July 6, 1954 F. O. SCHOB 2,682,703

APPARATUS FOR APPLYING METAL CASES TO BRICKS

Filed Feb. 14, 1950 3 Sheets-Sheet 1

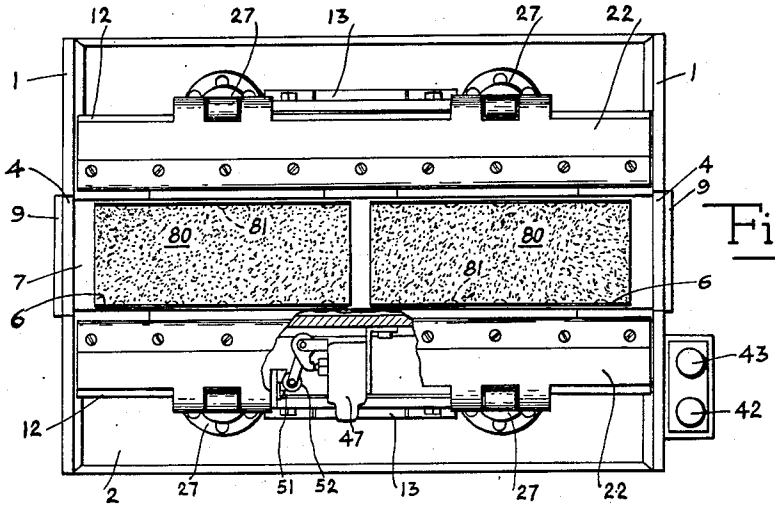



Fig. 1.

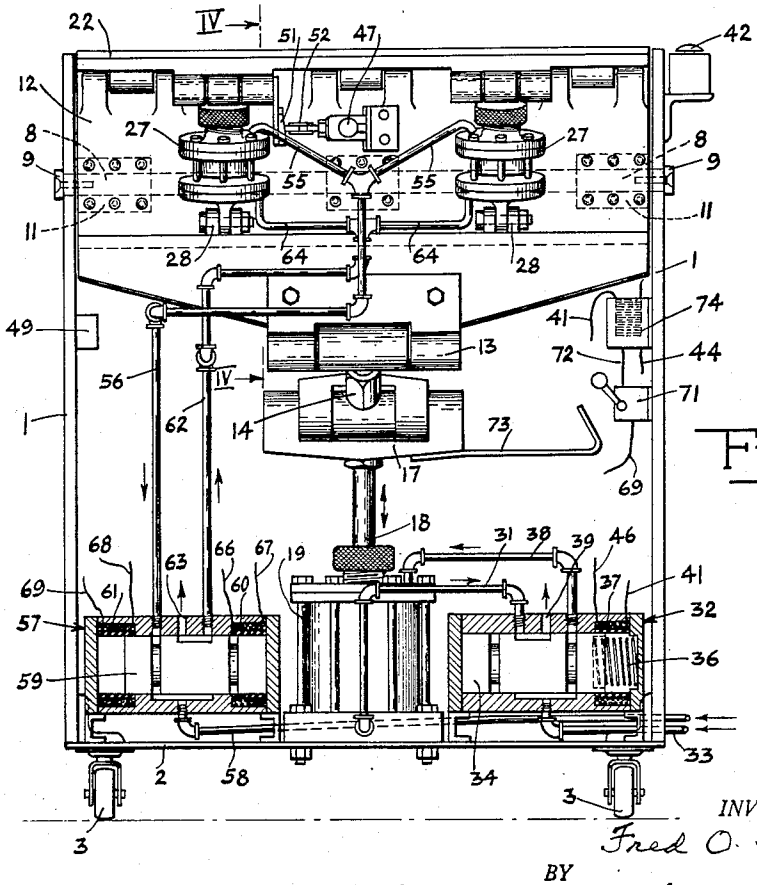



Fig. 2.

