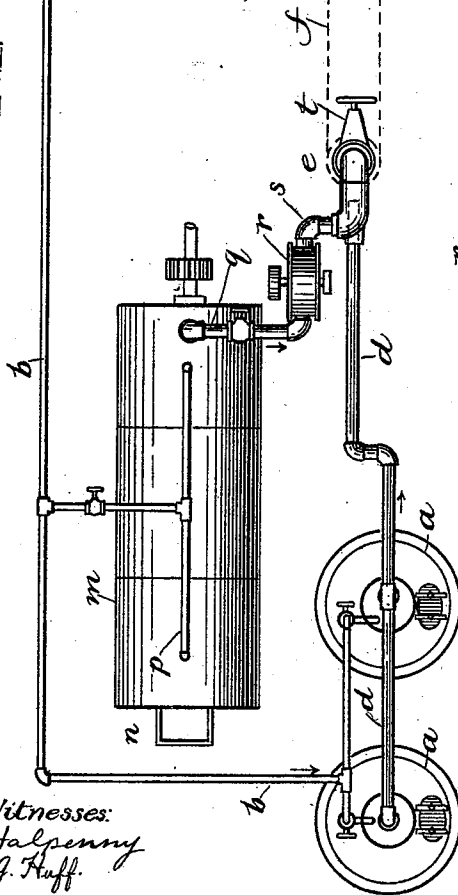


Fig. 2.



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UNITED STATES PATENT OFFICE.

ROYAL H. DOUD, OF CHICAGO, ILLINOIS.

PROCESS OF AND APPARATUS FOR DESTROYING NOXIOUS GASES.

SPECIFICATION forming part of Letters Patent No. 528,718, dated November 6, 1894.

Application filed February 26, 1894. Serial No. 501,617. (No model.)

To all whom it may concern:

Be it known that I, ROYAL H. DOUD, of Chicago, in the county of Cook and State of Illinois, have invented a new, useful, and Improved Method of and Apparatus for Utilizing and Destroying Vapors and Gases from Rendering-Tanks and Driers and Similar Places, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in which corresponding letters of reference in the two figures indicate like parts.

The object of this invention is to utilize and destroy the noxious vapors and gases generated in the tanks, driers and apartments of rendering, fertilizing and other similar establishments.

With this object in view the invention consists substantially in the method and apparatus hereinafter more particularly described, as shown in the accompanying drawings and finally pointed out in the appended claims.

Reference is had to the accompanying sheet of drawings and to the various views and reference signs appearing thereon, and wherein—

Figure 1 is a plain view of an apparatus embodying my invention. Fig. 2 is a view in front elevation of the construction shown in Fig. 1, a portion being in vertical section in order to more clearly illustrate the construction and operation.

In meat drying, fertilizing, rendering and similar establishments the disposition of the offensive and exceedingly noxious gases and vapors given off during certain stages of the operation thereof has become a most important question. Efforts have been made heretofore to destroy or deodorize these gases, and it has been endeavored to destroy them by forcing them into the furnace employed for running the establishment. These efforts have resulted in very little practical utility by reason of the fact that the offensive gases or vapors are not generated or given off at a constant rate. As is well known by persons skilled in the art a large volume of gases and vapors are given off during the first stages of the drying or rendering operations, but gradually decreases as the operation progresses. So large a volume of noxious gases and vapors are generated at the beginning of the drying

or rendering processes that the apparatus heretofore devised for consuming or deodorizing them have been wholly inadequate to the duty required of them. This fatal defect is especially present in those cases where it has been essayed to subject the generated vapors and gases to the action of the fires of the furnace employed to run the drying or rendering establishments. From an economical point of view it is a consideration of material importance to depend on the same furnace fire to run the establishment and to consume the gases and vapors generated and thus avoid the necessity and expense of separate gas or vapor consumption furnaces. With these considerations in view it becomes of the highest importance to provide an apparatus wherein the vapors or gases are fed to the furnace at a constant gentle rate of flow, notwithstanding the variations in the rate at which they are generated. I have found that by conducting the noxious gases and vapors when generated to a suitable chamber wherein they are cooled and allowed to expand, and thence conducting them to the furnace wherein they are to be subjected to the action of the furnace fire, I produce an apparatus that is absolutely effective in accomplishing a complete combustion and deodorization of the offensive gases. I have also found that by conducting the gases at a uniform rate from the expansion chamber to a point underneath the grate of the furnace, the gases percolate or filter through the bed of the furnace fire and into the fire space above the bed of fuel in the fire chamber and hence are completely consumed and deodorized.

