

March 24, 1925.

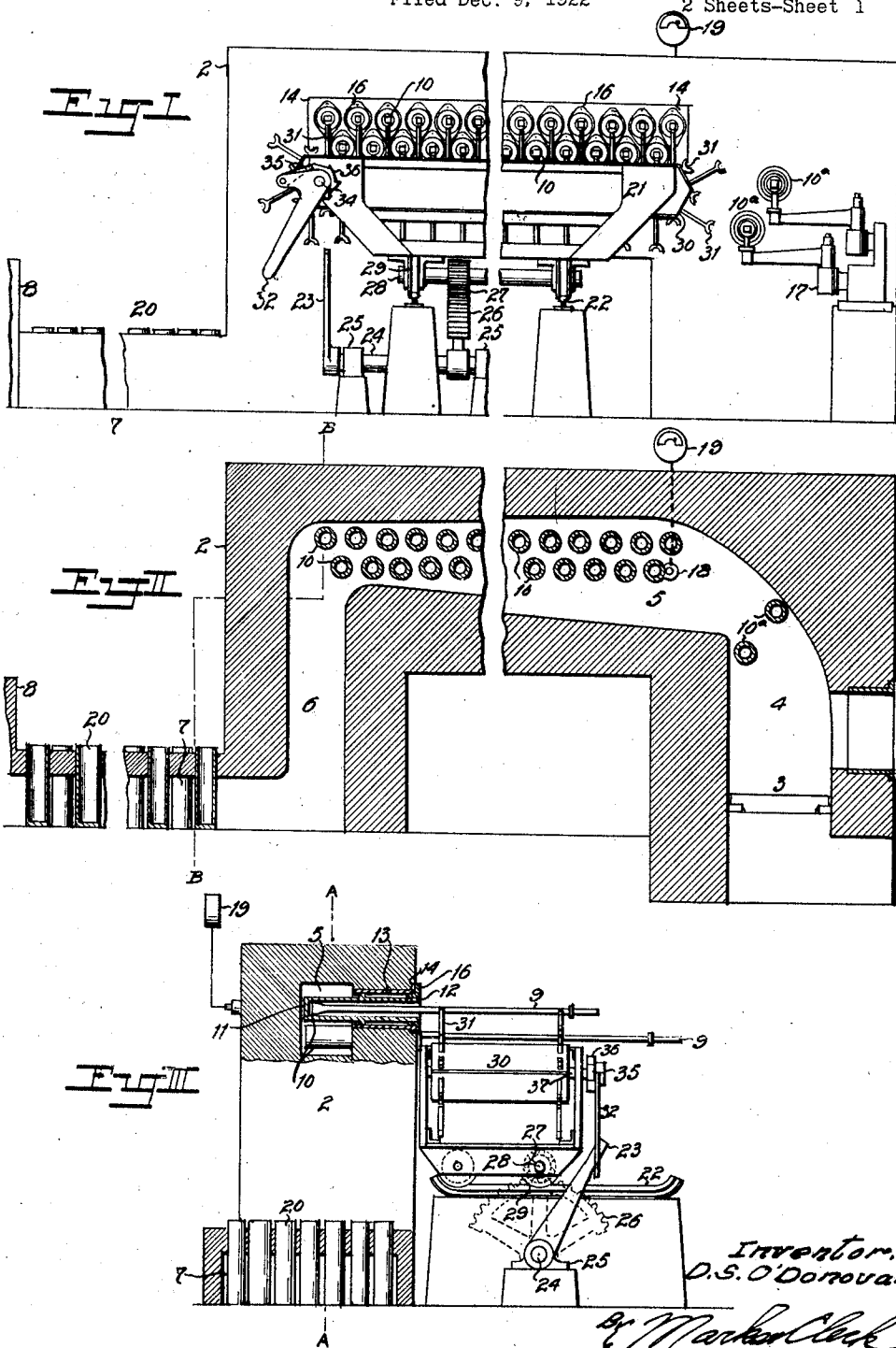
D. S. O'DONOVAN

1,531,214

FURNACE FOR HEATING ROCK DRILLS AND THE LIKE

Filed Dec. 9, 1922

2 Sheets-Sheet 1



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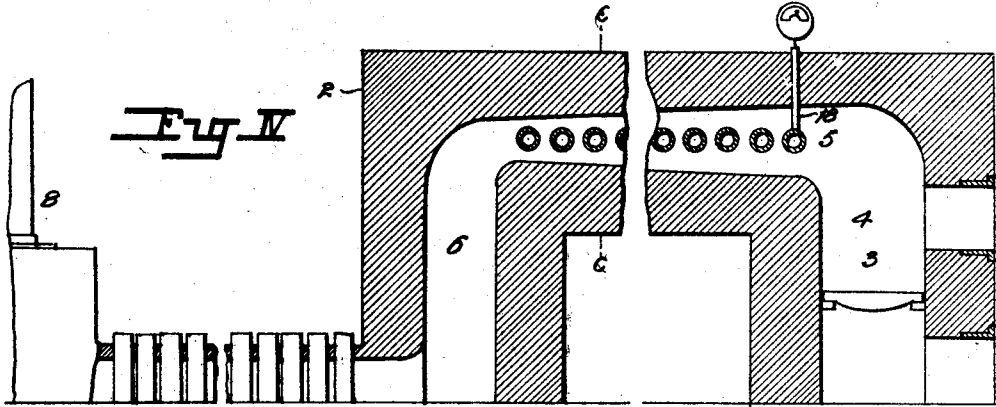
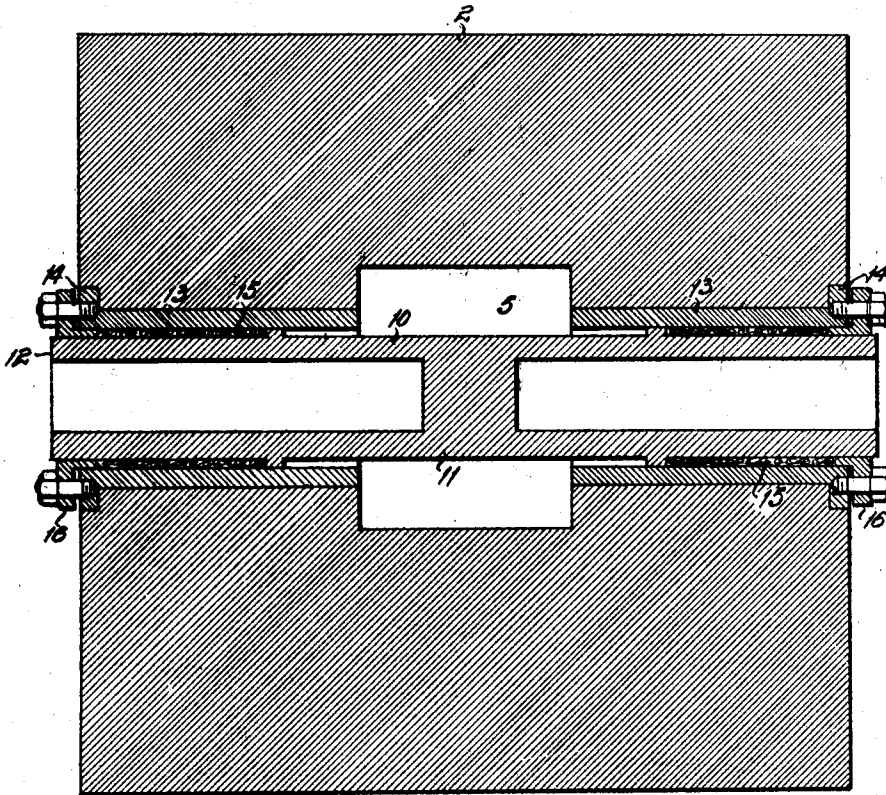
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D. S. O'DONOVAN

FURNACE FOR HEATING ROCK DRILLS AND THE LIKE

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2 Sheets-Sheet 2



Inventor:
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by *Mark Clerk*
Att'y

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UNITED STATES PATENT OFFICE.

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FURNACE FOR HEATING ROCK DRILLS AND THE LIKE.

Application filed December 9, 1922. Serial No. 605,926.

To all whom it may concern:

Be it known that DAVID STANISLAUS O'DONOVAN, a British subject, residing at 12 Plantation, Vogelfontein, Transvaal Province, Union of South Africa, has invented certain new and useful improvements in Furnaces for Heating Rock Drills and the like, of which the following is a specification.

The present invention has reference to furnaces intended especially for heating rock drills for the purpose of either forging or hardening them.

The invention is illustrated in the accompanying drawings in which—

Fig. I is a side elevation of a furnace for heating rock drills preparatory to hardening them.

Fig. II is a longitudinal section thereof on A—A Fig. III.

Fig. III is an end view partly sectioned on B—B Fig. II.

Fig. IV is a longitudinal section of a furnace for heating drills for forging.

Fig. V is an enlarged cross section thereof, on C—C Fig. IV.

In the drawings 2 indicates the furnace structure in which is a grate 3, a combustion chamber 4, and a muffle heating flue 5.

From the latter the gases pass through a down flue 6 and an economizer chamber 7 to the chimney 8.

