

No. 895,765.

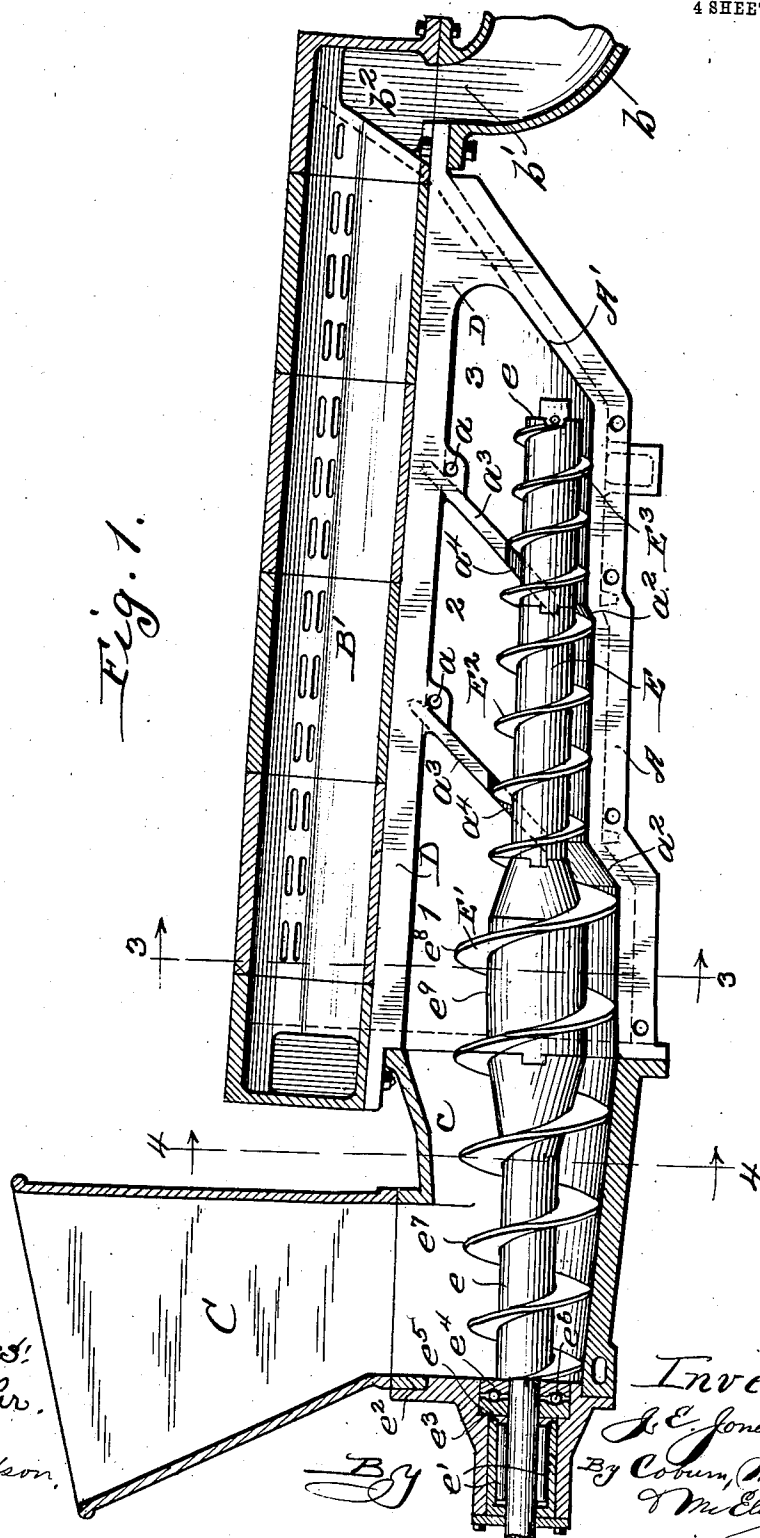
PATENTED AUG. 11. 1908.

J. E. JONES.

UNDERFEED FURNACE.

