June 21, 1938. G. N. HALTER 2,121,229

MECHANICAL FURNACE

Filed April 5, 1935 2 Sheets-Sheet 1

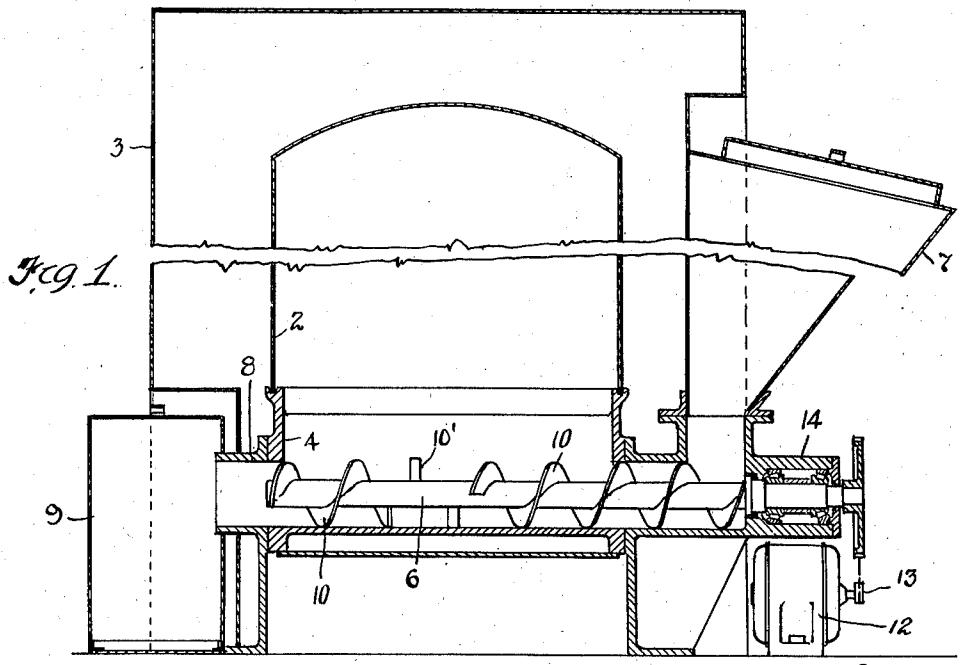



Fig. 1.

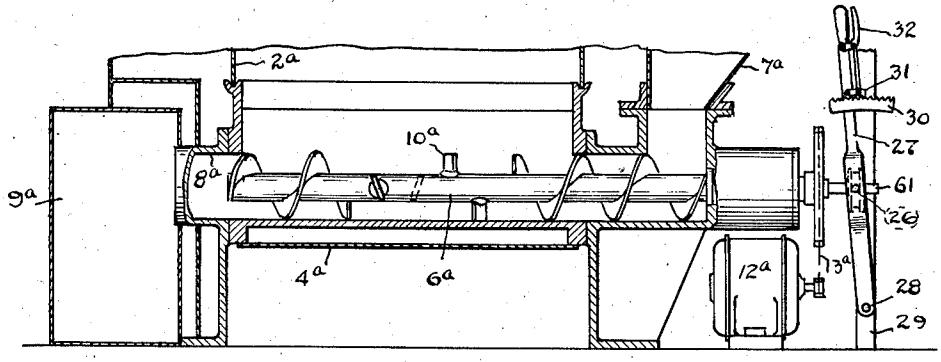



Fig. 2.

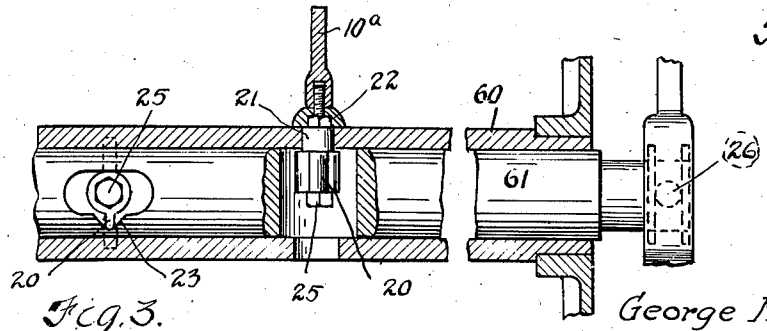



Fig. 3.

