2 Sheets--Sheet 1.

J. J. STORER.

Treating Offal and in the Manufacture of Fertilizers.

No. 136,943. Patented March 18, 1873.

Fig. 1.

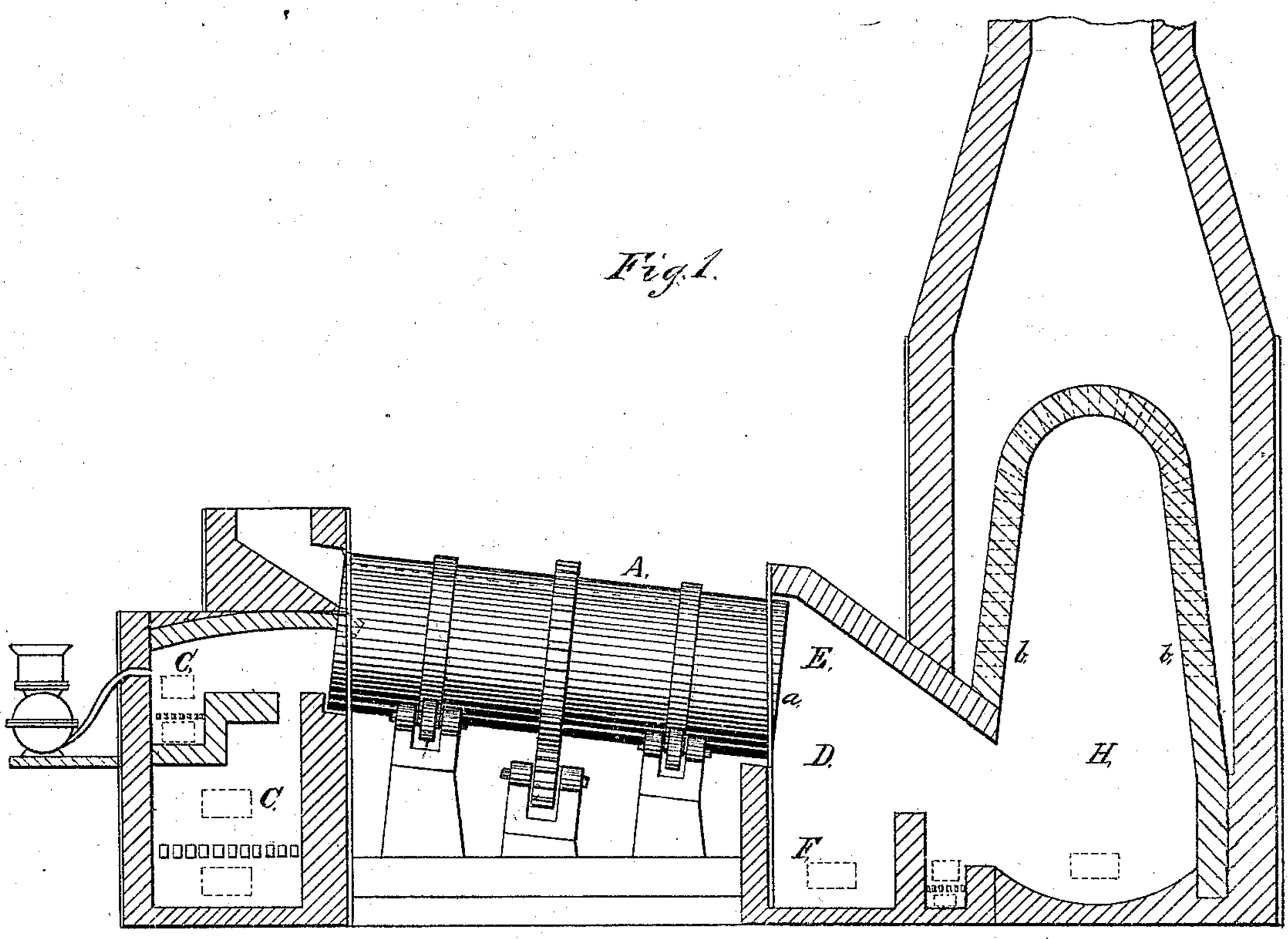
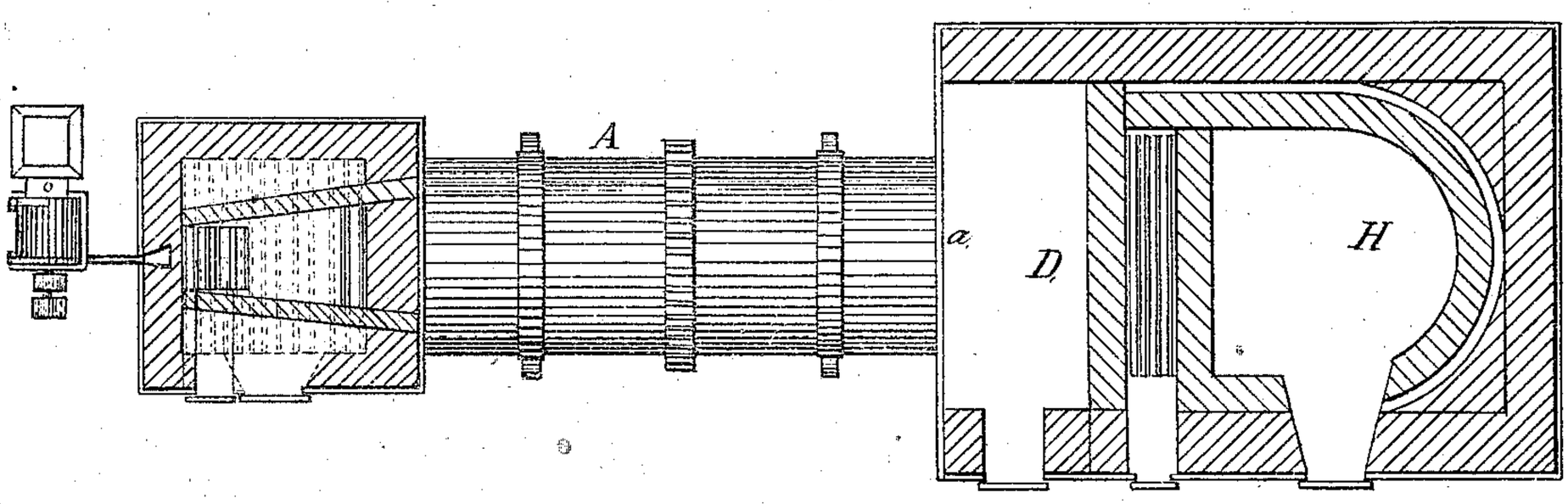


