May 5, 1925. 1,536,220

J. JOUCLARD

STOVE FOR BURNING SAWDUST AND LIKE RESIDUES

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Fig. 1

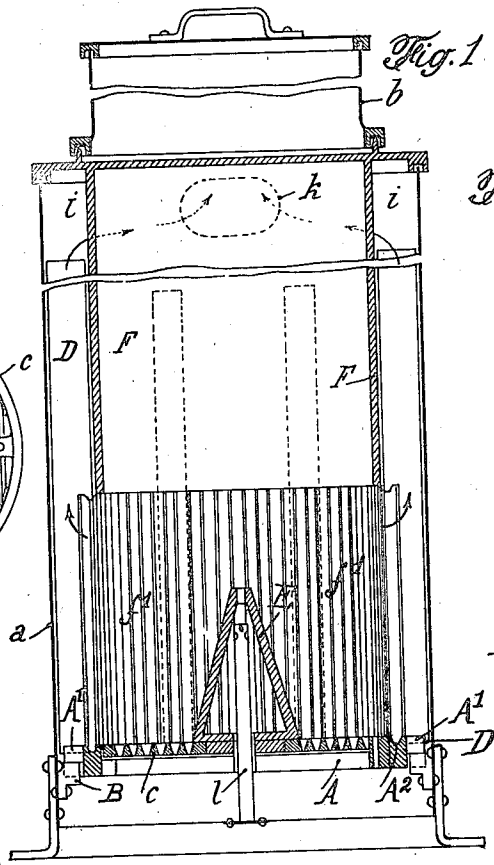


Fig. 5

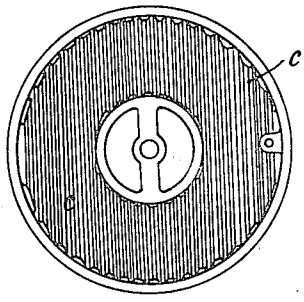


Fig. 6 Fig. 7

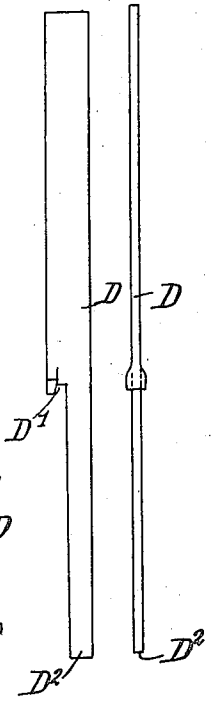


Fig. 12.

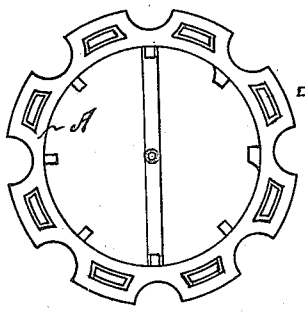


Fig. 2.

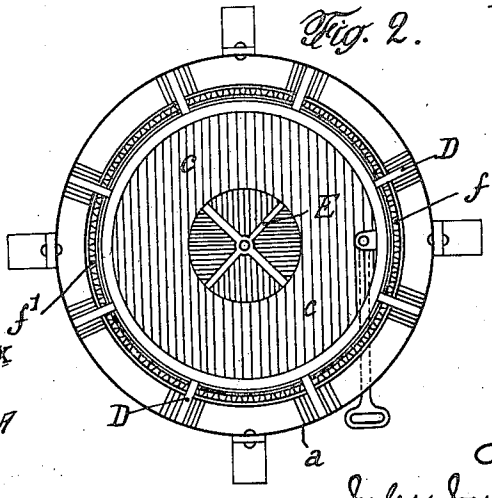


Fig. 3.

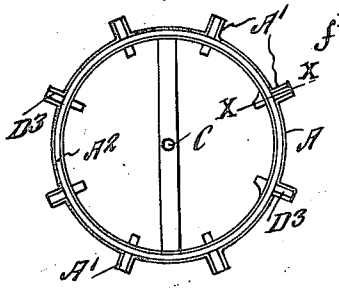


Fig. 4.



