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Patented Sept. 19, 1899.

C. WEGENER.
FURNACE FOR CONSUMING REFUSE.

(Application filed Oct. 10, 1898.)

(No Model.)

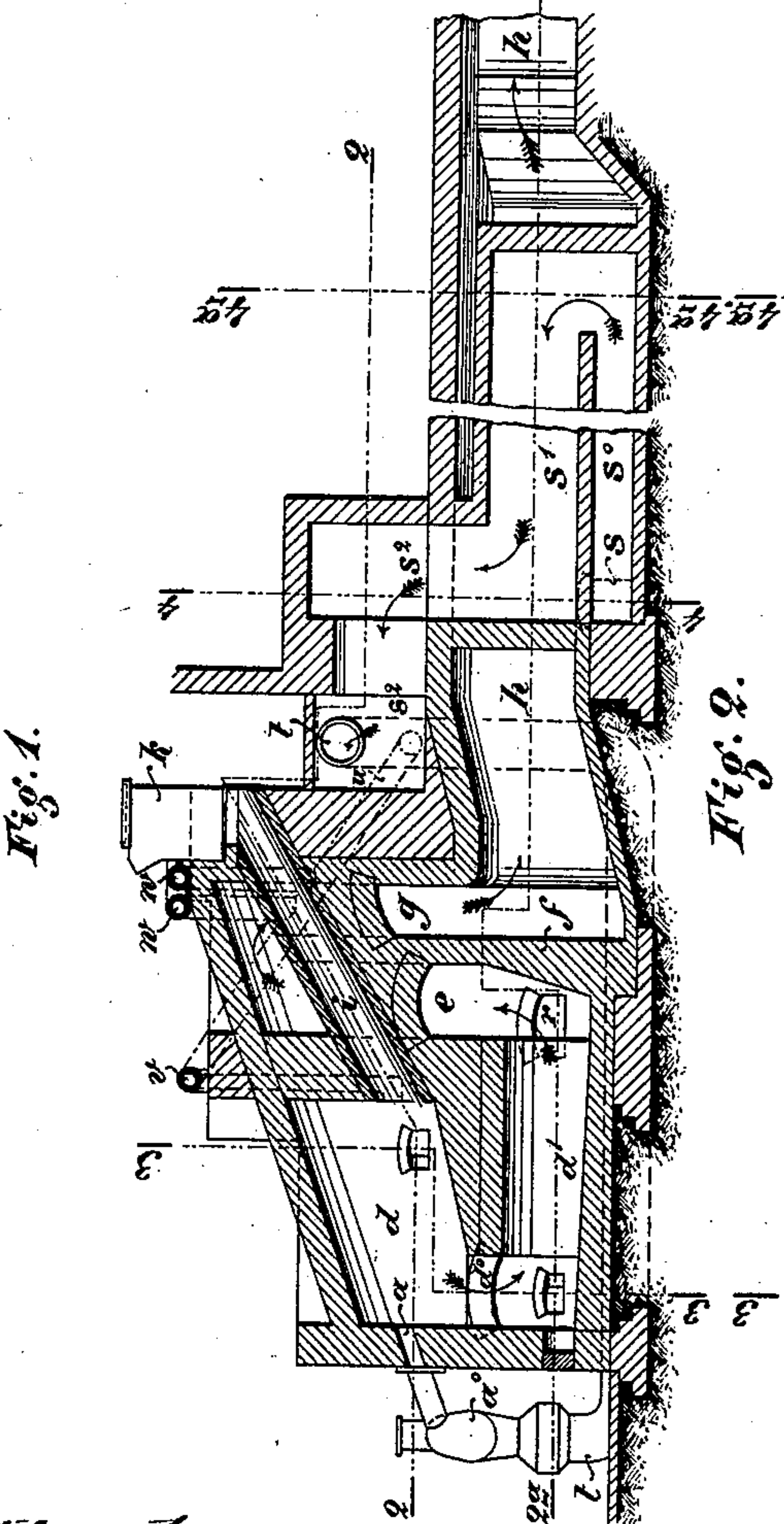