Fig. 2.



Witnesses.

Charles M. Nickerson.

Fred W. Longley.

Inventor.

Harold J. Storer.

2 Sheets--Sheet 2

J. J. STORER.

Treating Offal and in the Manufacture of Fertilizers.

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Fig. 5.

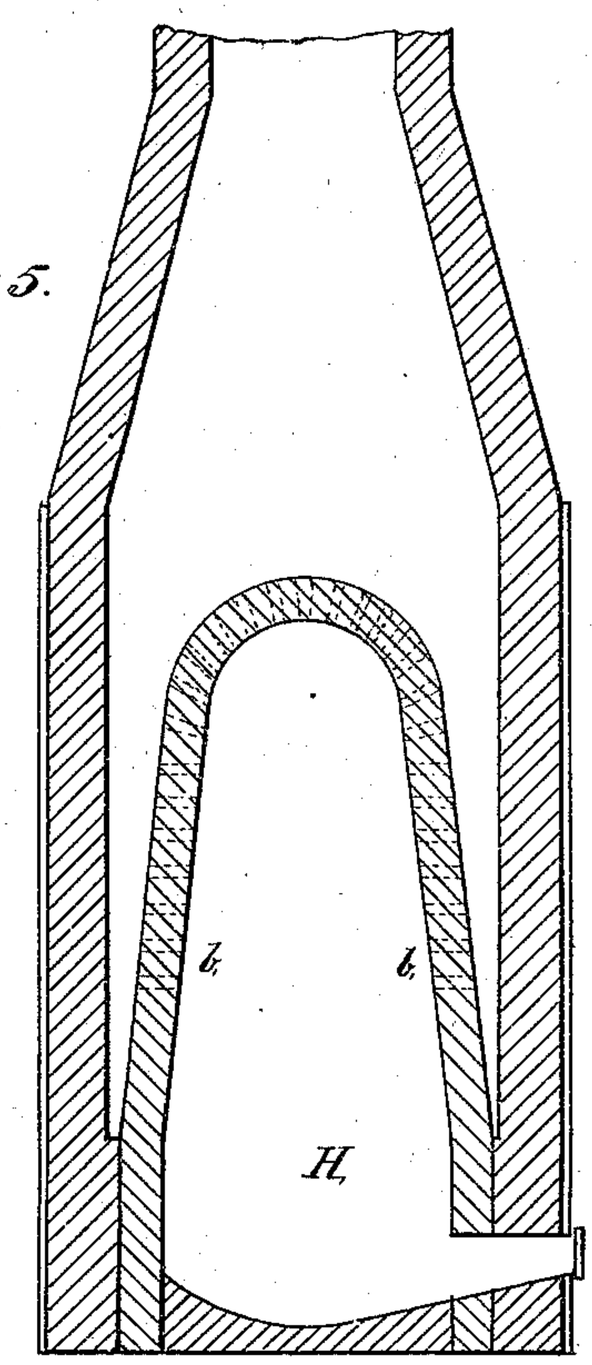


Fig. 3.

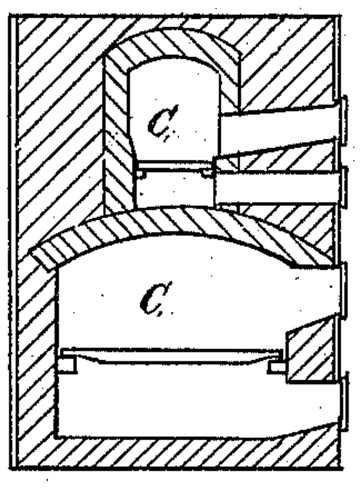


Fig. 4.

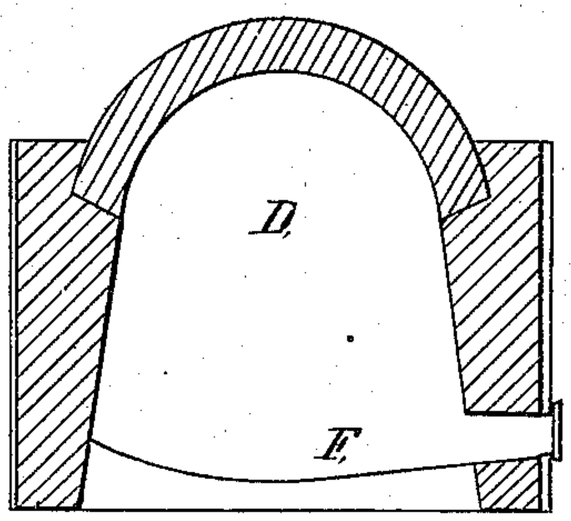


Fig. 6.

