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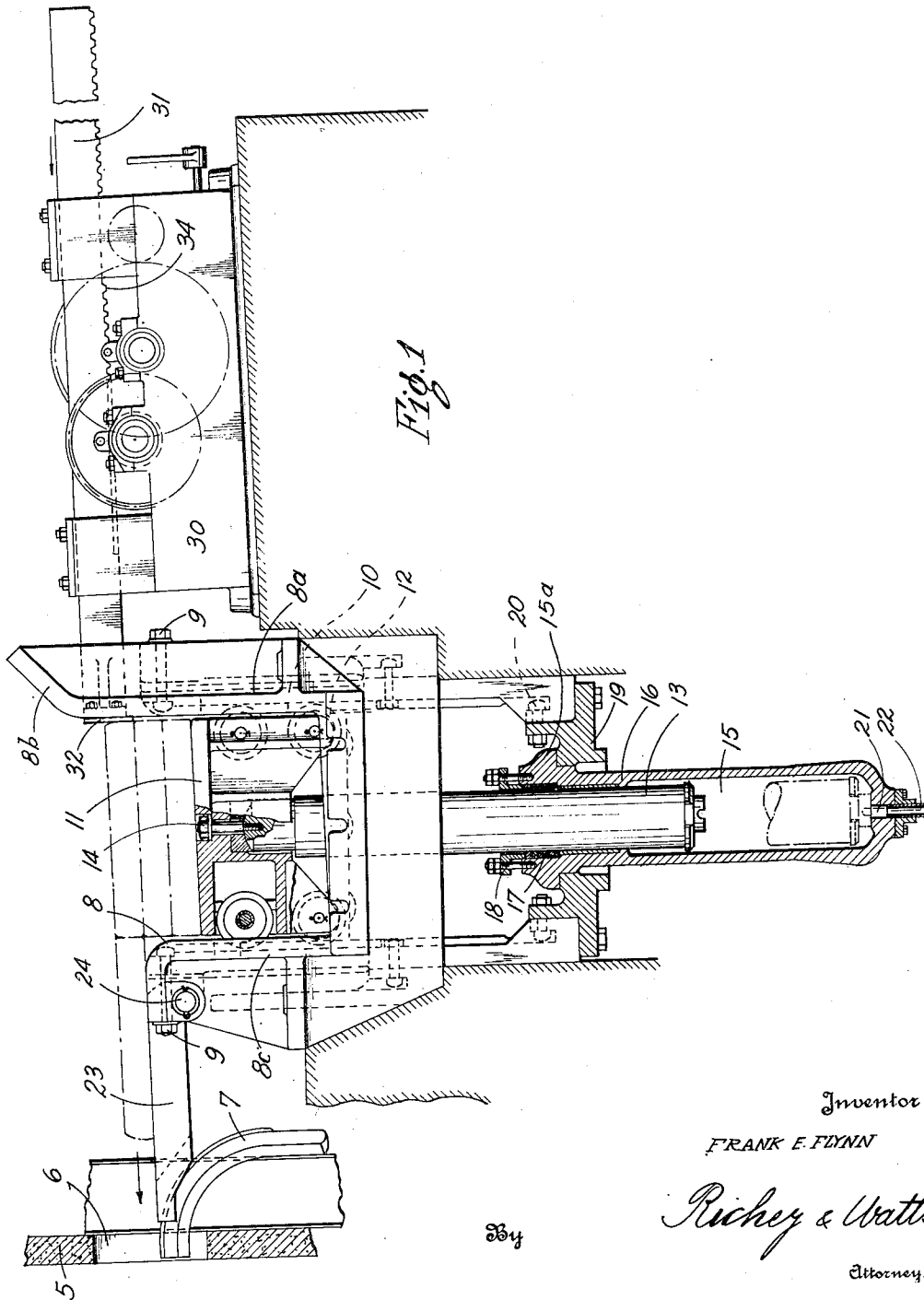
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CHARGING MECHANISM FOR CONTINUOUS HEATING FURNACES