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Fig. 8

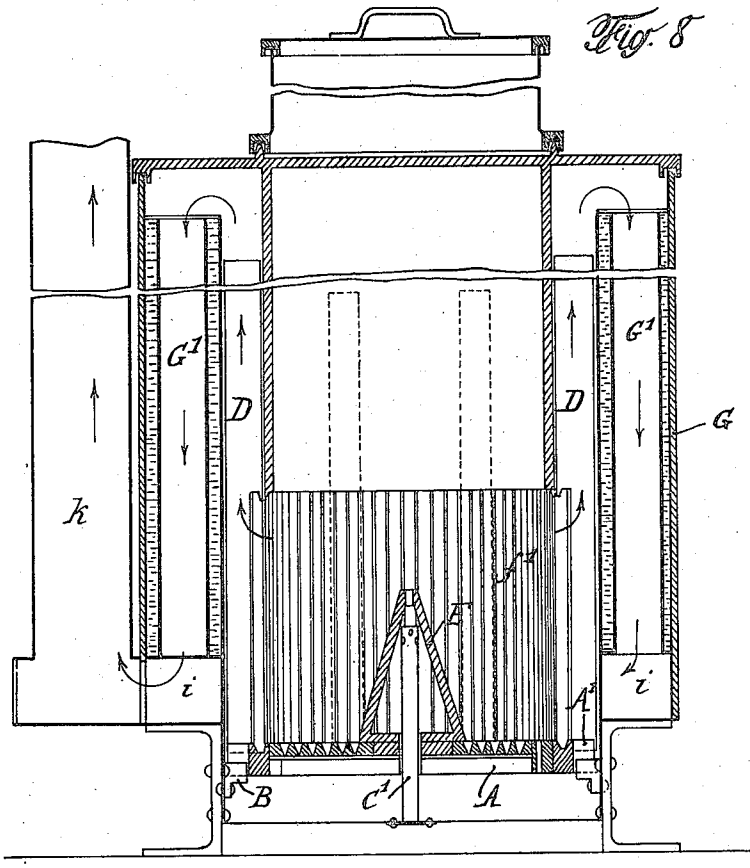
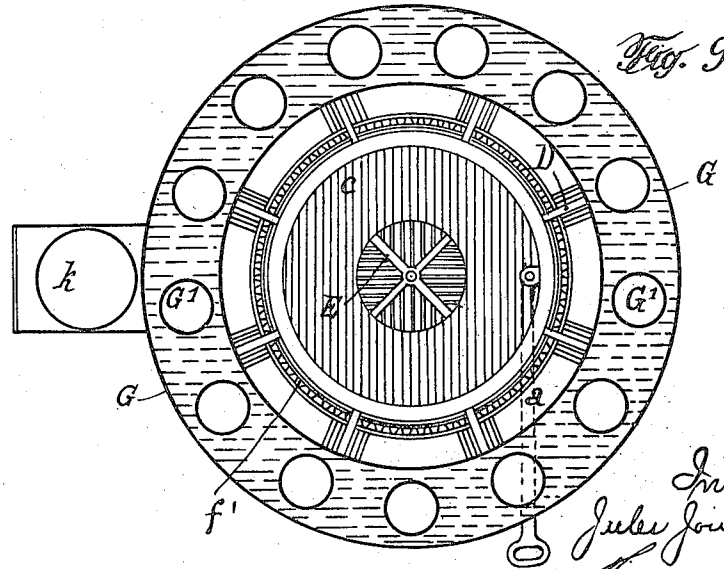


Fig. 9.