I have shown in the accompanying drawings an apparatus embodying my invention, wherein reference signs *a, a*, represent two rendering tanks. Through a suitably arranged system of pipes, *b, b*, steam from boilers *c, c*, is injected into said tanks, as indicated by arrows in the right-hand tank shown in Fig. 2. The noxious and offensive gases and vapors generated in the tanks or compartments *a, a*, are conducted therefrom through suitably arranged pipes *d, d, e* and delivered to a suitable chamber *f*. In the form shown in the drawings this chamber comprises piping and is preferably located beneath the surface of the ground a sufficient depth to insure

the cooling of the gases contained therein, thus, not only economizing space, but also avoiding any specially arranged and expensive apparatus for cooling the gases. By this arrangement the moisture contained in the gases is condensed in a most economical manner, and the gases are delivered therefrom into the furnaces in a thoroughly dried condition. The chamber *f* is of sufficient size to permit the expansion of the gases before they are fed into the furnace fire. This is absolutely necessary in order to reduce the tension of the gases due to the rapidity of their generation, and hence, in order to reduce the speed of flow into the furnace, to the end that the said gases may be fed at a gentle uniform rate by the natural draft of the furnace into and through the bed of furnace fire. This, I consider a vital feature of my invention. The failure of apparatus heretofore constructed to make provision for the expansion of the gases before being fed into the furnace is the direct cause, as I have demonstrated in actual practice, of their failure to produce satisfactory results.

Suitable connections, *g*, are made between the chamber *f*, and the furnaces at a point beneath the fire grate. This is an important feature of construction and arrangement, which, in connection with the feature of expanding the gases materially contributes to the production of a thoroughly efficient apparatus for successfully and completely accomplishing the purpose in view, namely, the complete combustion and deodorization of the noxious gases, for, thereby the gases are percolated gently, uniformly and at the natural draft through the bed of fuel, and, being thoroughly dried by the condensation due to the cooling, a complete combustion and deodorization thereof is effected. Connections *g*, are shown in the form of pipes and in order to effect a spreading of the gases at the delivery end of said connections, and to prevent cinders, ashes, &c., from falling into the mouth of such connections, I provide the same with deflecting hoods *h*. Suitable provision is made for drawing off the condensed matter from chamber *f*, through connection *j*, opening into a convenient sewer as *K*. A valve device *l*, for regulating the flow thereof may be provided. If desired, said valve may be dispensed with.

It will be observed from the construction and arrangement described that the enlarged chamber *f*, serves both as an expansion chamber and also as a condensing chamber for condensing the moisture contained in the vapors or gases. This is an important feature, for a more thorough condensation is possible when the condensing step is simultaneous with the expansion, and hence, the vapors are in better condition to be thoroughly consumed when fed into the furnace.

As one or more driers are ordinarily used in connection with rendering tanks, I have indicated in the drawings the manner of such

use, wherein a drier *m*, of any suitable construction is represented, provided with suitable doors, *n*, *o*, through which the material to be dried is fed to and from the drier in any well known way. The drier chamber may be incased in a hollow steam jacket, adapted to receive steam from the boilers *c*, *c*, through suitably arranged pipes *b*, *b*. The noxious gases and vapors generated in the drier chamber are conducted therefrom through pipes *q*, *s*, and *e*, to the chamber *f*. If desired, a fan or blower *e*, may be provided to assist in the exhaustion of the noxious vapors and gases from the drier chamber to the said chamber. If desired, pipe *e* leading to the expansion chamber may be of a larger internal diameter than the pipes conducting the vapors or gases thereto, whereby a slight expansion of gases takes place before they reach the expansion chamber proper.

I have shown a valve *t* arranged in pipe *e*, in order to regulate the flow of gases and vapors, but it is obvious as above indicated that said valve may be arranged in pipes *g*.