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Filed Feb. 14, 1950 3 Sheets-Sheet 2

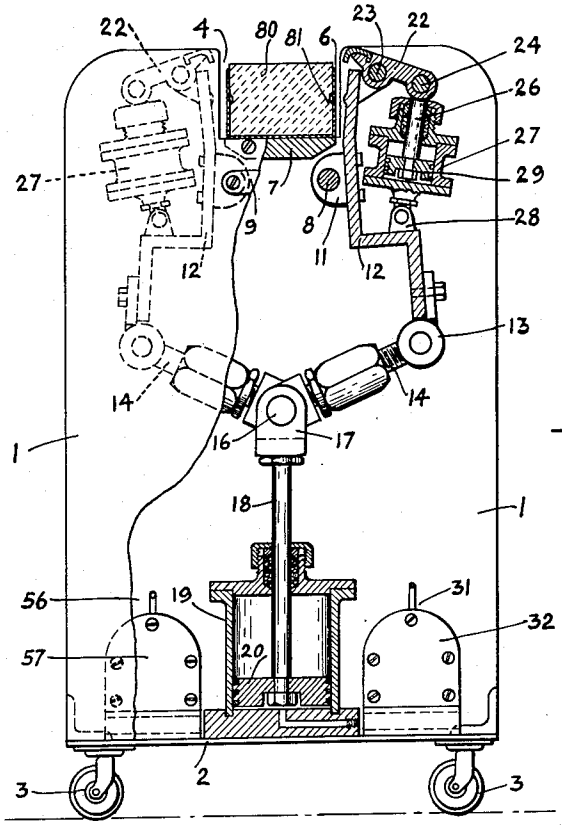



Fig. 3.

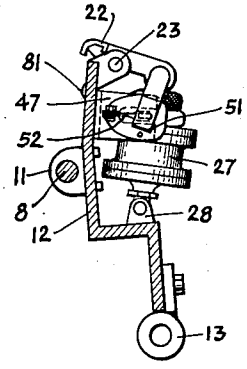



Fig. 4.

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APPARATUS FOR APPLYING METAL CASES TO BRICKS

Filed Feb. 14, 1950 3 Sheets-Sheet 3

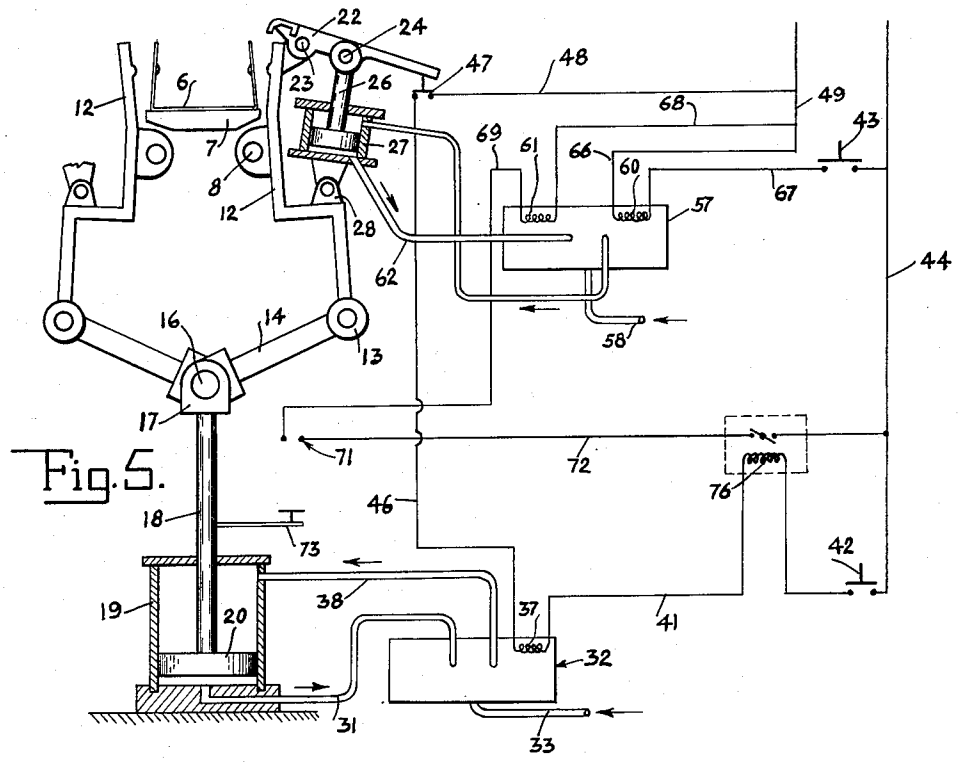



Fig. 5.