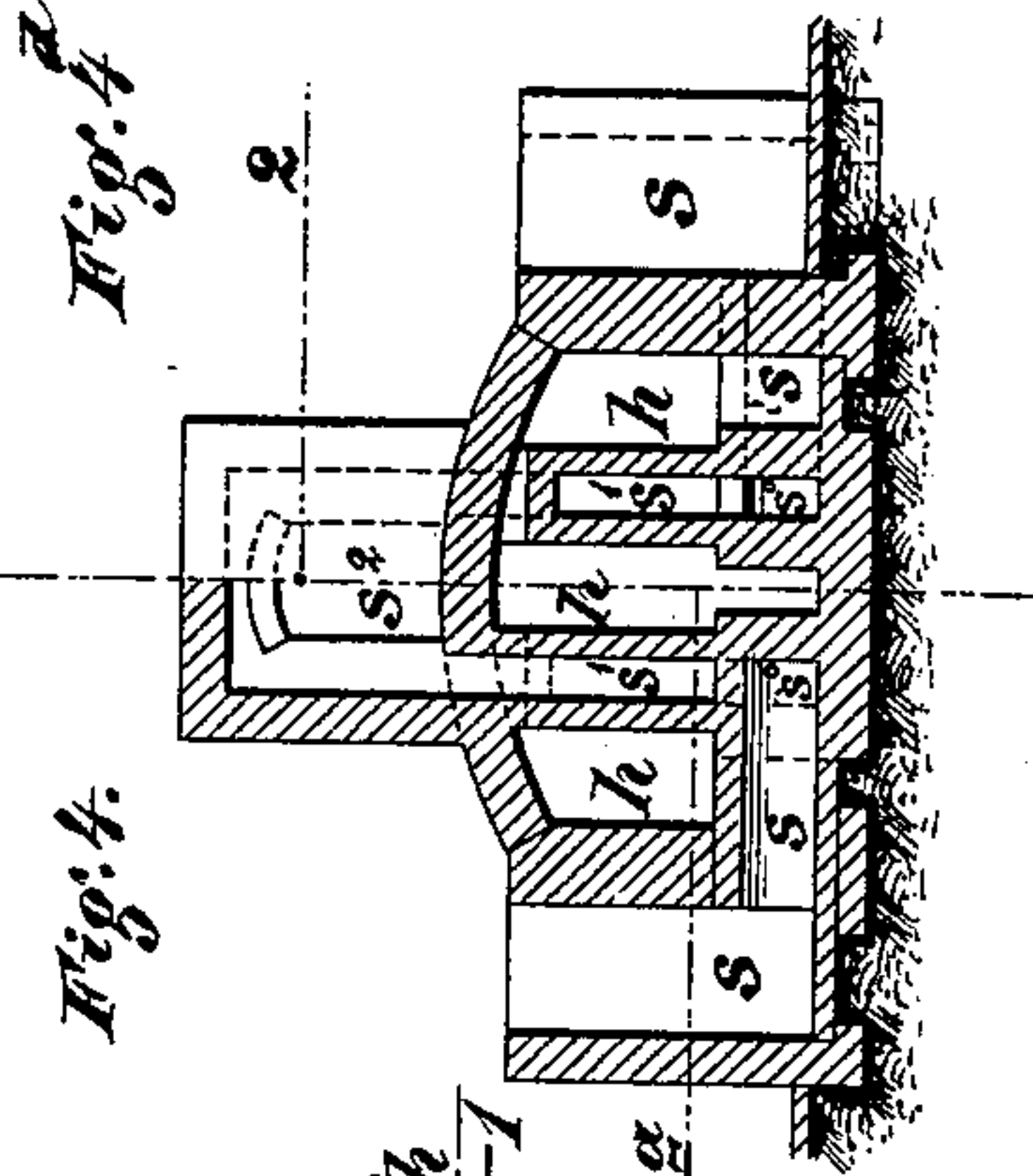
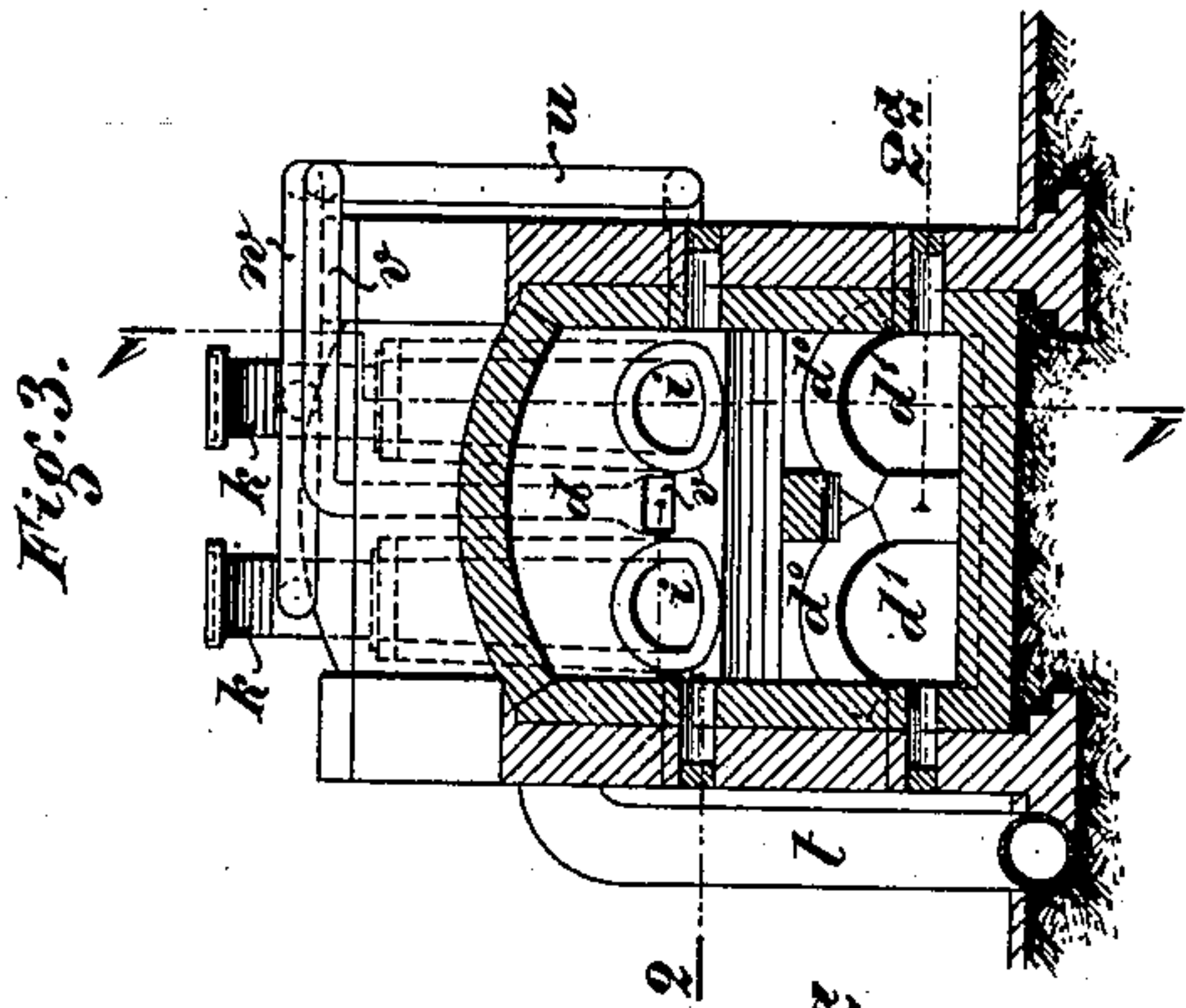