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Fig. 10

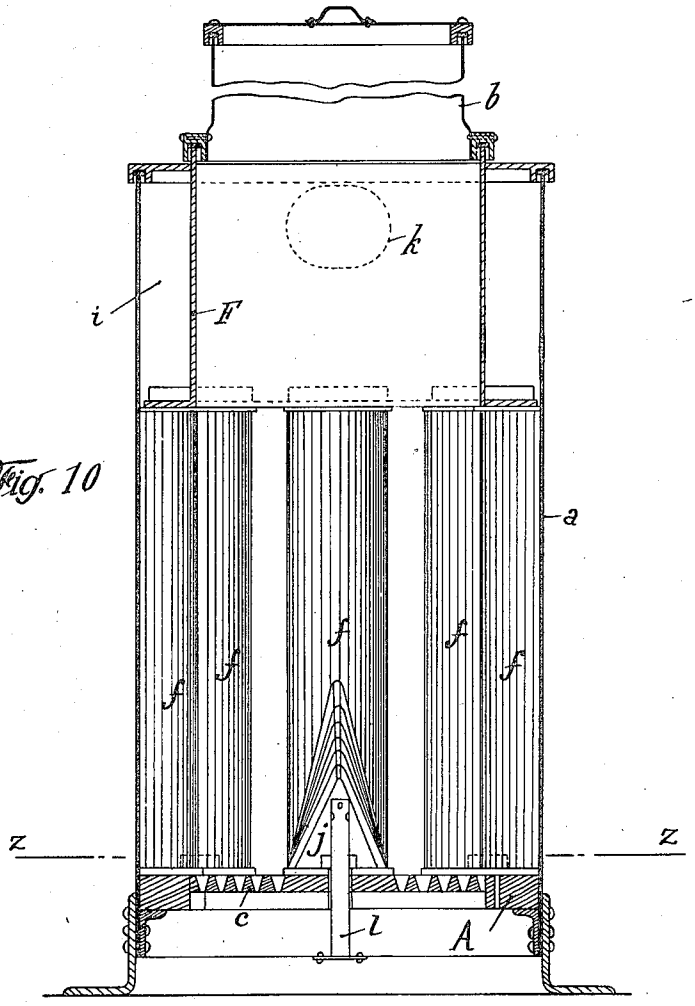
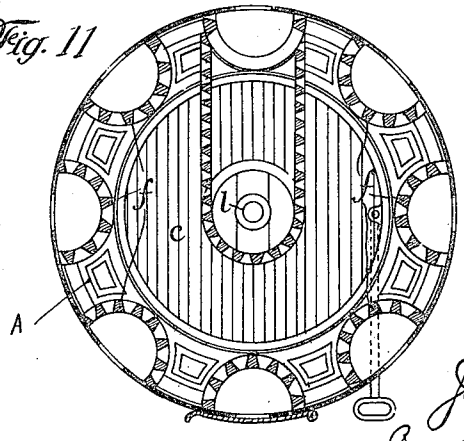