APPLICATION FILED SEPT, 7, 1901.

4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.

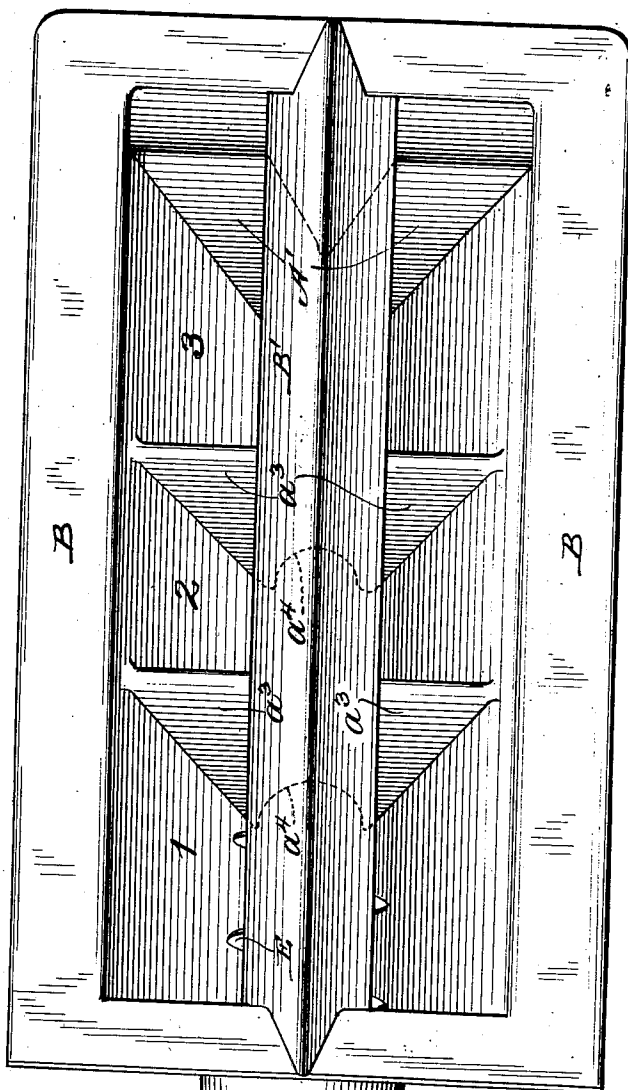
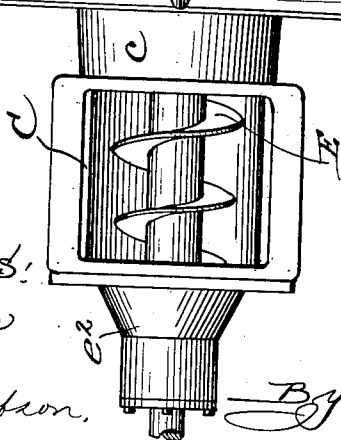


Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 3.

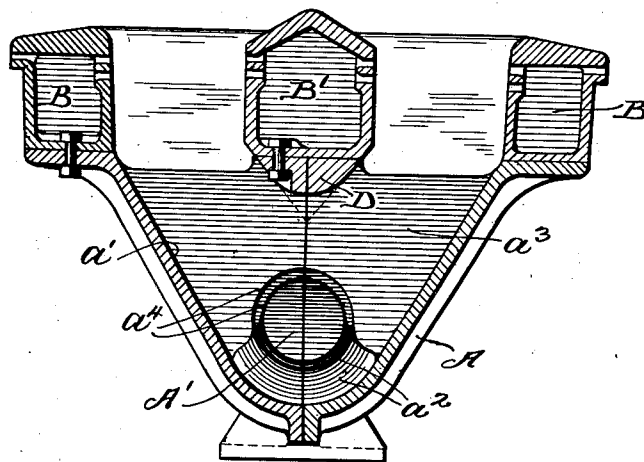
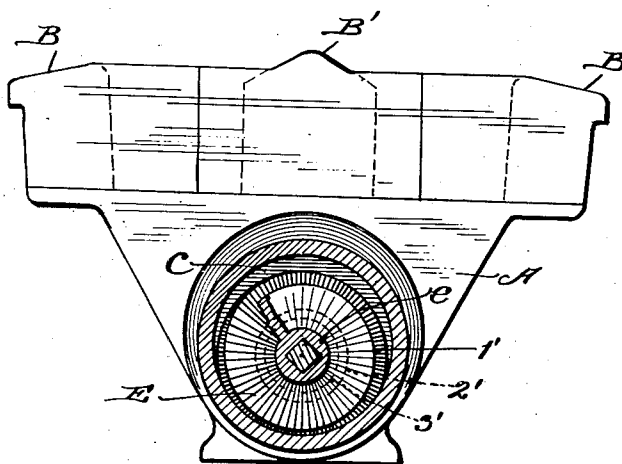