Fig. 2.

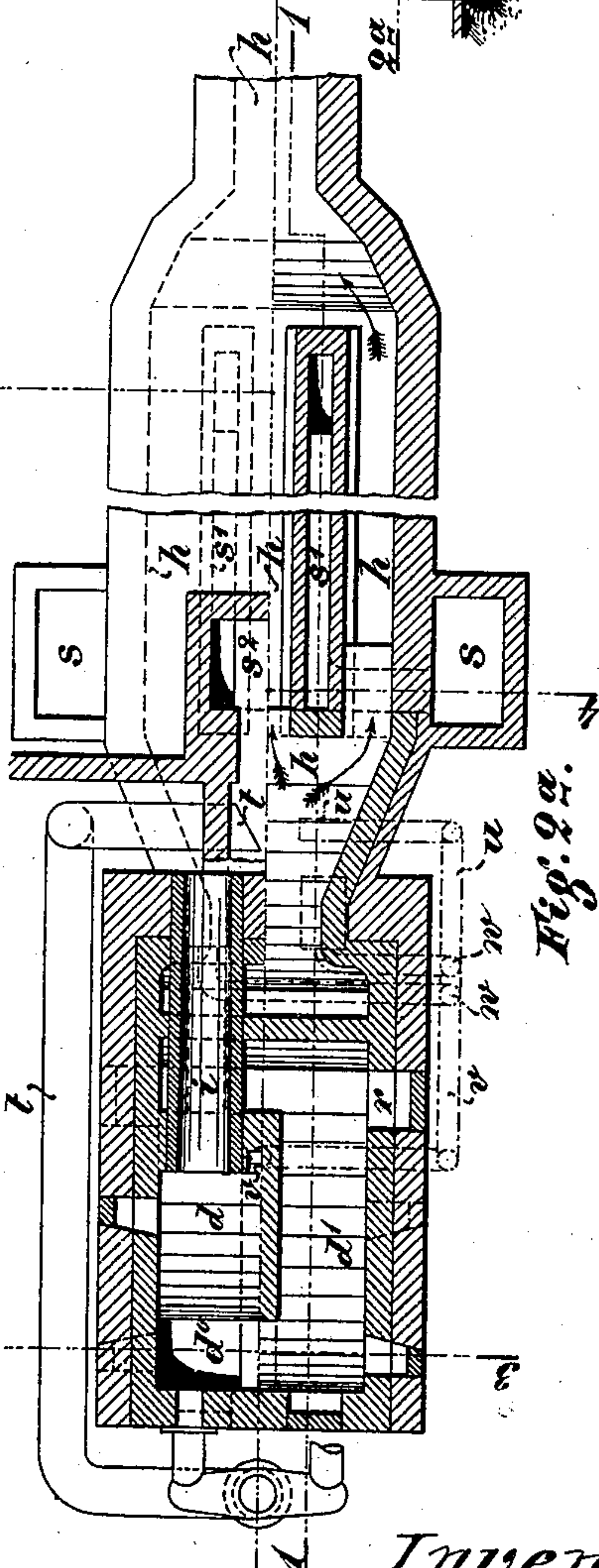


Fig. 2a.

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UNITED STATES PATENT OFFICE.

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FURNACE FOR CONSUMING REFUSE.

SPECIFICATION forming part of Letters Patent No. 633,299, dated September 19, 1899.

Application filed October 10, 1898. Serial No. 693,088. (No model.)

To all whom it may concern:

Be it known that I, CARL WEGENER, engineer, a subject of the King of Prussia, German Emperor, and a resident of Berlin, in the Kingdom of Prussia, German Empire, have invented a new and useful Furnace for Consuming Refuse, of which the following is a specification.

My invention relates to a furnace by means of which household refuse or other waste material can be consumed without the production of smoke or offensive gases, and its incombustible components can be transformed into a glassy and very hard slag, while the products of combustion possess at the outlet of the furnace a considerable value on account of their high temperature. The slag thus produced is capable of various applications—as, for instance, for the preparation of emery or glass paper, as an addition to ordinary glass materials, &c. The heat of the escaping gases may be utilized in the case of a refuse-destroyer according to this invention for the purpose of heating steam-boilers, the steam energy from which by means of steam-engines may be converted into electricity for being distributed in the neighborhood.

Referring to the construction of my new furnace illustrated, by way of example, in the accompanying drawings, Figure 1 shows a longitudinal section on the line 1 1 of Fig. 2^a. Fig. 2 is a horizontal section through one-half of the furnace on the line 2 2 in Figs. 1, 3, and 4^a. Fig. 2^a illustrates the other half of the furnace in a horizontal section on the line 2^a 2^a of Figs. 1, 3, and 4. Fig. 3 is a vertical section on the line 3 3 of Figs. 2 and 2^a. Fig. 4 is a half vertical section on the line 4 4 of Figs. 1 and 2^a. Fig. 4^a is a complementary section to the foregoing on the line 4^a 4^a in Figs. 1 and 2.

The furnace is devised as a double furnace, inasmuch as the furnace-chamber itself, which is simple, is arranged to be fed at two places, is provided with means for heating at two places, and also possesses two exits. At the upper end of each of the two sloping tubular feeding-flues *i* is placed a hopper *k*. The flues discharge below over the upper part of the sloping bottom of the furnace-chamber *d*, while at the other end of this bottom are placed the discharge-openings *d*⁰. Above

these latter and opposite to the exits of the feeding-flues *i* are placed the mouths of two conduits *a*, both proceeding from the apparatus *a*⁰. From the openings *d*⁰ are issuing two approximately horizontal conduits *d*¹, which pass underneath the furnace-chamber and thereafter come together again at a point where they communicate with one or two side openings *r*. They then connect to the bottom end of a perpendicular conduit *e*. This latter is separated by means of a partition *f* rising to the height of the feeding-flues *l* from a conduit *g*, passing downward. The conduits *e* and *g* communicate above the feeding-flues *i*, the former surrounding a lower portion and the latter an upper portion of the flues. At its lower end the conduit *g* discharges into the substantially horizontal conduit *h*, the section of which at a correspondingly widened part is divided by chambers *s*¹ into three separate parts, which again unite together behind these chambers. The chambers *s*¹ are connected below with the conduits *s*⁰ and by means of these with the open flues *s*, and above they are connected with a space *s*². The tube *t*, which leads to the apparatus *a*⁰, passes out of one side of this space, while on the other side another tube *u* has its commencement and branches into two tubes *w* and a third *v*. The tube *v* terminates between the two lower ends of the feeding-flues *i* in the furnace-chamber *d*, while each one of the tubes *w* is connected to a hopper *k*. In order to set the furnace in operation, coal-dust and air are driven into the furnace-chamber *d* by means of the apparatus *a*⁰, which may be of any known construction for this purpose. The mixture thus introduced is kindled by means of a fire temporarily lighted in the furnace-chamber. As soon as the walls of this chamber have been heated to a white heat each hopper *k* is filled with rubbish until also the feeding-flues *i*, placed at the lower ends of the said hoppers, are filled and the bottom of the chamber *d* is partly covered with the rubbish.