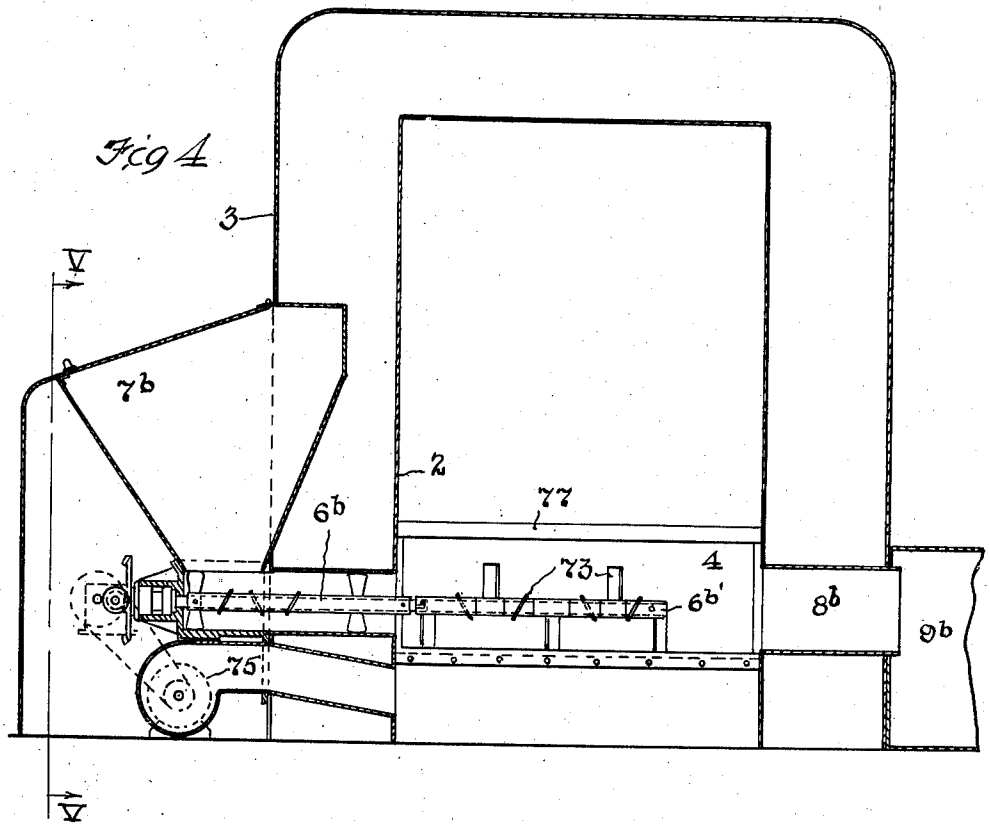
INVENTOR.
George N. Halter
BY
Fay, Oberlin & Fay
ATTORNEYS.

June 21, 1938. G. N. HALTER 2,121,229

MECHANICAL FURNACE

Filed April 5, 1935 2 Sheets-Sheet 2

Fig 4



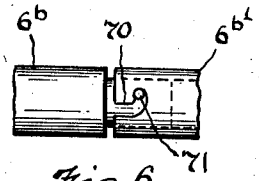




Fig. 6

Fig. 8

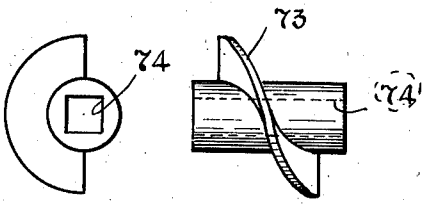



Fig. 7

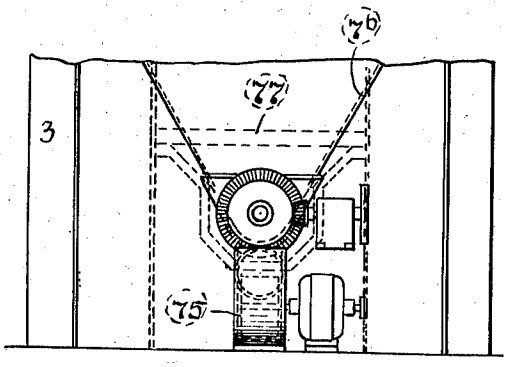



Fig. 5

INVENTOR.
George N. Halter
BY
Fay, Oberlin & Fay
ATTORNEYS.