Fig. 11



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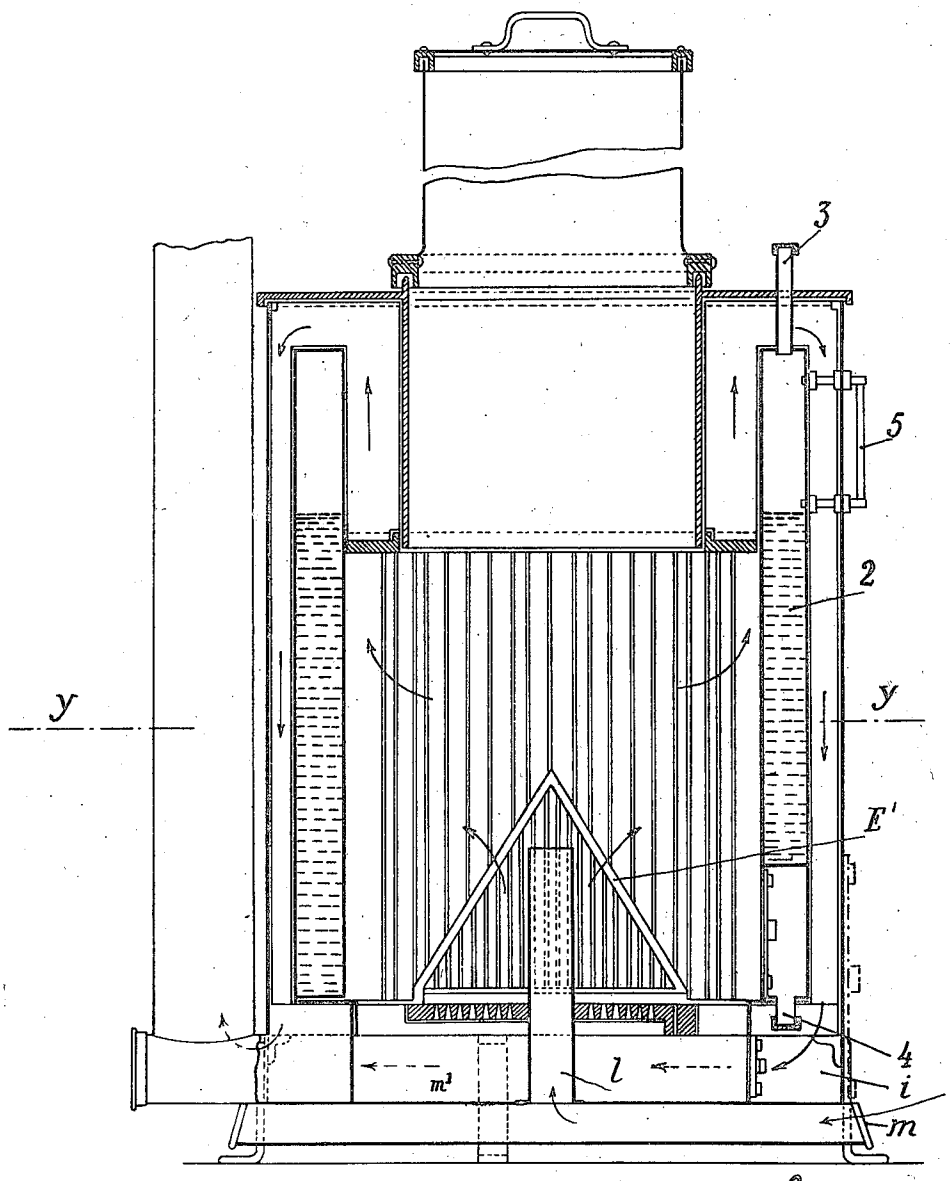
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STOVE FOR BURNING SAWDUST AND LIKE RESIDUES