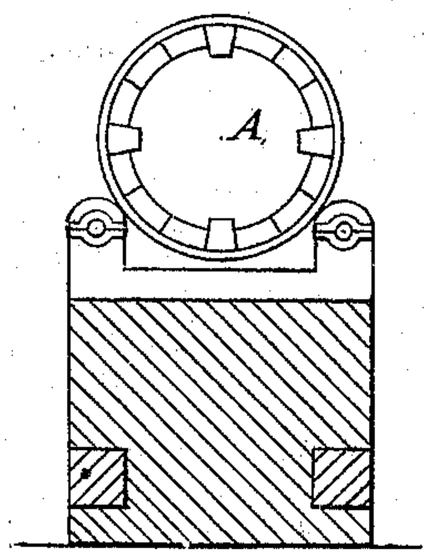
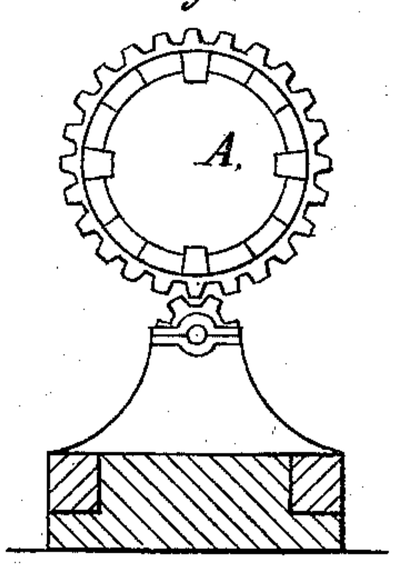


Fig. 7.



Witnesses.

Charles M. Nickerson.

Fred W. Longley.

Inventor:

Jason J. Storer.

UNITED STATES PATENT OFFICE.

JACOB J. STORER, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN TREATING OFFAL AND IN THE MANUFACTURE OF FERTILIZERS.

Specification forming part of Letters Patent No. **136,943**, dated March 18, 1873.

To all whom it may concern:

Be it known that I, JACOB J. STORER, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Treating Offal and Manufacturing Fertilizers and in Apparatus therefor, which the following specification and accompanying drawing sufficiently describe.

The object of my invention is to convert into fertilizers the refuse animal and other matter of slaughtering, packing, rendering, bone-boiling, glue-manufacturing, and like establishments, in such a way that no offensive or noxious odors or gases shall escape into the air. For this purpose I have designed an apparatus consisting of a combination of one or more fire-places, a revolving furnace or cylinder lined with brick or other refractory material, and a combustion-chamber for gases and steam.

In the drawing hereto annexed, and which forms part of the specification, Figure 1 is an elevation of the apparatus. Fig. 2 is a plan of the same. Fig. 3 is a section through fire-box and generator. Fig. 4 is a section through pit receiving the product from cylinder. Fig. 5 is a section through combustion and radiating chamber and stack. Fig. 6 is a section through friction-rolls and cylinder. Fig. 7 is a section through gear and cylinder.

The cylinder A is made of boiler-iron lined with fire-brick or other suitable refractory substance, and is preferably set on an incline for the more ready discharge of the material which is being operated upon. The lining is preferably made as shown in Figs. 6 and 7, where it is seen that some rows of brick project beyond the others. This is for the purpose of causing a better distribution of the offal, &c., around the cylinder when it is revolving, and for giving it (the offal, &c.) a more thorough exposure to the hot air and flame. When the projecting bricks of the lining are set in spiral lines they serve to assist in the discharge of the material at the exit end *a* of the cylinder. The cylinder may be revolved by belt, chain, or gear, but preferably by gear, as shown at Fig. 7, and is supported and made to revolve with but little friction by the friction-rolls, as shown at Fig. 6. At the front or feed end of the cylinder a fire place or places, C, are built. A constant high temperature is required for the decomposition of the gases arising from the refuse animal or other matter under treatment. When but one fire-place is used it is found that the temperature is reduced below the effective point with each fresh charge of coal therein, and the result is an intermittent escape of undecomposed and offensive gases; therefore, two or more fire-places are desirable, in order that by alternate stoking the proper temperature may be maintained. I prefer, however, to make use of pulverized coal as the principal fuel, according to the methods designed and patented by James D. Whelpley and Jacob J. Storer in United States patents No. 53,208, dated March 13, A. D. 1866, reissue No. 3,857, dated March 1, A. D. 1870, and No. 109,785, dated November 29, 1870, and by me in patents No. 131,131, dated September 3, A. D. 1872, and No. 132,498, dated October 22, A. D. 1872.