The drills 9, or other articles to be heated, are inserted in muffles 10. These are tubular members closed at their inner ends 11 and open at the end 12 for the reception of the drills. Their inner ends project into the furnace cavity and they are preferably arranged horizontally. In order to facilitate their renewal they are placed in sockets 13 which may be cast integral with the plate 14, and are secured therein by asbestos packing 15 compressed by a gland 16. They are spaced apart along the flue 5 so that their temperatures are progressively higher the nearer they are to the fire. In the case of the hardening furnace, Figs. I to III, two final heating muffles 10^a are shown, disposed in the combustion chamber 4. There are two corresponding rows of soaking muffles 10 in the heating flue 5, each row intended to co-operate with one final tube 10^a and the rows being staggered to assist the even distribution of heat. This furnace is

arranged to be worked from one side and is shown as provided with the automatic drill removing device 17 which is described in my other application filed herewith.

The furnace shown in Figs. IV and V is for heating the drills for sharpening. It is designed to be worked from both sides, the muffles 10 being double ended and arranged in a single row.

In each case the last muffle in the flue 5 is provided with a pocket 18 for a pyrometer, which indicates on a conveniently placed dial 19.

The economizer consists of a chamber 7 through which the partially cooled gases pass on their way to the uptake 8, and a number of tubes 20 with closed ends projecting into said chamber. These tubes are preferably arranged vertically.

The method of operation is that the cold drills are placed in the economizer tubes 20 and are there preliminarily warmed. They are then placed in the coolest of the soaking muffles 10 and after remaining there for a period are moved to the next hotter muffle and so on in succession until they attain the desired final temperature in the most highly heated muffle and are removed from the furnace.

This gradual heating is of considerable value in preventing internal strains in the metal; whilst the fact that the drills are not exposed to the furnace gases greatly assists in preventing deterioration of the quality of the steel.

In order to maintain the desired temperature gradient through the series of muffles in the heating flue 5 said flue is made of decreasing cross section away from the fire. This diminishes the contact of the hot gases with the muffles nearer the fire and enables such gases to carry over their heat to the farther muffles. By this means the temperatures of the various muffles can be so adjusted that the drills receive their increment of heat in each of them in the same time and all the drills can be moved together.

It is preferred to use mechanical means for effecting the shifting of the drills through the series of muffles. For this purpose there is provided a carriage 21 mounted to travel on rails 22 towards and from the furnace structure 2. It is so

5 moved by a lever 23 fixed on a shaft 24 carried in fixed bearings 25. On said shaft is a toothed quadrant 26 which engages a pinion 27 secured on the axle 28 which also has the carriage wheels 29 fixed to it.

10 Mounted on the carriage 21 is a chain or other convenient conveyor 30. On said conveyor are fixed drill supports 31 spaced from one another in the direction of the conveyor's length, by a distance equal to the distance between the muffles 10. The conveyor is moved step by step, through the same distance, by the lever 32 pivoted to the conveyor frame and fitted with a pawl 15 35 engaging the ratchet wheel 36 on the drum shaft 34 of the conveyor.

20 In making use of this mechanism, drills placed on the supports 31 are held thereby in position in the several muffles. When the drill in the last or most highly heated muffle has attained the correct temperature, the lever 23 is actuated to retract the carriage 21 from the furnace, whereby all the drills are withdrawn from the muffles.

25 The finished drill is removed from its supports; the lever 32 is actuated to advance all the drills one step ahead, and a drill which has been taken from the economizer is placed on the unoccupied support thus brought into position; whereupon the lever 23 is brought back to its original position, thus returning the drills to the muffles, but all moved one muffle ahead.

I claim:

35 1. A furnace for heating drills and the like comprising a horizontal flue and a series of open ended muffles arranged substantially in a horizontal line and extending into the flue, the flue being of considerable length so that there is a wide range of temperature throughout the series of muffles.

40 2. A furnace for heating drills and the like, comprising a long horizontal flue, a series of open ended muffles arranged in a

substantially horizontal line and extending into the flue and supporting means arranged in line with the muffles and adapted to support a number of drills with their ends in the muffles.

3. A furnace for heating drills and the like comprising a furnace structure providing a combustion chamber and a flue decreasing in cross sectional area away from the combustion chamber, and muffles 55 open at one end and positioned transversely in the flue at different points in the length thereof.

4. A furnace for heating drills and the like comprising a furnace structure providing a combustion chamber, a flue, and an economizer chamber, a number of open ended muffles disposed along the flue to be heated to different temperatures and a number of open ended tubes inserted into the 65 economizer chamber.

5. A furnace for heating drills and the like comprising a furnace structure, a row of muffles extending thereinto and arranged to be progressively heated to different temperatures and movable means for supporting drills or the like in the muffles, said means operating to advance the drills by steps from muffle to muffle.

6. A furnace for heating drills and the like comprising a furnace, a row of muffles therein presenting open ends externally to the furnace, a carriage retractible from the furnace structure, a conveyor mounted on the carriage to move parallel with the line 80 of muffles, supports for the drills or the like on the conveyor and spaced equally with the muffles, and means for reciprocating the carriage to and from the furnace structure and to advance the conveyor step by step.

In testimony whereof I affix my signature.

DAVID STANISLAUS O'DONOVAN.