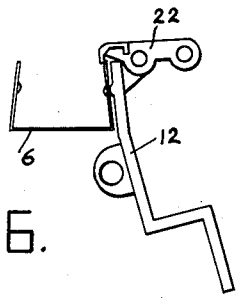



Fig. 6.

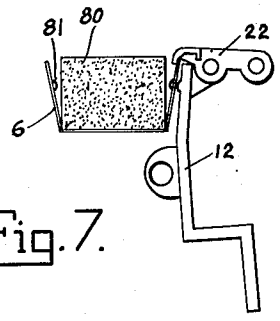



Fig. 7.

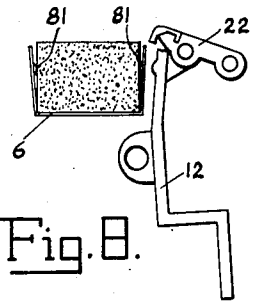



Fig. 8.

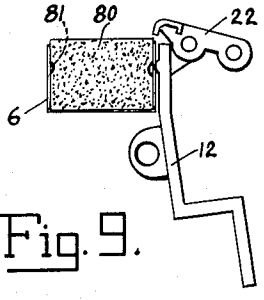



Fig. 9.

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Patented July 6, 1954 2,682,703

# UNITED STATES PATENT OFFICE

2,682,703

## APPARATUS FOR APPLYING METAL CASES TO BRICKS

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Application February 14, 1950, Serial No. 144,092

10 Claims. (Cl. 29—235)

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This invention relates to apparatus for applying metal cases to bricks.

As explained in Patent No. 2,480,804, in certain instances refractory bricks for industrial furnaces are partially enclosed in individual metal cases. The high temperature of the furnace fires the bricks and causes adjoining metal cases to bond with one another and with the bricks, whereby an integral structure is formed. The most common type of case is made from sheet metal bent into the form of a channel with the channel flanges converging toward their free edges. Consequently, the flanges must be sprung apart in order to permit a refractory block to be inserted between them. When the flanges are released, they spring back against the sides of the brick. To improve the grip of the case on the brick it is desirable to provide the flanges with inwardly projecting detents or longitudinally extending ribs which, if pressed into the opposite sides of the brick, will keep the brick from slipping out of the case. However, the pressure that the flanges exert against the brick when they are released after it has been inserted between them generally is not great enough to press the projections into the brick.

It is among the objects of this invention to provide apparatus which will spread the flanges of metal cases so that bricks can be inserted in them and which can press the flanges against the bricks so that any projections on the inner surfaces of the flanges will be pressed into the sides of the bricks.

In accordance with this invention, a support is provided for a channel shape sheet metal case having upwardly extending flanges, between which a refractory brick is to be inserted. Means are provided for pulling the case flanges farther apart so that a brick can be inserted in the case. After insertion of the brick the flange-pulling means are released from the case flanges so that the flanges can spring back against the sides of the brick. Means also are provided for pressing the case flanges against the sides of the brick after the flange-pulling means have been released from the flanges. Although the flange-pulling means may be magnetic, it is preferred that all of the different elements of the apparatus be actuated by fluid pressure means which may be fully automatic or dependent upon controls operated by an attendant. Thus, the flanges of the case may be pulled apart by claws pivotally mounted on movable presser bars beside the flanges. The presser bars are moved in to press the flanges against the sides of the brick after the claws have been moved out of engagement with the flanges so that the claws will not touch the brick.

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The preferred embodiment of the invention is illustrated in the accompanying drawings, in which Fig. 1 is a plan view; Fig. 2 is a side view; Fig. 3 is an end view, partly in section, with the pipes and wires omitted; Fig. 4 is a fragmentary vertical section taken on the line IV—IV of Fig. 2; Fig. 5 is a diagrammatic view illustrating the wiring and piping arrangement; and Figs. 6 to 9 are fragmentary views illustrating different steps in the casing operation.