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Fig. 13



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Fig. 15

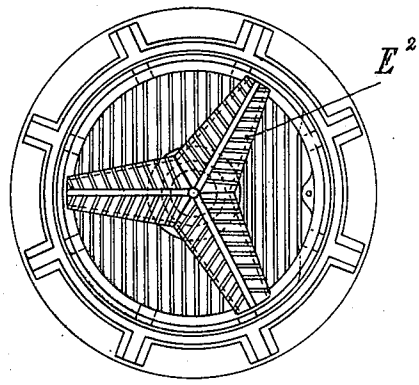


Fig. 16

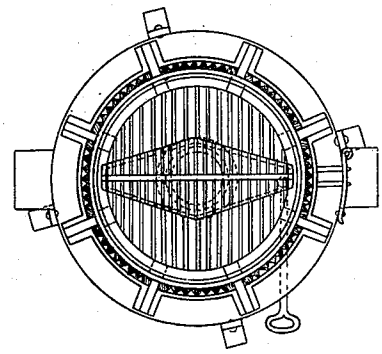
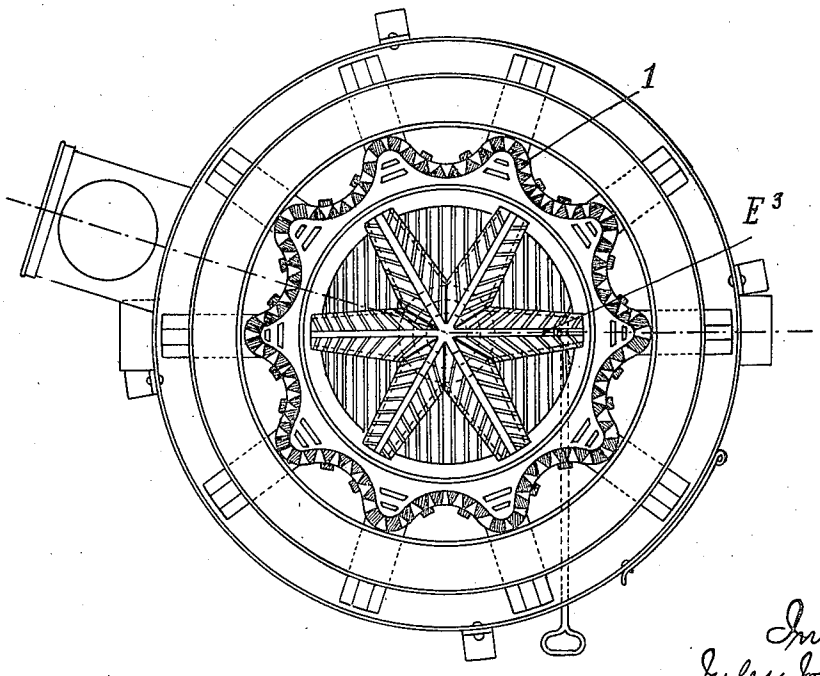


Fig. 14



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Fig. 19

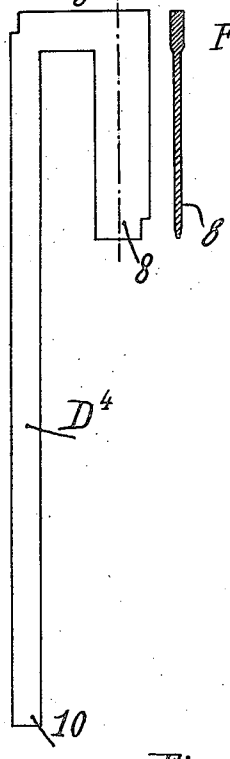


Fig. 19a

Fig. 18

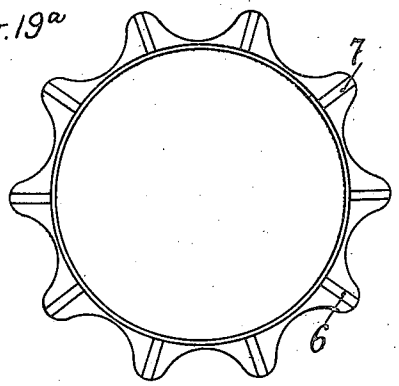


Fig. 20

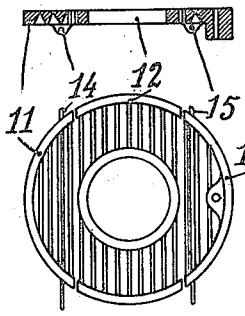
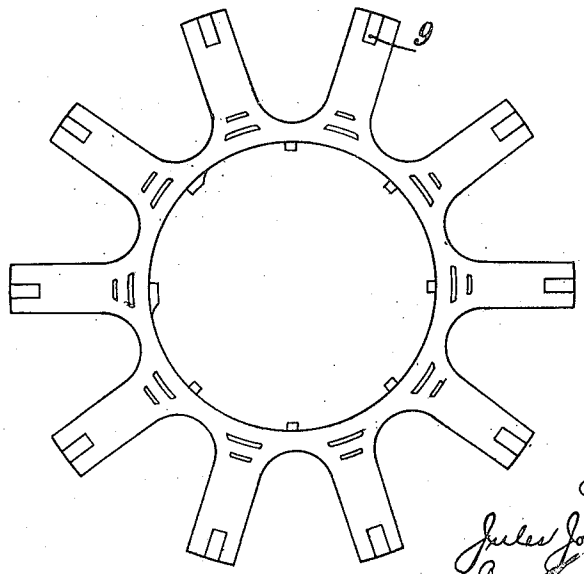


Fig. 20a.

Fig. 17



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Patented May 5, 1925. 1,536,220

UNITED STATES PATENT OFFICE.