Fig. 4.



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4 SHEETS—SHEET 4.

Fig. 5.

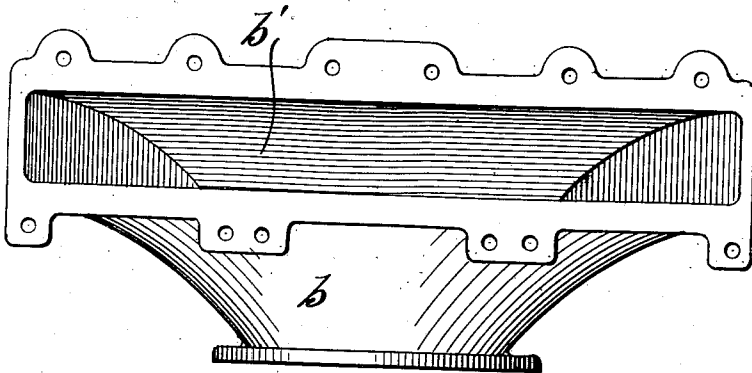
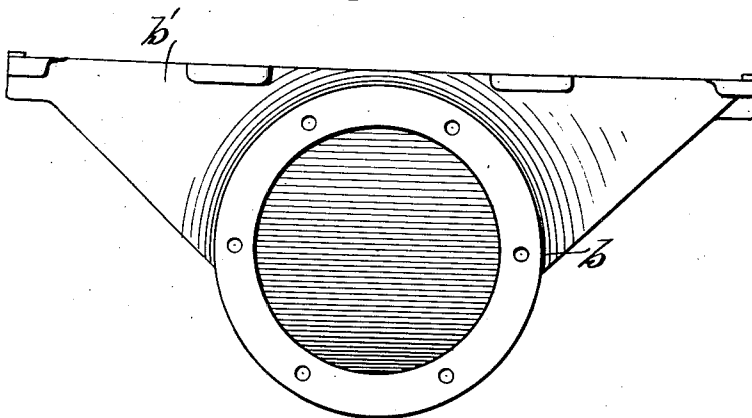


Fig. 6.



Witnesses:

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UNITED STATES PATENT OFFICE.

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UNDERFEED FURNACE.

No. 895,765.

Specification of Letters Patent.

Patented Aug. 11, 1908.

Application filed September 7, 1901. Serial No. 74,609.

To all whom it may concern:

Be it known that I, JOEL EDGAR JONES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Underfeed Furnaces, of which the following is a specification.

My invention relates to furnaces, and especially to that class in which the coal or other fuel is fed from the bottom of the furnace to the under side of the fire. In this class of devices the greatest efficiency and extent of fire surface are obtained, and the power for and cost of operating the fuel-feed mechanism are reduced, by providing organizations whereby a portion only of the fuel that is forced into the retort or fuel-support will be carried through the same, so that an equal distribution of the fuel to the fire will be accomplished. By reducing the capacity of the feed devices along the length of the retort or fuel-support in the direction of the feed, a part only of the fuel will be carried to the rear of the retort, and the fuel will be distributed and deposited along the length of the retort in even quantities to maintain a uniform supply throughout the area thereof.