Referring to Figs. 1 to 3 of the drawings, the housing for the apparatus includes parallel vertical end plates 1 rigidly connected at their lower ends by a base member 2 that may be mounted on casters 3. The upper portion of each end plate is provided with a recess 4 extending downward from its upper edges. These recesses are a little wider and higher than the metal cases 6 that are to be applied to bricks with this apparatus. The upper parts of the end plates are rigidly connected by a flat case support 7 which is secured to the two plates at the bottoms of the recesses. The top of the support is flush with the recess bottoms so that the metal cases may be pushed through the machine if desired.

A short distance below the corners of the case-support the housing end plates are provided with holes in which the ends of a pair of parallel horizontal shafts 8 are mounted. The shafts are held in the plates by means of straps 9 that are screwed to their opposite ends. Pivotally mounted on the shafts near their opposite ends are bearings 11 which are attached to the inner faces of a pair of opposed presser bars 12 extending substantially the full length of the housing and upward past the case support 7. The upper ends of the bars are located near the top of a case mounted on the support. Each presser bar also extends below bearings 11 and then outward to provide a shelf, from the outer end of which the bar extends downward again.

For swinging the bars toward and away from each other around shafts 8, a hinge 13 is connected to the lower end of each bar. The rotatable member of the hinge is connected to the outer end of a toggle link 14 that extends inward and has its inner end pivotally mounted on a pin 16 carried by a bracket 17. The inner end of one of the links straddles the inner end of the other link so that both links can be mounted on the same pin 16. The length of the links is adjustable to vary the minimum distance between the upper

ends of the presser bars so that the machine can be used with metal cases of different widths. The toggle bracket 17 is mounted on the upper end of a piston rod 18 that extends down into a cylinder 19 rigidly mounted on the base 2 of the housing. A piston 20 is carried by the lower end of the rod. It will be seen that as the piston is raised and lowered in the cylinder, the presser bars are rocked on their supporting shafts to swing their upper ends toward and away from each other.

Each metal case 6 is formed from sheet metal that is bent into the shape of a channel having a flat bottom or web and upstanding side flanges. When the web is placed on support 7 the flanges normally converge upwardly as shown in Figs. 5 and 6, and the distance between their upper or free edges is less than the width of the brick that is to be placed in the case, so that the flanges will have to be sprung outward and will press against the brick between them. In order to pull the flanges farther apart than their normal position so that they will diverge upwardly and thus permit a brick to be dropped between them without catching on their upper edges, a flange-gripping claw 22 is mounted on horizontal pivots 23 on each presser bar 12. Each claw extends lengthwise of the adjacent presser bar and inwardly across its upper end. The outer edge of the claw is connected by a pair of horizontal pivot pins 24 to the upper ends of piston rods 26. Each piston rod extends down into a cylinder 27 that is pivotally supported by a bracket 28 mounted on the presser bar shelf. The lower end of the piston rod carries a piston 29. When the pistons are moved up or down in the cylinders, the claw is rocked on its support. The inner end of each claw is recessed to provide a depending portion that can hook over the upper edge of the adjacent case flange. When the two claws have been tilted down into flange-gripping position the upper ends of the presser bars 12 can be swung apart, by moving toggle piston 20 down in cylinder 19, to cause the claws to spread the case flanges as indicated in Fig. 7.

Various fluid pressure systems may be provided for delivering fluid at the correct times to the different cylinders so as to rock the presser bars and claws in a predetermined sequence. One such system, shown in Figs. 2 and 5, which depends upon push buttons for controlling it, has the lower end of toggle cylinder 19 connected by a pipe 31 to a slide valve 32 that is connected by a pipe 33 to a source of air under pressure. The sliding valve member 34 is normally held in the position shown by means of a spring 36, but is moved in the opposite direction when an electric coil 37 is energized. In its normal position, the valve member connects inlet pipe 33 with a pipe 38 that is connected to the top of the toggle cylinder. At the same time the valve member connects pipe 31 with the atmosphere through exhaust port 39.

