July 17, 1951

M. A. BRUN ET AL
DISTRIBUTING DEVICE FOR THE
CHARGE OF SHAFT FURNACES

2,560,844

Filed June 24, 1949

2 Sheets-Sheet 1

Fig: 1

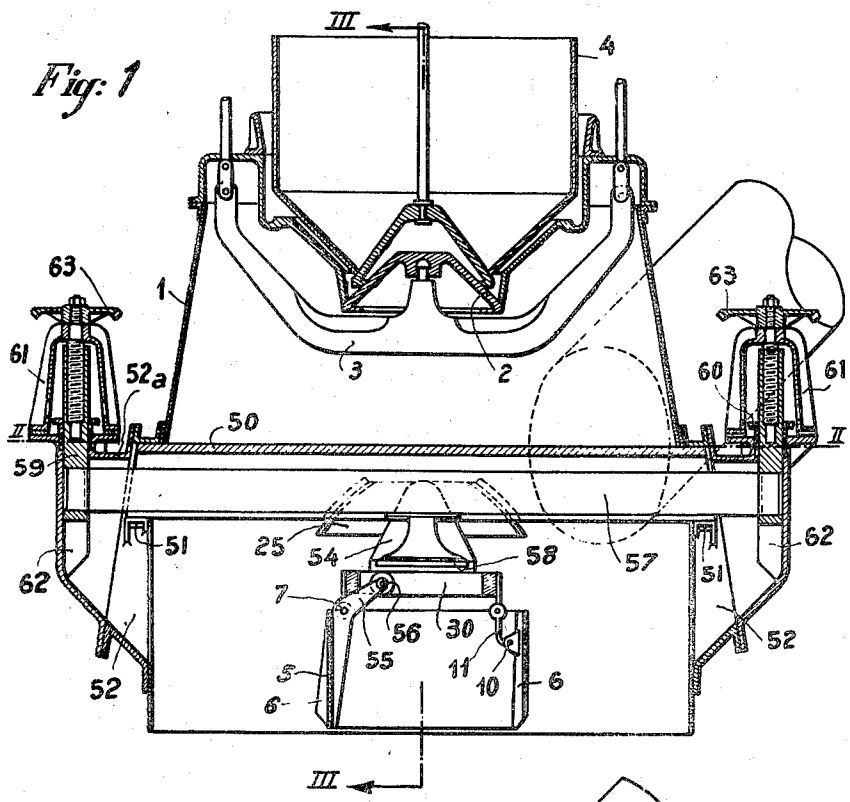
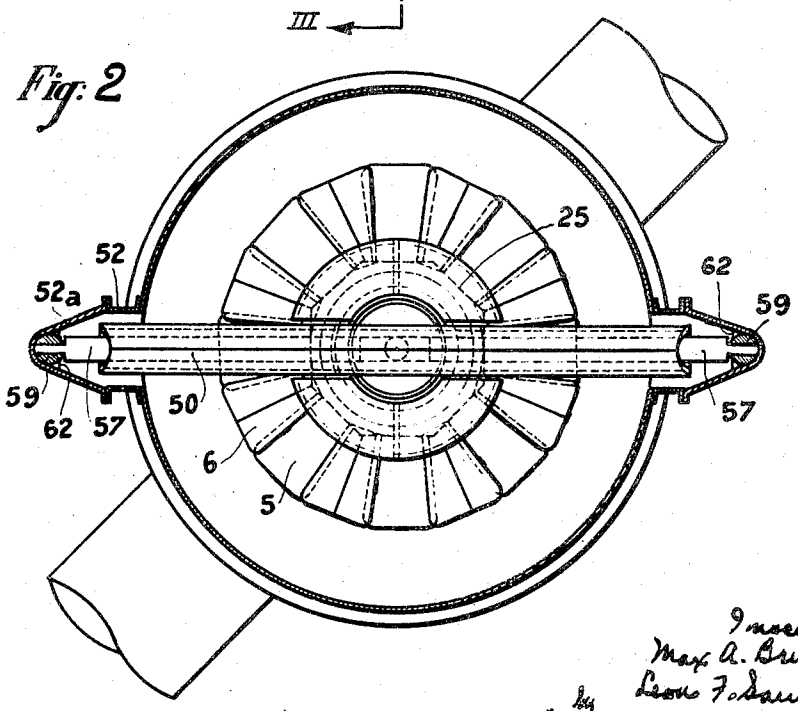