JULES JOUCLARD, OF VERSAILLES, FRANCE.

STOVE FOR BURNING SAWDUST AND LIKE RESIDUES.

Application filed April 25, 1923. Serial No. 634,516.

To all whom it may concern:

Be it known that I, JULES JOUCLARD, a citizen of France, and a resident of Versailles, Seine-et-Oise Department, France, have invented new and useful Improvements in Stoves for Burning Sawdust and like Residues, which are fully set forth in the following specification.

In my United States Patent No. 1,428,782 I described a stove for burning sawdust and like residues, in which the internal chamber contained various projecting or other elements bounded by vertical grate bars, and a vertical chimney likewise formed of grate bars which is disposed at the middle of the chamber, the said chimney being in certain modifications replaced by a transverse conduit or apertured andiron having a diametrical position upon the bottom of the stove.

The present invention relates to a stove of this kind and comprises the following improvements:

1. A grate holder disposed at the lower part of the apparatus.

2. A horizontal grate having an aperture at the centre for the admission of the draught into the apparatus and for the discharge of foreign bodies contained in the sawdust.

3. A grate element having the form of a cone, a cocked hat or a star with various branches, which is disposed at the middle of the horizontal grate.

4. A draught pipe whose air inlet is below the ash-pit traverses the centre of the grate holder and the horizontal grate in order to admit the air within and at the top of the said conical grate element.

5. A vertical cylindrical or corrugated grate composed of grate sections or elements which are fitted into the groove of the said grate holder and are connected together by eight solid coupling bars serving to attach the elements of the vertical cylindrical or corrugated grate and forming with the latter and with the wall of the furnace chamber various discharge flues for the gas of combustion.

The above-mentioned grate element instead of having a conical form may be replaced by an element whose surface has the form of an inclined andiron.

In a modification, the stove is surrrounded by an annular boiler which may contain tubes traversed by the burnt gas.

The following description, together with the accompanying drawings which are given by way of example, sets forth my invention.

Fig. 1 is a longitudinal section of the stove.

Fig. 2 is a plan view, with the upper part removed.

Fig. 3 is a view of the grate holder.

Fig. 4 is a section on the line X—X of Fig. 3.

Fig. 5 is a view of the lower grate.

Figs. 6 and 7 are respectively front and side views of a coupling bar.

Figs. 8 and 9 are longitudinal and horizontal sections of the stove surrounded by its boiler.

Fig. 10 is a longitudinal section of a modification.

Fig. 11 is a section on the line Z—Z, Fig. 10, showing in plan the grating illustrated in Fig. 5 and the chimneys proceeding to the collector and mounted upon the grate holder, Fig. 12, which forms part of the stove shown in Fig. 10.

Fig. 12 is a view of the grate holder.

Fig. 13 is a longitudinal section of another modification of the stove.

Fig. 14 is a section on the line Y—Y, Fig. 13, the device being provided with a different draught-grate.

Figs. 15 and 16 are modifications of the draught grate.

Fig. 17 is a plan view of the grate holder.

Fig. 18 is a plan view of the top cover of the grates of the stove illustrated in Fig. 13.

Fig. 19 is a view of one of the coupling bars of the stove shown in Fig. 13.

Fig. 19^a is a vertical section of the upper portion of Fig. 19.

Fig. 20 illustrates in section and Fig. 20^a in plan a circular horizontal grate of the pivoted type which is made in three parts.

The embodiment shown in Figs. 1 to 7 is an improvement on the device illustrated in Fig. 3 of my Patent No. 1,428,782.

Within the cylindrical main body *a* of the stove is disposed at the lower part a grate holder A, Fig. 3, having the groove A^2 and a plurality of lugs A^1 which latter are radially grooved as shown in Fig. 4 and are supported by the brackets B secured to the internal wall of the stove, Fig. 1. At the centre of the grate holder is either a rod C

which serves for pivoting purposes or an air pipe *l* which conducts the air within the conical grate elcment and to the upper part of the same.

