Aug. 17, 1943. R. G. LE TOURNEAU 2,326,953

FEEDING DEVICE FOR BILLET HEATING FURNACES

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Fig. 1

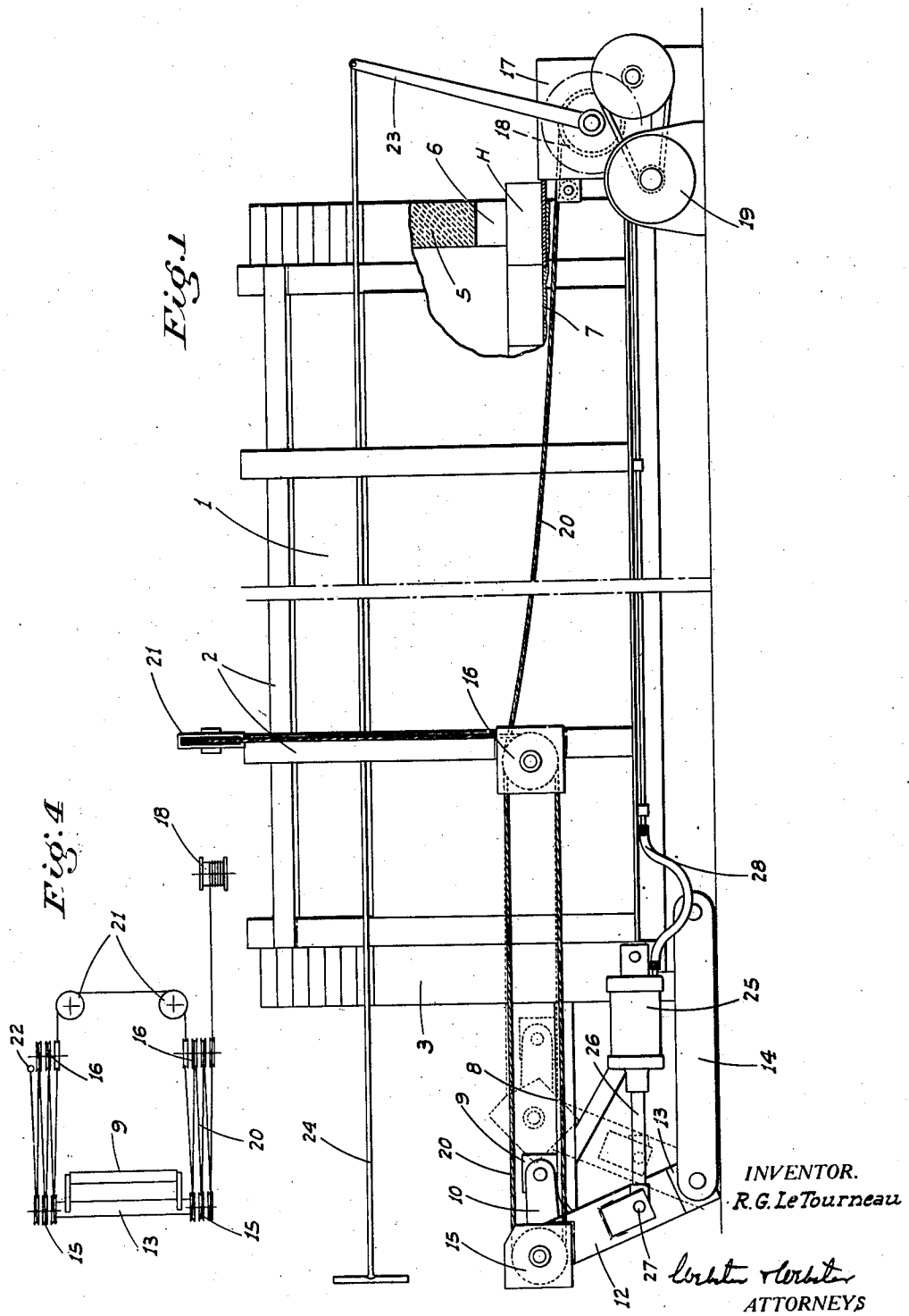


Fig. 4

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Fig. 2

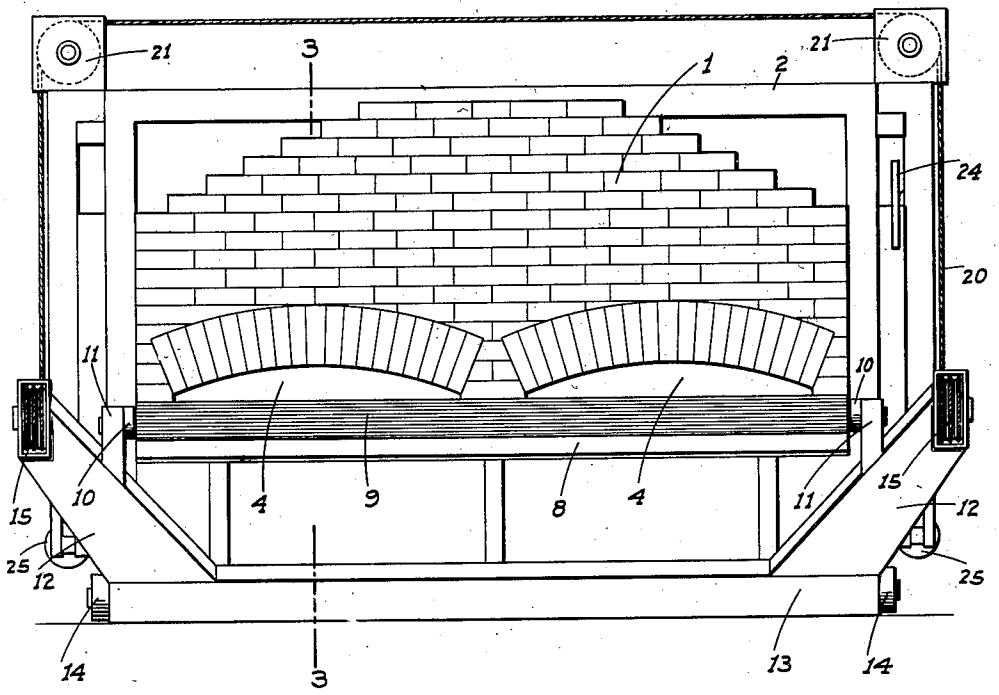
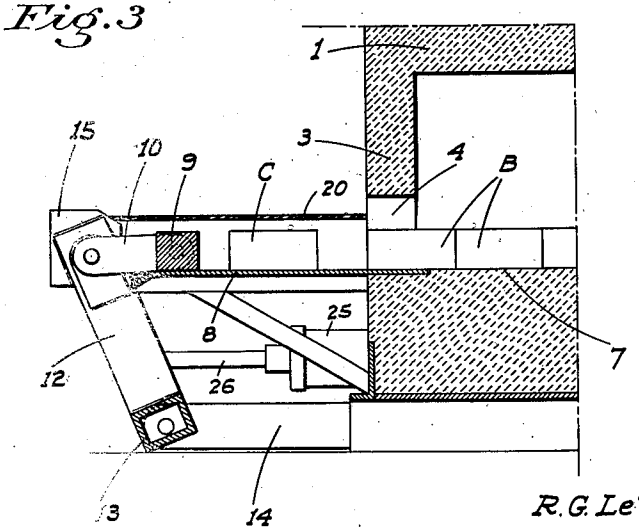


Fig. 3



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FEEDING DEVICE FOR BILLET HEATING FURNACES

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8 Claims. (Cl. 214—18)

This invention relates in general to a power attachment for a billet heating furnace, and in particular the invention is directed to, and it is the principal object to provide, unique power actuated mechanism to feed a plurality of billets through a furnace for heating.

Another object of this invention is to embody in a feeding device for a billet heating furnace, a novel billet advancing arrangement which is operative to move a plurality of lengthwise rows of billets through the furnace from end to end thereof; the rows being moved step by step whereby cold billets may be added to the beginning of the rows with each step.

It is also an object of this invention to provide a feeding device for a billet heating furnace, which includes a pusher bar, and actuating mechanism therefor; the latter including a cable assembly to advance the pusher bar, and an automatically functioning pneumatic cylinder operative upon release of said cable assembly to retract the pusher bar.

A further object of the invention is to provide a feeding device for a billet heating furnace, which includes a horizontal billet receiving apron at the feed end of the furnace, a pusher bar extending transversely of said apron, and means to alternately advance and retract said pusher bar over the apron and lengthwise of the furnace.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purpose for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Figure 1 is a side elevation, partly broken away, of a billet heating furnace with the feeding device arranged in connection therewith.

Figure 2 is a front end view of the furnace and billet feeding device.

Figure 3 is a fragmentary sectional elevation of the furnace and pusher bar assembly illustrating the same in its relation to the forward end of the furnace and billet supporting apron, taken on line 3—3 of Fig. 2.

Figure 4 is a diagrammatic plan view of the reeving of the cable assembly.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 indicates in general a billet heating furnace formed within an upstanding substantially rectangular frame 2; the furnace including a front wall 3 having feed openings 4 therein and a rear wall 5 having discharge openings 6 in the same.