The main object of my invention is to provide novel and efficient means for reducing the carrying capacity of the feed devices within the retort towards the rear thereof, to accomplish a uniform distribution of the fuel in the fire chamber or retort.

Another object of my invention is to provide an improved fuel-support or retort having novel deflecting devices, preferably arranged at intervals therein, to facilitate the feeding of the fuel to the under side of the fire.

Another object is to provide certain improvements in this class of devices relating to the construction of the retort whereby a simple and efficient organization is provided constituting an improved form of furnaces.

A further object of my invention is to provide improved arrangements of twyer-blocks and air-blast devices.

Other objects will be apparent from the description hereinafter given, and from the functions and operations of the various features disclosed.

My invention consists in the various constructions and organizations of parts as herein described, and as set forth in the claims.

In the accompanying drawings, which form a part of this specification, Figure 1 is a vertical longitudinal sectional view of a furnace embodying my invention. Fig. 2 is a top plan view of the furnace of Fig. 1. Fig. 3 is a transverse sectional view on line 3—3 of Fig. 1 with the conveyer removed, and Fig. 4 is a view similar to Fig. 3 but taken on the line 4—4 of Fig. 1 and showing the conveyer. Fig. 5 is a top plan view of a detail of the air-supply device, and Fig. 6 is a view in rear elevation of the device of Fig. 5.

In carrying out my invention I employ a retort or fuel support A, of such size and dimensions as may be required for each particular installment, and provided with twyer-blocks B at the top thereof, to which air is supplied through an air-pipe *b*, and from which it passes by lateral openings. The retort, which is arranged and supported in any suitable manner, consists preferably of a two-part casting, provided with suitable means for attaching and securing the parts together, as by suitable bolts adapted to the openings *a*, one side or half of the retort being shown in Fig. 1 and both sides being shown assembled in the other figures. The retort is curved transversely at its bottom, and its upper portion is formed with upwardly inclined or sloping sides *a'*, so that its width or area in cross-section is increased from the bottom upwardly.

In front of the retort is arranged the usual hopper C, communicating therewith by means of a conduit or neck *c*, which is preferably in extension of the front end of the retort-opening, and preferably is slightly tapered and enlarged or flared toward its mouth, as shown in Fig. 1. The retort is reduced in area or capacity from its front toward its rear, preferably by being divided into a number of sections or chambers, of unequal widths or cross-sections, at their bottoms as indicated by the reference numerals 1, 2 and 3, but which are of the same width above the central line of the conveyer. The bottom of each section is horizontal from front to rear, and the bottom of the retort is provided with steps or flanges *a''*, leading from one section or chamber into the next the steps or flanges being intermediate the sections and uniting the same. The steps or flanges are preferably rearwardly and upwardly inclined, for a purpose hereinafter explained.

The rear wall A' of the retort is inclined rearwardly and upwardly, and a series of deflecting-plates a^3 is placed transversely within the retort intermediate its ends at suitable intervals and inclined at approximately the same angle as the rear wall A'. The plates are secured across the retort above the steps or flanges, and approximately in extension of the upper ends thereof, as shown in Figs. 1 and 3. These plates are preferably sectional, each half being cast integrally with its corresponding section of the retort, as shown in Fig. 3, and the oppositely disposed members of each pair are of such width as to close the retort transversely at their respective lines of junction, except for a port providing a passage for such fuel as is supplied to those sections or chambers of the retort as are in the rear thereof. The port or passage in the plates is provided by an arch a^4 made by cutting away the inner edge of the plates at the bottom. The deflecting-plates also provide supports for the longitudinal V-shaped casting or back-bone D, which is secured in corresponding grooves in the plates, and to which is secured by bolts or other devices a series of twyer-blocks B' having lateral openings.