Patented June 21, 1938

2,121,229

# UNITED STATES PATENT OFFICE

2,121,229

## MECHANICAL FURNACE

George N. Halter, Canton, Ohio

Application April 5, 1935, Serial No. 14,867

1 Claim. (Cl. 110—32)

This invention relates to furnaces, and more particularly mechanically operated furnaces; and it is among the objects of the invention to provide a construction capable of not only attending to fuel-feed, but also tending the fire bed and removing the ashes. Another object is the provision of a construction which reduces moving parts in the heated zone to very simple terms, with consequent promotion of reliable operation and durability. Other objects and advantages will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, comprises the features hereinafter fully described, and particularly pointed out in the claim, the following description and the annexed drawings setting forth in detail certain illustrative embodiments of the invention, these being indicative however, of but a few of the various ways in which the principle of the invention may be employed.

In said annexed drawings:—

Fig. 1 is a vertical sectional view of an embodiment of the invention, portions being broken away; Fig. 2 is a similar view of a slightly different form; Fig. 3 is an enlarged fragmentary detail section; Fig. 4 is a view analogous to Fig. 1, showing some modification thereof; Fig. 5 is a section taken on line V—V, Fig. 4; and Figs. 6, 7, and 8 are enlarged details.

Referring more particularly to the drawings, there is shown a furnace chamber 2, which may be of any preferred form, and which may be surrounded by a housing 3, where a hot-air type of general installation is desired. At the base of the furnace chamber is a fire box or fire pot 4, and mounted in relation therewith is a rotary shaft 6 which extends from a point in relation with the solid fuel supply chamber 7 across to the ash-discharge port 8 which is arranged to cooperate with an ash-receiver 9 of conveniently removable and replaceable character. The shaft 6 carries forwarding blades, and these may be in the form of screw-pitch sections 10, Fig. 1. More or less interval or interspacing may be left between the blades 10 at the central portion of the fire pot. A few stagger blades or pins 10' may however be here arranged as an aid in breaking up any clinker formation which may tend to occur during quiescent periods of the mechanism. The shaft 6 is driven by any suitable means, for instance, a motor 12 through the medium of gearing or a chain 13 may drive the shaft and, depending upon the particular requirements of the installation, the motor may have a thermostatic control or not, as desired. By mounting the shaft in an end shaft-housing 14 and providing a sufficient extent of bearing or spaced-apart bearings, support for the shaft may be secured entirely outside of the heated zone, thereby obviating necessity for further bearings at the other end of the shaft or intermediately. In this manner also, particular freedom from distortion-stresses and binding in bearings is avoided. The initial blade section 10 lies under the mass of solid fuel in the fuel supply chamber 7, and operates to forward the fuel into the fire pot. The final blade section is in position to draw off the ashes from the fire zone into the ash-receiver 9.

From the foregoing, the mode of operation of the device will be clear. The supply of solid fuel is provided in supply chamber 7. This fuel may be anthracite or bituminous coal, or coke or the like, this construction being capable of operation with wide range of kinds and sizes of fuels, on account of its coordinated action. The ash as formed is progressively removed from the fire pot to the ash-receiver, and the latter when full may be removed and be replaced by substitute empty receiver. With intermediate blades 10' on the shaft, the fire bed is adequately stirred or broken up as the operation requires, thereby insuring ample aeration and avoidance of detrimental clinker-formation.

As a further refinement of the invention, the blades to the extent desired, may also be made regulable as to pitch, whereby the rate of progression of the fuel and ash may be controlled with high accuracy. As shown in Figs. 2 and 3, the furnace chamber 2a is arranged with the fire box or fire pot 4a, and the shaft 6a in relation therewith and extending from the fuel supply chamber 7a to the ash-discharge port 8a, a replaceable receiver 9a for the ashes being provided as aforedescribed. The shaft 6a is driven by suitable means, for instance motor 12a and gearing or sprocket chain 13a, and the motor may have a thermostat control or not, as desired. The blades 10a are regulable or of adjustable pitch. One way of obtaining this may comprise regulable studs upon which the blades are supported, the studs being capable of being positioned to pitch the blades as desired. Instead of individual regulation, it is preferable further, to control the pitch-setting from outside, and also without necessity of stopping the motor. Thus, the blades 10a may be mounted on the hollow shaft 60 with arrangement for pitch-adjustment swing, and core shaft 61 may incorporate the operation means for changing the pitch-setting of the