One end of the coil 37 is connected by a wire 41 to a spring-opened push button switch 42 mounted on one of the end plates of the housing. This switch, and another 43 just like it beside it, are connected in parallel by a wire 44 to a source of electric current. The other end of the coil is connected by a wire 46 to one pole of an electric switch 47 mounted on one of the presser bars 12 between cylinders 27. The other pole of this switch is connected by a wire 48 to a terminal block 49 (Fig. 2) that can be connected to the source of electric current to complete the circuit through coil 37 when switches 42 and 47 are closed. Switch 47 is closed when the overlying claw 22 is tilted up away from a case, and is opened by a cam 51 when the claw is tilted down. The cam is rigidly supported by the claw and is engaged by the spring-pressed actuating member 52 of the switch.

The upper ends of all of the claw cylinders 27 are connected by flexible conduits 55 and a pipe 56 to a slide valve 57 that also is connected by a pipe 58 to the source of air pressure. The sliding valve member 59 is moved back and forth by electric coils 60 and 61 that encircle its opposite ends. In the position shown in Fig. 2, in which coil 60 has been energized to draw toward it the valve member, the latter connects inlet pipe 58 with pipe 56, and connects another pipe 62 with valve exhaust port 63. Pipe 62 is connected by flexible conduits 64 to the lower ends of all four claw cylinders.

Coil 60 is connected by wires 66 and 67 to terminal block 49 and push button switch 43, respectively. One end of coil 61 is connected by a wire 68 to the terminal block. The other end of this coil is connected by a wire 69 to one pole of a normally open electric switch 71 mounted on one of the housing end plates. The other pole of the switch is connected by a wire 72 to wire 44. Switch 71 is closed every time toggle piston 20 rises, by means of an arm 73 projecting laterally from toggle bracket 17.

Connected in series in wire 72 is a ratchet contactor 74 or switch. As is well known, the circuit through such a contactor is closed every other time that a switch-actuating solenoid coil 76, with which the contactor is provided, is energized. The coil in this case is connected in series with wire 41 so that the coil is energized every time that push button 42 is closed. It will be seen that valve coil 60 is energized whenever push button switch 43 is closed, but that coil 61 is energized only when the ratchet contactor, as well as switch 71, is closed. Consequently, the inner ends of claws 22 are tilted down automatically every alternate time that presser bars 12 are swung toward each other.

In using this apparatus, an empty case 6 is placed on support 7, or two or more cases, depending upon the length of the support, can be placed on it at the same time. They can be dropped between claws 22 or slid in through one of the end plate recesses. At that time the upper ends of presser bars 14 are in their outer positions and the inner ends of the claws are raised, as shown in Fig. 5. Switch 47 is closed, switch 71 is open, and the ratchet contactor 74 is open. The operator then presses and holds down button 42, which closes the circuit through valve coil 37 and thereby draws valve member 34 (Fig. 2) to the right to connect the air supply pipe 33 with pipe 31 and the lower end of toggle cylinder 19 and to connect pipe 38 with the atmosphere. The piston 20 therefore rises in the toggle cylinder to spread the lower ends of the presser bars apart and thereby swing their upper ends toward each other.

Just as the piston reaches its upper limit of travel switch 71 is closed by arm 73. This closes the circuit through valve coil 61, because ratchet contactor 74 was closed when button 42 was pushed. Coil 61 draws valve member 59 (Fig. 2) to the left to connect the air supply pipe 58 with the lower pipe 62 and ends of claw cylinders 27 and to connect pipe 56 with the atmosphere. Pistons 29 in those cylinders rise and tilt the inner ends of the claws down to hook them over the

upper edges of the case flanges, as shown in Fig. 6. This movement of the claws causes cam 51 to open switch 47 so that the circuit through valve coil 37 is opened, whereupon toggle piston 20 will descend and spread the upper ends of the presser bars to cause the claws to pull the case flanges farther apart to the position shown in Fig. 7 so that a brick 80 can be dropped between them without any trouble. Push button 42 then can be released.