Filed Sept. 25, 1931

2 Sheets-Sheet 1



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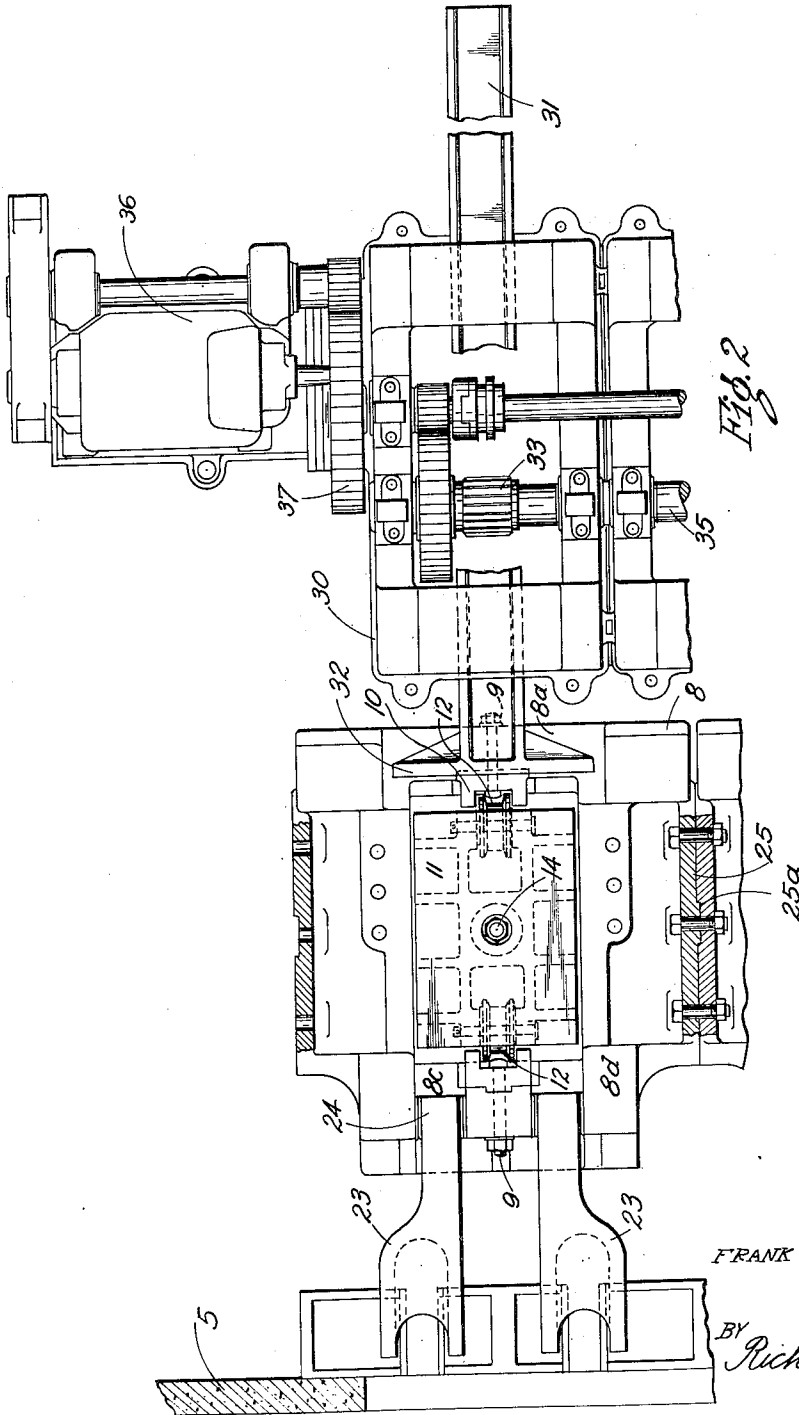
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UNITED STATES PATENT OFFICE

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CHARGING MECHANISM FOR CONTINUOUS HEATING FURNACES

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2 Claims. (Cl. 214—23)

This invention relates to apparatus for charging slabs into heating furnaces and is particularly adapted for charging slabs into furnaces of the continuous type such as those commonly used in hot strip mills for heating slabs which are subsequently rolled into strip.