The reference letter E represents a screw-conveyer, the flights E' of which are preferably mounted on a round sleeve e fitting a square shaft, which is provided at its front end with a reduced bearing portion journaled in suitable roller bearings e' , which are arranged in a journal-box e^2 secured to the body of the hopper at its front. The box is provided with a chamber or recess e^3 in its rear face concentric with the bearing of the shaft, and suitable thrust-plates e^4 and e^5 are disposed within this recess and provided with intermediate bearing-balls e^6 . The plate e^4 bears against the shoulder formed by reducing the end of the shaft, and the organization provides an end-thrust bearing by which the shaft is enabled to carry a heavy load. The shaft is provided outside the bearing-box with suitable operating means of any desired type, and has bearings with and against the arches against the stress of the load of fuel, the arrangement preferably being such that the flights fill the arches leaving only the required clearance.

The conveyer E is constructed to have its greatest carrying capacity immediately at and within the mouth of the retort, and preferably has a reduced carrying capacity in each direction from this portion of maximum capacity. For this purpose the conveyer is formed to taper preferably throughout the length of the conduit or neck, as shown at e^7 , and this is preferably accomplished by gradually reducing the diameter of the flights from the mouth of the retort toward the hopper. The mouth section e^8 of the conveyer is preferably formed with a

hub e^9 tapering in both directions from its center, the flights thereof being of approximately uniform diameter within the first section or chamber 1 of the retort, and sweeping the longitudinally horizontal floor thereof to provide a maximum carrying capacity within such section or chamber. The conveyer is reduced in carrying capacity at the first arch, preferably by reducing the diameter of the flights at that point, whereby a portion of the fuel will be deposited in the chamber 1, and a reduced quantity will be carried through the first arch into the second chamber 2. The carrying capacity of the conveyer within the chamber 2 is uniform by reason of the horizontal floor in the longitudinal line thereof and the uniform diameter of the conveyer flights therein. The conveyer is again reduced in carrying capacity, preferably by again reducing the diameter of its flights, at the second arch leading to the chamber 3, whereby a portion of the fuel carried from the first arch will be deposited in the second chamber and a reduced quantity will be carried from the second arch into the third chamber, in which likewise the conveyer is of uniform carrying capacity throughout the length thereof and the floor of which is horizontal from front to rear.

The relative arrangement of the flight-sections appears in Fig. 4, which being on the line 4—4 of Fig. 1 shows the spiral line 1' as indicating the conveyer-flights within the flared neck and the outer development of that line as indicating the flights in the chamber 1. The numerals 2' and 3' indicate the diameters of the flights in chambers 2 and 3 respectively.

The reduced diameters of the conveyer-flights are coincident with the steps a^2 and plates a^3 , whereby the carrying capacity of the conveyer is reduced in steps from the mouth of the retort to the rear, and the carrying capacity within each chamber is uniform throughout the length thereof. By this construction the fuel is deposited in the different chambers continuously, only part thereof passing through one chamber into the chamber next in the rear thereof, and the quantity in each chamber is uniform throughout its length, as the carrying capacity of the conveyer is uniform therein. The chambers have different capacities owing to the successive reductions of the widths thereof at their bottoms toward the rear of the machine, which vary their capacity or area corresponding with the portions of the decreased carrying capacity of the conveyer therein.

By the construction of the bearings for the conveyer, I reduce the friction of the parts appreciably, which is a desirable result in machines of this type, where the load is very heavy and has much inherent friction. The deflecting-plates and inclined rear-end

cause the fuel to pass readily upward and prevent its clogging and banking up with the retort. The increased carrying capacity of the conveyer from the hopper of the retort insures the supply of the maximum quantity of fuel at the mouth of the retort or at this place of initial distribution.

The part A furnishes the fuel support or magazine, and inasmuch as the combustion occurs at its top, in the region of the twyer-blocks, it constitutes the retort or furnace proper.

The twyer-blocks B and B' are supported directly upon the retort, and these several series have a common source of air-supply located preferably at the rear of the furnace. The pipe *b*, leading from a suitable source of air-supply, is extended into a rectangular discharge opening *b'*, the length of which corresponds approximately with the length of a chamber or passage *b*² on the underside of the rear of the retort and to which it is suitably bolted. The passage *b*² communicates with the several series of blocks, and air supplied from the pipe *b* is thereby distributed to the twyer-openings.