Fig: 2



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Fig. 4

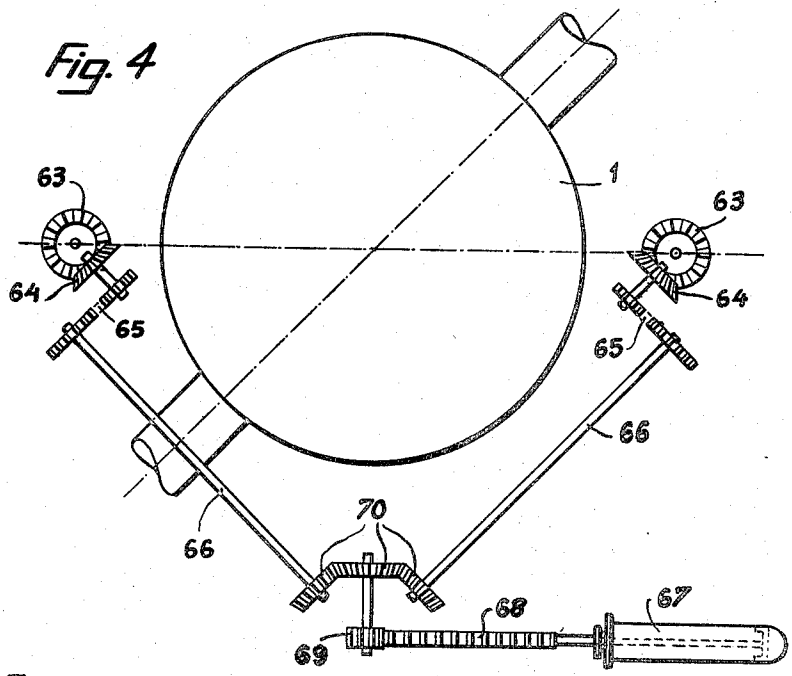
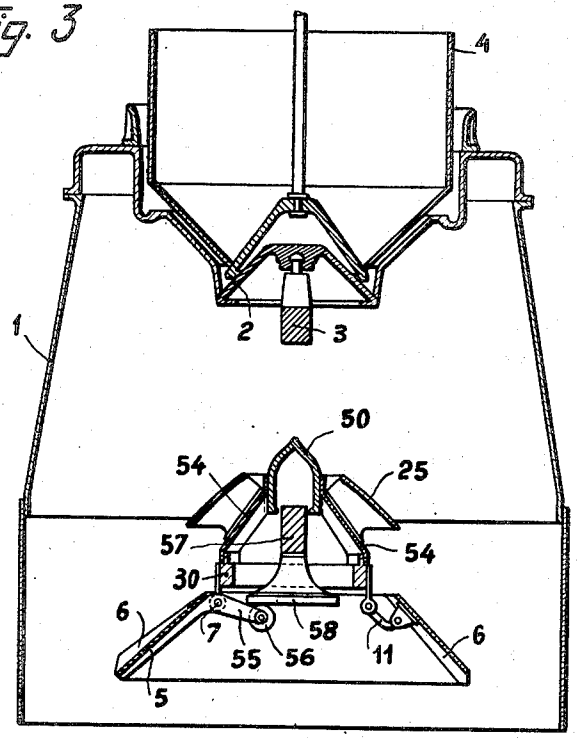


Fig. 3



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UNITED STATES PATENT OFFICE

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DISTRIBUTING DEVICE FOR THE CHARGE OF SHAFT FURNACES

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Application June 24, 1949, Serial No. 101,124
In France July 16, 1948

6 Claims. (Cl. 214—35)

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In our co-pending U. S. patent application Serial No. 39,914, filed July 15, 1948, we have described a distributing device for the charges in shaft furnaces, made of a series of pivoted panels arranged according to a crown on a stationary frame, provided inside the top of a furnace. These panels overlap one another and are mounted as an umbrella, in such a manner that they can simultaneously take a variable slope, which determines the diameter of the circular jet when the charge is falling. They are simultaneously operated by means of a suitable control device.

The panels are plane or dihedral. The plane panels, which are pivoted at their upper portion on the central frame, are the only ones which are operated by the driving mechanism. The dihedral panels, inserted between two consecutive plane panels in order to partially overlap them, are connected to the central frame by a double pivoting, in such a manner that they may bear on the driven plane panels along their whole length, whatever be the slope given to said panels.

In our above mentioned patent application, we have also described a driving mechanism of the plane panels, and consequently of the whole distributing device, comprising a horizontal beam diametrically arranged at the upper part of the furnace and which may be raised or lowered by a suitable mechanism while remaining constantly horizontal. This beam supports a vertical column arranged along the axis of the furnace. At the upper part of this column are pivoted the connecting rods operating the plane panels, which are pivoted at their other end at the lower portion of said panels. At each position of the horizontal beam thus corresponds a determined slope of the panels of the distributing device.