In the prior practice of charging continuous heating furnaces for slabs, or the like, long skids were provided in alignment with the charging entrance of the furnace. Associated with these skids were long charging rams which engaged the slabs disposed on the skids and pushed them into the furnace. In carrying out this practice it was necessary to manually line up a number of slabs horizontally on the skids in abutting relation. The end slab remote from the furnace door was then engaged by the ram and the slabs pushed through the furnace, the ram moving intermittently a distance equal to the width of a slab whenever it was desired to discharge a heated slab from the furnace. This apparatus was cumbersome in operation and necessarily employed a great amount of space. Furthermore, it required men to work near the charging entrance of the furnace to line up the slabs on the lengthy skids.

It is among the objects of this invention, therefore, to provide a mechanism for charging slabs into a continuous furnace which will take little space and can be disposed closely adjacent the charging entrance of the furnace. It is a further object of this invention to provide a mechanism which will preclude the necessity of men working near the charging entrance of the furnace to line up the slabs prior to their entry therein.

It is a still further object of this invention to provide a charging magazine for a continuous heating furnace which may be charged with a plurality of slabs at one time and then operated to charge the slabs successively into the furnace, the machine being comparatively simple in construction and substantially automatic in operation, thereby easily and economically charging furnaces of this type.

Other objects more or less ancillary to the foregoing and the manner in which all the various objects are realized will appear in the following description which, considered in conjunction with the accompanying drawings, sets forth the preferred embodiment of the invention.

The illustrated embodiment of the invention comprises a cradle or magazine having associated therewith a hydraulic plunger which is adapted to impart vertical movement to a load supporting platform disposed within the cradle. The cradle

and associated mechanisms are adapted to be placed adjacent the charging entrance of a furnace. A reciprocating ram is effective to travel transversely of the cradle to move a slab from the platform and into the furnace.

Figure 1 is a plan view partly broken away illustrating my invention;

Figure 2 is a sectional elevation of the view shown in Figure 1.

Referring to the drawings, the numeral 5 designates a portion of the front wall of a continuous heating furnace having charging openings 6 therein, only one of the latter being shown here. The wall 5 is preferably extended to provide a support 7 for a charging skid.

The charging machines are preferably arranged in pairs to accommodate a double furnace, although only one is herein shown for the purpose of illustration. Each machine comprises a magazine or cradle, generally designated at 8, adapted to receive a plurality or stack of slabs, said magazine being stationarily supported on a suitable base structure such as concrete or the like. As shown, this magazine or cradle is in the form of a casting having a front wall 8a remote from the furnace which terminates on opposite sides in upright portions or standards 8b, and a rear wall 8c which is recessed and terminates in outwardly extending portions 8d. Secured to the front and rear walls 8a and 8c by bolts 9 are guides or track members 10. Mounted to reciprocate substantially vertically on the guides 10 is a slab lifter or platform 11 provided with flanged wheels 12 which travel in said guides. This member 11 is secured on the upper end of a plunger 13 by means of a bolt 14, the lower extremity of said plunger being mounted for reciprocatory movement in a cylinder 15, extreme vertical movement of the plunger being limited by a stop flange 16. The assembly as shown includes packing glands on rings 17 and a retaining collar 18. The cylinder 15 may be positioned in a well formed in a suitable base, the upper extremity thereof being formed with a flanged portion 15a which rests on an annular base member 19, the latter having the lower ends of the guides 10 secured thereto by bolts 20. The plunger 13 is preferably fluid operated, the operating fluid being admitted to the cylinder 15 at the lower end thereof through an inlet port 21, a suitable pipe or flexible conduit connection 22 being secured to the cylinder at this point and extending to a control valve, (not shown), which may be either manually or automatically operated, as desired.