In consequence of the intensity of heat prevailing in the furnace and with the aid of the air for combustion supplied by means of the tubes *v* and *w* the combustible parts of the refuse are burned and the remainder, which composes the slag, is melted. This mass then

flows through the openings d^0 into the conduits d' and at the end of the latter through the openings r and either drops away continuously or is periodically removed. The gases of combustion caused by the heating on the one hand and the combustion of the refuse on the other escape from the chamber d through the openings d^0 and accompany the slag through the conduits d' . Within these conduits by means of a remainder of air contained in the gases of combustion any combustible materials which may have flowed down with the slag are burned. At the same time the presence of the hot gases acts, together with the position of the conduit d' beneath the furnace-chamber d , to prevent any premature cooling and hardening of the slag. Where the two conduits d' again unite the gases turn upward and pass into the conduit e in order to surround the lower part of the two feeding-flues i , after which they turn around above the latter and again passing around the upper part of these flues descend into the conduit g . From this latter they pass into the horizontal conduit h , which preferably discharges into the furnace of a steam-boiler. Immediately behind the furnace proper the hot gases are utilized to heat the air for combustion, which, entering through the flue s , passes by means of the conduits s^0 into the heating-chambers s' and from these into the common collecting-chamber s^2 , from whence it is conducted through the tube t to the coal-dust-feed apparatus a^0 and through the tube u and its branches v on the one hand and w on the other hand partly immediately to the furnace-chamber d and partly to the hoppers k . The motive force for the motion of the air consists only in the draft of the chimney, which at the same time operates the apparatus a^0 . By means of the heating of the feeding-flues i in the contrary direction to the refuse descending through these flues the said refuse is gradually brought to a very high temperature, so as to be not only dried but also subjected to dry distillation before it enters the furnace-chamber d . The gases and vapors thereby generated pass, together with the air introduced through the tubes w , into the hopper k to the lower end of the feeding-flues and into the furnace-chamber, where they take part in the combustion, so that the whole apparatus is free of smell.

The smokelessness of the apparatus is secured by reason of the intense heat in the furnace necessary for smelting the refuse and

the complete combustion, which is easily attainable at this heat. For exactly regulating the combustion dampers or the like (not shown in the drawings) are placed in the air-flues $t v w$.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In a furnace for consuming refuse the combination with the furnace-chamber of a flue for feeding the refuse, a fuel-feeding apparatus, tubes for supplying air for combustion, and a conduit common to both the gases of combustion and the molten slag, leading from the furnace-chamber toward the gas and slag discharge, essentially as described.

2. In a furnace for consuming refuse the combination with the furnace-chamber of a refuse-feeding flue, a fuel-feeding apparatus, tubes for supplying air for combustion, an exit at the bottom of the furnace-chamber for both the gases of combustion and the molten slag, and a horizontal conduit situated below the furnace-chamber and leading from the said exit-opening to the slag-discharge opening and to the exit-flue of the combustion-gases, essentially as described.

3. In a furnace for consuming refuse the combination with the furnace-chamber of a refuse-feeding flue, a fuel-feeding apparatus, tubes for supplying air for combustion, an exit at the bottom of the furnace-chamber for both the gases of combustion and the molten slag, a discharge-opening for the slag and a flue for the escape of the combustion-gases, at first ascending and surrounding a lower part of the refuse-feeding flue and then descending and surrounding an upper part of the said flue, essentially as described.

4. In a furnace for consuming refuse the combination with the furnace-chamber of a refuse-feeding flue, a fuel-feeding apparatus, air-supply tubes, an exit at the bottom of the furnace-chamber, a conduit issuing from the said exit and leading to a discharge-opening for the slag and to an exit-flue for the gases of combustion, the said exit-flue surrounding the refuse-feeding flue, and an air-tube arranged to supply air into the upper end of the refuse-feeding flue, essentially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

CARL WEGENER.

Witnesses:

C. H. DAY,
HENRY HASPER.