In the same patent application, the circular beam supporting the panels may be hung on the cone protecting the device, which is itself supported by radial brackets secured to the wall of the top.

The main objects of our present invention are:

1. To simplify the device supporting the panels in order to enable a free expansion of said device,

2. To reduce the number of the pivotings of the driving mechanism,

3. To enable an easier discarding of certain parts.

According to the invention, the circular beam on which the various panels are pivoted can be hung on a diametral beam maintained at the top of the furnace, in such a way that it can freely expand, and each plane panel can be integral with a radial arm bearing a roller at its free end,

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a roller which is maintained by the weight of the panel against a central plate attached to a diametral beam freely expanding which can be displaced vertically, while remaining horizontal, by an appropriate operating mechanism.

In that case, the diametral suspension beam may conveniently have a cross-section in the shape of an inverted U, and be supported, by its two ends, inside boxes attached to the wall outside the furnace. The diametral beam driving the motion of the panels will be placed inside the U beam and freely engaged by its two ends in two rods guided vertically and displaced in synchronism by screw-jacks.

The lateral boxes can have as a cover a detachable part, permitting the extraction laterally of the beam and the plate driving the panels.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this application and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a vertical cross-section taken on the axis of the distributing device,

Figure 2 is a horizontal section taken on line II—II of Figure 1,

Figure 3 is a vertical section taken on line III—III of Figure 1, and

Figure 4 is a diagrammatical view of one of the utilizable devices for the operation of the diametral beam.

In the embodiment shown in the drawing, the distributing device is hung on a fixed diametral beam 50 bearing freely at its two ends on supports 51 designed inside two boxes 52 attached to the wall of the top. This hollow beam in the shape of an inverted U can thus freely expand, and is maintained below the charging device at a distance only just sufficient for enabling the bell 2 to normally open.

A fixed circular beam 30, on which plane panels 5 and dihedral panels 6 are pivoted, is hung on or supported by the diametral beam 50 by steel fittings 54 and, as in already described devices, a protection cone 25 prevents the fall of the charge into the variable truncated pyramid formed by the movable panels.

To each plane panel 5 hung on circular beam 30, by a pivoting axle 7, is invariably linked an arm 55 placed in a radial plane of the furnace; this arm is provided at its end with a roller 56. Each dihedral panel 6 bears on plane panels 5

between which it is placed, and is linked to the circular beam by the double pivoted rod 11.

Inside the beam 30, in the shape of an inverted U, is placed a horizontal beam 57 which adjusts the panels. The latter beam is movable vertically and carries in its middle a circular horizontal plate 58 which rests on rollers 56 secured to the plane panels.

Each end of the movable beam 57 engages, in such a way that it can freely expand, a vertical cylindrical driving rod 59 guided above and below; all inclination of beam 57 is thus prevented. Both rods 59 are compelled by the adjusting device to always have a travel absolutely the same, and the beam 57 thus remains constantly horizontal in all its positions, at the same time as plate 58. The latter being plane, an off setting from its center has no influence on the working of the distributing panels.

Plate 58 can only rest on rollers 56, and when going down causes the umbrella to open. When the plate is lifted, the closing is obtained automatically by the weight of the panels and by the fall of the charge on them. At every position of the plate corresponds one slope of the panels of the distributing device.

Each one of rods 59 passes through a tight stuffing box 60 in the upper part of the cover 52a of each of the boxes 52 attached to the outside wall of the furnace and is actuated by a reversible screw-jack 61 secured to this cover.

The guiding of each rod is obtained at the upper part by stuffing-box 60 and at the lower part by a tubular grip 62 integral with the cover 52a and surrounding rod 59 on about 4/5 of its periphery.

The arrangement including the cover 52a of the box, rod 59 and its screw-jack 61 can be easily removed. Beam 57 is then accessible and can also be brought out through the open box, boxes 52 and the suspension of the internal circular beam 30 being designed in order to allow the passage of beam 57 and plate 58.

Both screw-jacks 61 actuating beam 57 are identical and are simultaneously driven by two identical transmissions.

In the embodiment shown in Fig. 4 both screw jacks 61 which each carry a conical pinion 63 are driven in unison by two pinions 64 receiving their motion by means of a transmission including a chain 65. Both chains 65 are actuated by two shafts, placed at right angles, linked by conical pinions to any electric, hydraulic motor or any motor of any other type, the reversibility of screw-jacks enabling to adopt any desired solution. In Fig. 4 a hydraulic cylinder 67 actuates a rack 68 producing the rotation of shafts 66 by proper intermediary gears 69 and 70.