The furnace is of suitable brick and fire-resistant plaster construction and includes a fire-resistant floor 7 which is substantially flush with the bottom of openings 4 and 6.

At the front end of the furnace and on the level of floor 7 there is a horizontal shelf or apron 8 which extends substantially the full width of the furnace and which is of substantial dimension lengthwise of the furnace. A heavy-duty pusher bar 9 rests on the apron 8 transversely thereof and at right angles to the length of the furnace. Attachment links 10 are pivoted on the pusher bar at the ends and project rearwardly and generally horizontally therefrom; such links being pivoted at their rear ends to rigid upstanding ears 11 mounted on diverging arms 12 intermediate the ends of the latter. The arms 12 are fixed at their lower ends in connection with a cross beam 13 adjacent ground level, while the upper ends of these divergent arms project to points laterally beyond the plane of the sides of the furnace, for the reason as will hereinafter appear. The cross beam 13 is pivoted at its lower ends to the outer end of bars 14 which extend beneath apron 8 from the frame of the furnace.

The pusher bar 9 is alternately advanced and retracted on apron 8 by the following mechanism: A multiple pulley sheave 15 is mounted on the upper end of each arm 12 and with the axis of the sheave disposed horizontal, and transversely of the furnace. A corresponding multiple pulley sheave 16 is mounted in similar position on each side of the furnace frame 2 in substantially the same horizontal plane as sheaves 15. A power control unit or power winch 17 is mounted adjacent one end of the furnace and to the side thereof, such winch including a cable drum 18 which normally runs free, the unit being actuated by an electric motor 19.

A cable 20 leads from cable drum 18 and is reeved back and forth about the sheaves 15 and 16 on the corresponding side of the furnace to form a block and tackle assembly, and thence extends upwardly and across the furnace above the same and down to the sheave 16 on the opposite side of the furnace, being guided by direction changing pulleys 21. Thereafter the cable is reeved back and forth between sheaves 15 and 16 on said opposite sides of the furnace to form another block and tackle assembly, and finally is dead-ended as at 22 in Fig. 4.

In the present embodiment, the power con-

trol unit 17 is disposed adjacent the discharge end of the furnace; the control lever 23 for this unit upstanding therefrom and being connected with a push-pull rod 24 which extends to a point adjacent and above the apron 8 at the front or feed end of the furnace, and at which end the feed control operator stands.

Pneumatic cylinders 25 are pivoted at their rear end on the furnace frame 2 adjacent and parallel to, but above the bars 14; the piston rod 26 of each cylinder 25 being pivoted at its outer end, as at 27, to the corresponding arm 12 intermediate the ends of the latter. Each cylinder 25 is constantly supplied with air pressure by a conduit 28, whereby the piston and rod 26 normally tend to advance.

Operation

In operation of the furnace, a plurality of rows of billets B, engaged in end to end relation, extend through the furnace from the feed openings 4 to the discharge openings 6; such rows of billets being disposed in relatively close side by side relation. To advance these rows through the furnace a cold billet C is disposed on apron 8 adjacent and alined with each row within the furnace. Thereupon the power control unit 17 is actuated to shorten the cable reaches between sheaves 15 and 16, which results in the arms 12 swinging forwardly and advancing the pusher bar 9. With advance of the pusher bar it engages the cold billets C and slides them through openings 4 into the furnace, advancing the corresponding row. The heated billets H at the discharge end of the furnace may be removed in any suitable manner with each step by step advance of the rows through the furnace.

After each advancing step, the power control unit is released, whereupon the power cylinder 25, which is always energized, acts on arms 12 to swing the same away from the furnace, retracting the pusher bar to its starting position.

From the foregoing description it will be readily seen that I have produced a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

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

1. A device for feeding members to be heated through a furnace having a feed opening, said device comprising an apron mounted in position adjacent said feed opening, a pusher bar extending transversely of the apron, a pair of transversely spaced arms upstanding adjacent the apron, said arms being pivoted at their lower ends for swinging movement lengthwise of the furnace, links pivotally connecting the end portions of the pusher bar and the corresponding arms, said arms being formed and mounted so that the upper end of each arm terminates at a point outwardly of the plane of the corresponding side of the furnace, a pull cable reach extending from said upper end of each arm to a point along the corresponding side of the furnace, and means to apply a pull to each reach.

2. A device for feeding members to be heated through a furnace having a feed opening, said device comprising an apron mounted in position adjacent said feed opening, a pusher bar extending transversely of the apron, a pair of transversely spaced arms upstanding adjacent the apron, said arms being pivoted at their lower ends for swinging movement lengthwise of the furnace, links pivotally connecting the end portions of the pusher bar and the corresponding arms, said arms being formed and mounted so that the upper end of each arm terminates at a point outwardly of the plane of the corresponding side of the furnace, a pull cable reach extending from said upper end of each arm to a point along the corresponding side of the furnace, and a power actuated winch connected with and operative to simultaneously exert a pull on said cable reaches.