blades. As illustrated in Fig. 3 a construction to this end may comprise a stud having an eccentric inner end 20 and a rounded journal portion 21, and a squared end 22, the eccentric 20 riding in and being controlled by a slot 23 in the core shaft 61, while the round portion 21 of the stud serves as a journal, being mounted in the bushing 24 which in turn is carried in the sleeve shaft 60. By having the bushing cylindrically surfaced internally to receive the stud journal and taper-surfaced externally to lock into the sleeve shaft, the members are securely mounted in assembly, and with freedom for turning to the extent required. The squared portion 22 of the stud fits into a corresponding recess in the base of the blade 10*a*, whereby turning of the stud also occasions turning of the blade in its slight pitch-adjusting movement. The stud is held to the blade, and the blade held to the shaft, by a suitable cap-screw 25 which takes through a smooth bore through the length of the stud and screw-fastens into the blade. The slots 23 which receive the eccentric ends of the blade-carrying studs are sufficiently curved to give blade-pitch positions in a range as practicably desired, the adjustment being attained simply by relative longitudinal movement of the core shaft 61 in the sleeve shaft 60. For this, the core shaft 61 may be grooved near its outer end to receive the pins 26 of the shift-lever 27. The latter may be suitably pivoted, as at 28 on a brace or support 29, and the position of the core shaft relative to the sleeve shaft 60 may be maintained in adjusted set by suitable means, for instance a ratchet segment 30 and pawl 31, the latter controlled by thumb-lever 32 on the operating handle of the shift-lever 27. As readily seen, the pins 26 of the shift-lever 27 ride in their groove irrespective of the rotation of the shaft, in the manner of clutch-shift devices, and while the motor is driving the shaft, the set of the blades may be adjusted to whatever pitch may be desired at the time.

In the form shown in Figs. 4–7, the feeder shaft is in two general portions, 6*b*, 6*b'*. The latter in the fire pot need not extend entirely across, it being found sufficient for suitable feed if it extend merely the greater proportion of the distance between the walls and in alignment with the discharge port 8*b* to the ash-receiver 9*b*. This portion of the shaft is desirably of a heat-resisting alloy, nickel alloy, etc., while the shaft portion 6*b* may be of ordinary ferrous base or ordinary steel. The shaft portion 6*b'* is furthermore conveniently separable from the portion 6*b*, as for instance by bayonet joint, such that on positioning the slot-end 70 in relation with the pin 71 which is on the end of the shaft portion 6*b*, normal turning movement of the shaft locks the parts firmly together. For removal, it is merely necessary to twist the shaft portion 6*b'* backwards sufficient to disengage the bayonet slot 70 from the pin 71. Conveniently also, this portion of the shaft may be in whole or in part formed of blade-sections 73 having a squared or shouldered opening 74 so as to fit on to the squared or shouldered shaft portion. The endmost blade section may be secured to the shaft by suitable means, for instance an end drive wedge pin or a set screw. The drive motor may also be arranged to drive a blower 75 to provide an air supply to the combustion chamber.

In some cases it is desirable to retain grate bars 77 of conventional construction, supplementarily, in order that the furnace may be hand-fired on occasions as desired, instead of using the mechanical equipment.

Other modes of applying the principle of the invention may be employed, change being made as regards the details described, provided the means stated in the following claim, or the equivalent of such, be employed.

I therefore particularly point out and distinctly claim as my invention:—

In a hot air furnace, a fire box, a furnace chamber above said fire box, a furnace housing surrounding said fire box and said furnace chamber, and having oppositely disposed recesses therein, said fire box having an ash discharge port at one end thereof adjacent one of said recesses and a fuel conduit in its opposite end extending into the other recess, a fuel supply chamber inset into said last named recess and communicating with said fuel conduit, and an ash receiver in said first named recess communicating with said ash discharge port and having a portion accessible from the exterior of said housing.

GEORGE N. HALTER.