The advantages of using pulverized fuel in this connection are the economies in cost and quantity of fuel and the constant and intense heat maintained.

At the lower or delivery end of the cylinder is the gas mingling and combustion chamber D. This end of the cylinder may project directly into the chamber or be connected therewith by a flue. The flue, as shown at E, answers the purpose for which it was designed. Its roof is composed of a series of arches in contact with each other and forming an incline or deflector from the top of the cylinder down toward the bottom of the combustion-chamber. The combustion and radiating chamber H, into which the gases and products of combustion and evaporation pass from the cylinder, is built of refractory materials, preferably fire-brick, and the bricks from base of curve *b* are so laid that interstices—say, of three or four inches square—are left between them all. This chamber is by preference made dome-shaped for the better radiation of heat inward and downward. The heated gases and products of combustion and evaporation passing into this chamber there mingle and burn, their final decomposition and combustion being greatly assisted by their brief detention caused by the surrounding brick-work and the radiation of heat therefrom. The resulting products pass inodorously, or deprived of offensive odor, out through the interstices. It is preferable to place this

chamber in the bottom of a chimney of sufficient height and capacity to create a good draft, as shown in the drawing in Fig. 5.

The apparatus to be in proper operating condition should be at a bright-red or white heat—that is, the cylinder and combustion and radiating chamber should be so heated. The cylinder will be heated quickly by the fires at its upper or feed end; the chamber may be quickly heated by fire placed on the grate, shown at *c*, Fig. 2. It is also sometimes advantageous to keep this fire burning during the operation of the process, as it will serve to assure the decomposition and combustion of gases or steam that may perchance be evolved in excess of the decomposing capacity of the fuel at the other end of cylinder.

In the bottom of the chamber liquids may be placed for evaporation, or solids to be dried or heated, or the heat therefrom may be utilized in various other ways.

At F is a pit into which the dried offal, blood, &c., is delivered from the cylinder, and from which it may be removed either by hand or machinery. The material to be operated upon may also be fed into the cylinder by hand or machinery. A screw-conductor will readily take it from a bin or other receptacle and deliver it continuously into the cylinder.

I am aware that revolving cylinders have long been used for the purpose of converting offal and other refuse animal matter into fertilizers. In one or more of these instances the heat and flame are applied to the outer surface of the cylinder; others are arranged to be jacketed with steam; in others, steam, and sometimes hot air, is forced into the mass of material in the cylinder for the purpose of drying it; while in some instances two or more of these methods are combined.

My process differs from all these in a most essential particular—*i. e.*, I cause the flame and products of combustion from the fire-place or places C, or from the pulverized fuel, to enter the cylinder and come directly in contact with or to radiate heat directly upon the material which is to be dried or evaporated, no heat being applied to the outside of the cylin der.

By this plan much quicker action is secured, while the offensive gases and steam arising from the material are decomposed and burned without giving offense in the apparatus itself, and, burning, serve as so much additional fuel for the prosecution of the work. The high temperature maintained in the cylinder also superficially chars the offal, so that the escape of the nitrogenous elements are prevented to a greater degree than by any other process, analyses showing that the fertilizer prepared by this method contains a considerably larger percentage of nitrogen than that prepared by any other known method.

Having thus described my process and apparatus, what I claim is—

1. The combustion and radiating chamber, constructed in the manner and for the purposes substantially as described.

2. The combination of the fire-places, lined cylinder, and combustion and radiating chamber, in the manner and for the purposes substantially as described.

JACOB J. STORER.

Witnesses:
CHARLES M. NICKERSON,
FRED. W. LONGLEY.