Upon the said grate holder is disposed the flat grate *c* which is shown in plan in Fig. 5; it is provided at the middle with an aperture for the air draught as well as for the discharge of foreign substances mixed with the sawdust. In the circular groove A^2 of the grate holder are disposed the sections of a cylindrical vertical grate f^1 which are connected together by the coupling bars D, Figs. 6 and 7, having the slot D^1 engaging the top of the said grate f^1 and whereof the foot D^2 is supported in the groove D^3 of the grate holder lugs A^1.

At the centre of the stove is disposed the conical grate element E fitting upon said pivot rod C or upon the said air pipe *l* of the conical grate element. A solid drum F is secured to the upper cover of the stove and consists of a cast or plate iron cylinder of somewhat smaller diameter than the cylindrical grate f^1 and descends as far as the top of said cylindrical grate, forming with the outer wall of the stove an annular space which the said coupling bars which stop at different heights as observed in Fig. 1 divide into various flues for the flow of the gases of combustion according to the arrows, Fig. 1, the gases being collected in the main collecting chamber *i* and escaping through the pipe *k*.

The said collecting chamber is disposed within the stove and not outside the same as in the prior patent, and it is so arranged as to be flush with the inside and without any projecting parts, thus enabling the fuel to descend properly in the drum F.

A receptacle *b* is disposed outside the stove and contains a supply of fuel which is fed downwardly as the combustion takes place. The various elements of the stove are assembled by means of asbestos packing whereby leakage of gas and air is obviated. One may increase the distance between the drum F and the outer wall of the stove so that the space may contain a water boiler G, Figs. 8 and 9, comprising the tubes G^1 in which are circulated the gas and smoke according to the arrows, Fig. 8, and in this case the discharge pipe or chimney *k* and the gas collector are disposed at the lower part of the stove.

The arrangement of the eight coupling bars is such that the spaces formed between these bars, the outer wall of the stove, the cylindrical vertical grate and the feeding device will constitute veritable smoke flues so that the fuel can burn throughout the said cylindrical grate but without affecting the upper layers of the fuel. Since the draught takes place from the inside to the outside of the furnace, the air entering the said conical grate element through the adjustable inlets *m* disposed below the ash pit m^1, Fig. 13, will pass through the fuel and will be discharged into the flues through the cylindrical vertical grate.

The stove is supplied by means of the fuel which is contained in the superposed cylindrical receptacles F and *b*. As the fuel descends into the furnace portion it is dried and heated, and it commences to burn when in contact with the burning fuel upon the lower grate. In this manner a continuous heating is obtained, and the rate of combustion will depend upon the amount of air admitted by the regulating elements.

In the modification shown in Figs. 10 to 12, the cylindrical grate f^1 is replaced as in Fig. 1 of the prior patent by eight semi-cylindrical grate elements *f* disposed upon the internal face of the stove. In this case the grate holder A has the form represented in Fig. 12, and the bottom grate resembles the grate *c* of Fig. 5. Each grate element *f* forms a small chimney communicating with the main collector *i* in which the gases of combustion are collected before their discharge through the chimney *k*. At the middle is provided a grate element *j* having the form of an inclined apertured andiron, through which the draught passes. An air inlet pipe *l* traverses the centre of the ash pit and conducts the air to the upper part of the interior of the said element. The latter may also be given a conical shape as represented at E, Fig. 1.

In the embodiment shown in Figs. 13 to 20^a, the stove comprises a corrugated vertical grate element 1, Fig. 14, in which the burning fuel cannot come into direct contact with the plate iron of the stove, while at the same time preserving the arrangement of the ten gas discharge chimneys. The conical grate element E^1 in Fig. 13 also has a greater draft surface than in Fig. 1. The said element can be replaced by an element having the shape of a cocked hat, Fig. 16, or by an element having radial parts of a general star shape, for instance with three parts as shown at E^2 in Fig. 15 or with six parts as at E^3 in Fig. 14.