Having described my invention what I claim as new and desire to secure by Letters Patent is,

1. In an underfeed furnace, the combination with a retort, a conduit leading therefrom, and a hopper connected with said conduit, of a screw-conveyer extending through said conduit into said retort, said conveyer being of increasing carrying capacity from the hopper to the retort, and of decreasing carrying capacity within the retort.

2. In an underfeed furnace, the combination with a retort, having inclined sides, a hopper, and a connecting horizontal conduit, of a screw-conveyer extending from said hopper through said conduit into said retort, said conveyer having an increasing carrying capacity within the conduit and a decreasing carrying capacity within the retort.

3. In an underfeed furnace, the combination with a retort having a transversely curved bottom and inclined sides, a hopper, and a conduit leading from said hopper to the retort, of a conveyer in the conduit and retort, said conveyer having its maximum carrying capacity adjacent the mouth of the retort and reduced carrying capacity on each side thereof.

4. In an underfeed furnace, the combination with a retort having a longitudinally horizontal bottom curved in cross-section and provided with inclined sides, and a conduit in lateral extension thereof, of a screw-conveyer having an increasing carrying capacity from the source of supply toward the retort, and a decreasing carrying capacity within the retort.

5. In an underfeed furnace, the combination with a retort composed of chambers

of successively reduced capacities, and a feed conduit, of a screw-conveyer having its maximum carrying capacity in the first chamber and portions of reduced carrying capacities within the succeeding chambers and the feed conduit.

6. In an underfeed furnace, the combination with a retort composed of chambers of successively reduced capacities, deflecting-plates between the chambers, and a feed conduit, of a screw-conveyer having portions of successively reduced carrying capacities within the respective chambers and of increasing carrying capacity in the conduit.

7. In an underfeed furnace, the combination with a retort having a bottom formed in stepped horizontal sections, and deflecting-plates between the sections, of a screw-conveyer having an enlarged hub within the first section and whose flights are reduced in diameter at opposite sides of such hub.

8. In an underfeed furnace, the combination of a retort having a transversely curved bottom, inclined steps or flanges in the bottom providing horizontal sections, deflecting-plates arranged transversely of the retort and in approximate extension of said steps or flanges, the lower portions of said plates being cut away to form arched ports of successively reduced area, and a screw-conveyer having its maximum carrying capacity adjacent the mouth of the retort and being of decreasing carrying capacity at opposite sides of its portion of maximum carrying capacity.

9. In an underfeed furnace, the combination of a retort, deflecting-plates therein having ports, a conduit leading thereto, a screw-conveyer in said conduit and retort, roller bearings therefor, and an endthrust for the conveyer consisting of a pair of plates and rollers interposed between the plates.

10. In an underfeed furnace, the combination of a retort, deflecting-plates therein having ports, a conduit leading thereto, a screw-conveyer in said conduit and retort, an endthrust bearing device and journal bearing for said shaft in the conduit, the flights of the conveyer bearing in the ports of the plates.

11. In an underfeed furnace, the combination of a retort, a screw-conveyer therein, central and side twyer-blocks supported on the retort, and an air-passage in the rear of the retort leading to the blocks.

12. In an underfeed furnace, the combination of a retort, a screw-conveyer therein, a series of twyer-blocks on each side thereof, a central series of twyer-blocks supported on the retort, an air-supply passage across the rear of the retort, and an air-supply extended into a rectangular opening corresponding in area with the passage.

13. In an underfeed furnace, a retort composed of longitudinal sections each having a transversely curved bottom and an out-

wardly inclined unobstructed side, the rear
walls of the sections being upwardly and
backwardly inclined, and each section hav-
ing a plate which with the plate of the other
5 section forms a deflector.

14. In an underfeed furnace, a retort com-
posed of longitudinal sections and having
transverse deflecting-plates portions of which

are formed on each section, and upwardly
and backwardly inclined rear walls. 10

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

JOEL EDGAR JONES.

Witnesses:

GEORGE R. HARBAUGH,
J. McROBERTS.