It will be observed from the above description that the noxious vapors and gases generated in the drying chambers and rendering tanks or compartments are conducted into a suitable chamber where they are cooled and permitted to expand and whence they are drawn off according to the capacity of the furnaces to which they are conducted. By reason of the expansion of the vapors the pressure thereof is reduced and hence may be gently drawn off at a uniform rate and slowly percolated or filtered through the bed of the furnace fire and thoroughly and completely consumed. It is thus immaterial in what quantities the gases or vapors are generated, or what may be the variation of the rate in which they are generated, as they are first expanded and then drawn off according to the capacity of the furnace fires; whereas, if they were conducted directly to the furnace fire without such preliminary expansion not only is the furnace fire taxed, at times, beyond its capacity to consume the gases, but the efficiency of the fire is seriously interfered with the result in either case being a failure to effect a complete combustion of the offensive odors.

After numerous experiments and comparative tests with heretofore known devices for effecting a combustion or deodorization of these offensive gases, and at a considerable expense, I have discovered the absolute efficiency of the apparatus herein described, wherein the gases are conveyed from the compartments or tanks wherein they are generated into an expansion chamber and thence into a furnace at a point beneath the grate at such a gentle rate of flow as to be drawn through the bed of fuel by the natural draft of the furnace, and wherein they are spread over a wide area of heating surface. By this arrangement I have demonstrated that the most noxious and offensive odors generated

in packing houses, drying, rendering or similar establishments are not only completely destroyed, but, containing as they do a considerable percentage of carbon, greatly aid in producing a more perfect combustion of the fuel employed in heating the furnace, while not, at the same time, increasing the amount of coal required as a fuel because a forced draft is avoided and hence, aside from the effectiveness of my method in completely eliminating the foul odors, the use thereof results, as I have demonstrated in actual and extensive practice, in greater economy in the operation of the entire plant.

It is obvious that my improved method is equally applicable and efficacious in the treatment or drying of garbage and all other offensive matter, and that many modifications may be made in the details of construction of apparatus for carrying out the principles of my invention without departing from the spirit or scope thereof. I do not desire to be limited, therefore, to the exact details shown and described; but,

Having now fully explained the principles of my invention and a form of apparatus embodying the same, what I claim as new, and desire to secure my Letters Patent of the United States, is—

1. The method as substantially herein described of utilizing and destroying offensive vapors generated in tanks and driers, and apartments of rendering, fertilizing, and similar establishments, which consists in first conducting said vapors into an enlarged chamber, next, exteriorly maintaining said chamber at a low temperature, thereby permitting said vapors to expand, and, simultaneously with such expansion, cooling the same; next, opening communication between said chamber and a furnace at a point beneath the fire grate, whereby the vapors cooled and expanded are drawn into the furnace by the

natural draft thereof, and, finally, spreading said vapors, whereby they are slowly percolated through the bed of fuel, and hence, completely consumed and deodorized; as and for the purpose set forth.

2. The combination with a tank, drier or compartment in which are generated offensive vapors, a furnace, an enlarged cooling chamber arranged adjacent thereto, means for delivering to said chamber the vapors when generated, whereby said vapors are cooled and simultaneously therewith are permitted to expand, thereby thoroughly condensing the moisture contained therein, pipe connections between said chamber and furnace, delivering into the latter at a point beneath the fire grate thereof, and a hood arranged over the delivery end of said pipe connections, whereby the vapors are spread before being drawn into and through the fire; as and for the purpose set forth.

3. The combination with a tank, drier or compartment in which are generated offensive vapors, a series of furnaces, an enlarged chamber arranged beneath the surface of the earth adjacent to said furnaces, whereby said chamber is maintained at a uniform low temperature, means for delivering thereto the vapors when generated, whereby they are expanded and simultaneously with the expansion the moisture contained therein is condensed, pipes connecting said chamber with each of said furnaces at a point beneath the grate bars and hoods arranged over the delivery end of each of said pipes; as and for the purpose set forth.

In testimony whereof I have signed this specification, in the presence of two subscribing witnesses, this 10th day of February, 1894.

ROYAL H. DOUD.

Witnesses:

D. H. FLETCHER.

FLORENCE KING.