The drive of the screw-jacks by chain, that is by a non-rigid link, has the advantage of permitting the arrangement of the motor at any height and to thus avoid the possible obstacles, and specially intake gas ducts.

In the arrangement which is above described, the device sustaining the distributing device is limited to a hollow diametral beam, in which is placed the beam actuating the panels. Possibilities of hanging or clogging by certain materials, such as scraps or steel turnings are thus reduced to a minimum.

The beam actuating the panels is rectilinear and easily removable; its position above the distributing device reduces its length in the case of tops having the shape of a truncated cone.

Finally, the number of pivots unchanged for the dihedral panels, is reduced to one for each plane panel. Furthermore, the operating of the apparatus by a plane plate makes it insensitive to a possible off setting of the plate relatively to the distributing device.

It is to be understood that the form of our invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of our invention or the scope of the subjoined claims.

We claim:

1. A device for the distribution of the charges in a shaft furnace which comprises a first diametral beam secured at the top of the furnace and adapted to freely expand; a circular beam supported by said diametral beam; a set of regularly spaced plane panels pivoted at their upper end on said circular beam; a radial arm extending from each plane panel; a roller provided at the end of each radial arm; a set of dihedral panels pivoted near their upper ends on said circular beam, each dihedral panel set outside and between two consecutive plane panels being adapted to cover the edges of the plane panels whatever be their slope; a second diametral beam, arranged at the top of the furnace, adapted to be vertically moved; a central plate secured to said second diametral beam, arranged and adapted to bear on said rollers; and means to vertically move the second beam and central plate while keeping the second beam horizontal whereby said rollers are urged to vary the slope of said plane panels.

2. A device according to claim 1, in which the first diametral beam has the shape of an inverted U, two bearers are provided outside the top of the furnace, both ends of said first diametral beam are supported outside the furnace by said bearers, and two boxes are secured to the outside wall of the furnace to enclose said bearers.

3. A device according to claim 1, in which the first diametral beam has the shape of an inverted U, and the second diametral beam is arranged inside said first diametral beam.

4. A device for the distribution of the charges in a shaft furnace which comprises a first diametral beam secured at the top of the furnace and adapted to freely expand; a circular beam supported by said diametral beam; a set of regularly spaced plane panels pivoted at their upper end on said circular beam; a radial arm extending from each plane panel; a roller provided at the end of each radial arm; a set of dihedral panels pivoted near their upper ends on said circular beam, each dihedral panel set outside and between two consecutive plane panels being adapted to cover the edges of the plane panels whatever be their slope; a second diametral beam arranged at the top of the furnace; two vertical rods adapted to be vertically moved arranged at the ends of said second diametral beam so that the ends of said second beam engage them, a central plate secured to said second diametral beam, arranged and adapted to bear on said rollers; and means to vertically move said vertical rods, second beam and central plate, while keeping the second beam horizontal whereby said rollers are urged to vary the slope of said plane panels.

5. A device for the distribution of the charges in a shaft furnace which comprises two bearers secured outside the top of the furnace; a first diametral beam, having the shape of an in-

verted U, supported by said bearers; two boxes secured to the outside wall of the furnace enclosing said bearers; a circular beam supported by said diametral beam; a set of regularly spaced plane panels pivoted at their upper end on said circular beam; a radial arm extending from each plane panel; a roller provided at the end of each radial arm; a set of dihedral panels pivoted near their upper ends on said circular beam, each dihedral panel being set outside, between two consecutive plane panels, adapted to cover the edges of the plane panels whatever be their slope; a second diametral beam arranged at the top of the furnace; two vertical rods adapted to be vertically moved, arranged at the ends of said second diametral beam so that the ends of said second beam engage them; a gas tight stuffing-box arranged at the upper part of each one of both said boxes, each adapted to guide

one of said vertical rods; a vertical grip arranged inside each of said boxes adapted to guide the lower portion of each of said vertical rods; and means to vertically move said vertical rods, second beam and central plate while keeping the second beam horizontal, whereby said rollers are urged to vary the slope of said plane panels.

6. A device according to claim 5, which comprises a screw jack secured at the upper part of each one of said boxes, adapted to vertically move the corresponding vertical rod; two identical drive systems comprising each a sprocket-chain for both said screw jacks; and a motor adapted to actuate both drive systems.

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No references cited.