3. A device for feeding members to be heated through a furnace having a feed opening, said device comprising an apron mounted in position adjacent said feed opening, a pusher bar extending transversely of the apron, a pair of transversely spaced arms upstanding adjacent the apron, said arms being pivoted at their lower ends for swinging movement lengthwise of the furnace, links pivotally connecting the end portions of the pusher bar and the corresponding arms, said arms being formed and mounted so that the upper end of each arm terminates at a point outwardly of the plane of the corresponding side of the furnace, a pull cable reach extending from said upper end of each arm to a point along the corresponding side of the furnace, a power actuated winch connected with and operative to simultaneously exert a pull on said cable reaches, and a constantly energized power cylinder connected with one of said arms and urging the latter in a direction away from the furnace.

4. A device for feeding members to be heated into a furnace having a feed opening, said device comprising a member support adjacent said feed opening, a pusher element mounted adjacent said support for reciprocating movement above the support toward and away from said furnace, and means to reciprocate said pusher element; said means including a cable arranged as a block and tackle connected so as to advance the pusher element with a pull on the cable, a normally released power winch to which the cable is connected, and a constantly energized power cylinder connected so as to retract the pusher element relative to the member support whenever the winch is released.

5. A device for feeding members to be heated into a furnace having a feed opening, said device comprising a member supporting apron mounted in cooperating relation adjacent said feed opening exteriorally of the furnace, a pusher element extending transversely over the apron, said pusher element being mounted for reciprocating movement lengthwise of the furnace, block and tackle assemblies connected at one end with the pusher element adjacent opposite ends thereof, said assemblies extending forward and being connected at the other end with the furnace, said assemblies being reeved from a single cable, said cable including a cross reach extending from one assembly to the other, direction changing pulleys mounted on the furnace and about which pulleys said cross reach extends, one end of the cable being dead ended from one assembly, and the other end of the cable extending from the other assembly, a normally released power winch mounted adjacent the furnace, said other end of the cable being connected to said winch, and means arranged with said pusher element operative to retract the same.

6. A device for feeding members to be heated into a furnace having a feed opening, said device comprising a member supporting apron extending out from the furnace in cooperating relation to said feed opening, a pusher element extending transversely over said apron, said element being mounted for reciprocating movement lengthwise of the furnace, a pair of block and tackle assemblies including a single actuating lead, said assemblies being connected with opposite end portions of said pusher element and extending forward to connection with the furnace on opposite sides of the latter, and a power winch to which said single actuating lead is connected; there being a cross lead between said assemblies, said cross lead being separate from the actuating lead and extending vertically from one assembly, thence across the furnace and vertically to the other assembly, and direction-changing pulleys on the furnace for and on which said cross lead runs.

7. A billet feeding device for a furnace having a feed opening in one end thereof, said device comprising a substantially horizontal apron mounted beyond said end of the furnace in cooperating relation to said opening, a pusher bar extending transversely over said apron, a pair of transversely spaced upstanding arms disposed beyond said one end of the furnace, said arms being pivoted adjacent their lower ends for swinging movement lengthwise of the furnace, ears on said arms intermediate their ends, links pivoted between said ears and corresponding ends of the pusher bar, cable reaches connected with the upper ends of said arms and extending forwardly, means to exert a pull on said cable reaches whereby to swing the arms forwardly and advance the pusher bar, and means to swing said arms rearwardly and retract the pusher bar upon release of said pull means.

8. A billet feeding device for a furnace having a feed opening in one end thereof, said device comprising a substantially horizontal apron mounted beyond said end of the furnace in cooperating relation to said opening, a pusher bar extending transversely over said apron, a pair of transversely spaced upstanding arms disposed beyond said one end of the furnace, said arms being pivoted adjacent their lower ends for swinging movement lengthwise of the furnace and diverging upwardly to termination at points beyond the planes of the sides of the furnace, ears on said arms intermediate their ends, links pivoted between said ears and corresponding ends of the pusher bar, a block and tackle assembly connected with each arm adjacent its upper end and extending forwardly to connection with the furnace, a single actuating lead for said block and tackle assemblies, a power winch having a normally released drum, said single actuating lead being connected to said drum, and a constantly energized fluid pressure power cylinder pivoted adjacent one of said arms; the piston rod being pivoted to said arm and normally urging the latter in a direction away from the furnace.

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