Skids 23 are provided for supporting the slabs

when the latter are pushed from the platform 11 and into the furnace 5. As shown, these skids have one end thereof remote from the furnace and fitted in the recessed portion of the wall 8c of the cradle 8 and pivotally mounted on pins 24, while the opposite extremities of said skids rest on the support 7 adjacent the charging port of the furnace. A pair of skids 23 are provided for each charging mechanism, but it will be understood that when a plurality of the devices are arranged side by side or in pairs, the two intermediate skids may be dispensed with, depending upon the size of the slabs being handled.

The cradle 8 is formed with outwardly extending side flanges 25 which are provided with bolt holes 25a to receive bolts for attaching an adjacent machine when the machines are arranged in pairs as above specified.

From the foregoing description, it will be seen that the improved charging machines may receive a plurality or stack of slabs from a crane or the like and thereafter raise the stack to bring one or more slabs successively into a plane substantially in line with the furnace openings 6 ready to be pushed onto the skids and thence into the furnace. As the slabs are brought into this position, they are pushed into the furnace preferably by the mechanism herein shown, although any suitable type of slab-charging apparatus may be used. This mechanism as shown comprises a frame structure, generally indicated at 30, having a ram 31, which terminates in a ram-head 32, mounted for horizontal reciprocatory movement therein. The ram 31 is driven by means of a drive pinion 33 which meshes with teeth 34 formed on said ram, said pinion being secured on a shaft 35 through suitable bearings in the frame 30, the drive being applied to said shaft by means of a reversible motor 36 through suitable reduction gearing generally indicated at 37.

The operation of the charging apparatus is substantially as follows:

Assume that the platform 11 has been lowered to the dotted line position in Figure 2 by an operator opening the control valve and releasing the fluid pressure in the cylinder 15. This places the machine in loading position so that a bundle of slabs may be deposited in the magazine or cradle 8 by a crane or other suitable device. When the magazine has been loaded with slabs, the operator works the valve control lever and admits sufficient pressure into the cylinder 15 to raise the platform 11 a distance equal to the thickness of each slab, bringing the latter clear of the magazine 8, whereupon the rams 31 move forward and push the slabs onto the skids 23 and then re-

tract ready to repeat the operation, the slabs being thus pushed successively one against the other into the furnace opening 6.

It will be understood that the entire apparatus including the control valve for the elevating mechanism and ram mechanism could be connected up and driven in synchronism so that the charging operation would be fully automatic; also the stroke of the plunger 13 could be such that a plurality of slabs would be raised into charging position clear of the cradle 8, and various other modifications in structure and operation adopted within the scope of the invention, as recited in the appended claims.

What I claim is:

1. Apparatus for charging slabs into the charging opening of a heating furnace comprising: a magazine mounted below the level of the opening and having substantially vertical guide members secured to the side walls thereof, a slab supporting platform mounted for vertical movement in the magazine and provided with wheels adapted to engage said guide members, a fluid operated plunger connected to said platform, a pressure cylinder in which said plunger has movement, means for admitting a fluid medium under pressure into said cylinder to impart a vertical step-by-step movement to said platform, skids connecting said magazine with said charging opening, a substantially horizontal reciprocating ram mounted in rear of said magazine, and means for reciprocating said ram to push the slabs from the magazine onto said skids and into and through said charging opening.

2. Apparatus for charging slabs into the charging opening of a heating furnace comprising: a magazine mounted below the level of said opening and having vertical trackways located in the side walls thereof, a platform mounted for vertical travel in said magazine and adapted to support a plurality of slabs in stacked relation, said platform being provided with flanged wheels adapted to engage said tracks, a plunger connected to said platform, a fluid pressure cylinder in which said plunger has movement, means for admitting a fluid medium under pressure into said cylinder to raise said platform step-by-step to bring the slabs successively into horizontal alignment with the top of the magazine, skids connecting the top of the magazine with the furnace opening, a horizontally reciprocating pusher mounted in rear of said magazine, and means for reciprocating said pusher to push the slabs clear of said magazine onto said skids and into and through the furnace opening.

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