According to the rate of combustion which is desired, the said radial element will comprise a greater or less number of branches, so that the air admitted by the pipe *l* can be circulated, through the various passages thus formed, below the mass of sawdust. In this manner the combustion is very active; the cold air which passes through the fuel over a very large surface of the same will become heated by passing through the great number of channels which are formed in the burning fuel, so that the said arrangement will produce the maximum heating effect.

According as it is desired to obtain from

a given apparatus a very moderate heat which serves for the heating of a room or to produce an average temperature, or in other cases to obtain a considerable yield in the case of a steam boiler for central heating purposes, or further, for burning household waste, one disposes in the apparatus a grate element having a conical form, or the form of a cocked hat, or a rosette form, as desired.

In the modification shown in Fig. 13, the stove as for Fig. 8 is surrounded by an annular boiler 2, but the burnt gas instead of traversing the boiler is now made to pass around it, according to the arrows, so as to heat both sides of the boiler, thus increasing the heating surface. The coupling bars D^4 which subdivide the space so as to form discharge flues have the form shown in Figs. 19 and 19^a and are placed upon the top of the annular boiler 2. The said boiler is provided with a filling aperture 3 and an emptying orifice 4 which may be of any suitable nature. A water gauge 5 can also be provided.

In this embodiment, the upper part of the vertical grate 1 is covered and secured in place by an upper supporting member 6 whose form is shown in Fig. 18, it being provided with the grooves 7 engaging the ends 8 of the coupling bars D^4, Fig. 19. The grate holder is represented in Fig. 17, and has the slots 9 engaging the ends 10 of the said bars. The inner horizontal grate, Figs. 20 and 20^a, may be made in three parts 11, 12, 13 and by pivoting on the two trunnions 14, 15 it can overturn into the ash pit so as to discharge any foreign bodies contained in the sawdust.

Obviously, the said arrangements are susceptible of modifications in detail without departing from the principle of the invention.

What I claim is:

1. A stove for burning sawdust and like residues, comprising a cylindrical main body, a horizontal grate disposed at the lower part thereof, vertical grates surrounding the cylindrical central portion forming the furnace, a cylindrical partition extending from the top of the cylindrical main body to the top of the said vertical grates and providing for the continuous downward feed of the fuel, an annular space between the said vertical grates and the external cylindrical main body forming a collector for the burnt gas, an inclined grate disposed upon the said horizontal grate in order to augment the surface of the burning fuel, and means for circulating cold air from the bottom of the stove to the top of the inclined grate thereby supplying air for combustion and cooling the inclined grate.

2. A stove comprising a cylindrical external envelope, a horizontal grate disposed at the lower part thereof, vertical grates having the form of a cylinder with corrugated walls disposed at the centre of the said envelope, a cylindrical partition whereby the vertical grates are extended to the top of the stove, means for feeding the stove which are adapted to fit upon the top of the said partition, inclined grates disposed upon the horizontal grate, means for supplying the stove with air whose outlet is situated below the said inclined grates, partitions subdividing the annular space between the vertical grates and the external envelope of the stove in order to form flues for the discharge of burnt gas.

3. A stove for burning sawdust and like residues, comprising a cylindrical external envelope, a cover thereupon, a grate holder disposed at the lower part of said envelope, a horizontal grate disposed upon the said grate holder, vertical grates forming cylinders with corrugated walls and surrounding the central part, inclined grates having the form of a star with various branches mounted upon the horizontal grate within the vertical grates, an internal partition secured to the cover of the stove and having a cylindrical form in order to cooperate with the top of the said vertical grates, means for feeding the stove which are adapted to fit upon the top of the said partition, a tube in coaxial position communicating with the outer air whose outlet is situated below the inclined grates, and which serves for the air supply to the stove, partitions radially disposed in the annular space between the vertical grates and the external envelope in order to form discharge flues for the burnt gas, an annular cylindrical envelope disposed in the said annular space and adapted to contain water and to thus constitute a boiler, a collector for the burnt gas disposed at the lower part of the stove, and a discharge pipe connected to the said collector.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JULES JOUCLARD.

Witnesses:
RAYMOND ECKER,
JULICY DOUILLET.