The operator then pushes button 43 to energize coil 60 so that valve member 59 will be drawn back to the position shown in Fig. 2. This will connect the lower ends of the claw cylinders with the atmosphere and connect their upper ends with the air supply. The pistons in those cylinders thereupon rock the claws to tilt their inner ends up away from the case flanges and to close switch 47. As soon as the claws release the case flanges they spring back against the sides of the brick in the case, as shown in Fig. 8, but the projections 81 (either detents or ribs) on the inner faces of the flanges prevent the flanges from resting flat against the brick. The operator then presses button 42 again and holds it down in order to deliver air to the lower end of the toggle cylinder so that the upper ends of the presser bars will be swung toward each other. However, as the ratchet contactor does not close until the next time button 42 is pressed, valve 57 is not reversed when switch 71 is closed, so the claws remain out of engagement with the case flanges as shown in Fig. 9. The inwardly moving presser bars press the case flanges tightly against the brick between them, thereby pushing projections 81 into the sides of the brick to lock it in the case. When push button 42 is released, the presser bars are swung away from the case, as shown in Fig. 3, so that the cased brick can be slid off the end of support 7 and an empty case put in its place in readiness for the operating cycle just described.

According the provisions of the patent statutes, I have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. Apparatus for applying a channel shape sheet metal case having a bottom and upwardly extending flanges with projections on their inner faces to a refractory brick, comprising a support for the bottom of such a case, means operative while the case is at rest for pulling the case flanges farther apart in readiness to receive a brick between them, means for releasing said flange-pulling means from engagement with the case flanges after a brick has been placed in the case, and positively actuated means for pressing the case flanges tightly against the sides of the brick after said flange-pulling means have been released from the flanges, whereby to press said projections into the brick.

2. Apparatus for applying a channel shape sheet metal case having a bottom and upwardly extending flanges to a refractory brick, comprising a support for the bottom of such a case, presser bars on opposite sides of said support extending above it, means supporting the bars adjacent said support, actuating means connected to said bars for moving them toward and away from each other, means for pulling the case flanges farther apart in readiness to receive a brick between them, and means for releasing said flange-pulling means from engagement with the case flanges before the presser bars are moved in again to engage the flanges and press them against the sides of a brick between them.

3. Apparatus for applying a channel shape sheet metal case having a bottom and upwardly extending flanges to a refractory brick, comprising a support for the bottom of such a case, presser bars on opposite sides of said support extending above it, means supporting the bars adjacent said support, actuating means connected to said bars for moving them toward and away from each other, a claw movably mounted on each presser bar and projecting inwardly therefrom, the claws having inner ends shaped to engage the inner surfaces of the case flanges when those inner ends are moved downward, actuating means connected to the claws for moving their inner ends downward after the presser bars have been moved toward each other, whereby when the bars are moved away from each other the case flanges will be pulled farther apart by the claws in readiness to receive a brick between them, and means for moving the inner ends of the claws upward to release them from the case flanges and for holding the claws in released position while the presser bars are moved in again to engage the case flanges and press them against the sides of the brick.

4. Apparatus for applying a channel shape sheet metal case having a bottom and upwardly extending flanges to a refractory brick, comprising a support for the bottom of such a case, presser bars disposed on opposite sides of said support and extending above it, means supporting the bars adjacent said support, actuating means connected to said bars for moving them toward and away from each other, a claw pivotally mounted on a horizontal axis on each presser bar and projecting inwardly therefrom, the claws having inner ends shaped to engage the inner surfaces of the case flanges when those inner ends are tilted downward, actuating means connected to the claws for tilting their inner ends downward after the presser bars have been moved toward each other, whereby when the bars are moved away from each other the case flanges will be pulled farther apart by the claws in readiness to receive a brick between them, and means for tilting the inner ends of the claws upward to release them from the case flanges and for holding the claws out of engagement with those flanges while the presser bars are moved in again to engage the case flanges and press them against the sides of the brick.

5. Apparatus for applying a channel shape sheet metal case having a bottom and upwardly extending flanges to a refractory brick, comprising a support for the bottom of such a case, presser bars on opposite sides of said support and extending above it, means pivotally mounting said bars on parallel horizontal axes adjacent the support, actuating means connected to said bars for swinging their upper ends toward and away from each other, a claw pivotally mounted on a horizontal axis on each presser bar and projecting inwardly therefrom, the claws having inner ends shaped to engage the inner surfaces of the case flanges when those inner ends are tilted downward, actuating means connected to the claws for tilting their inner ends downward after the upper ends of the presser bars have been swung toward each other,

whereby when the bars are swung away from each other the case flanges will be pulled farther apart by the claws in readiness to receive a brick between them, and means for tilting the inner ends of the claws upward to release them from the case flanges and for holding the claws above those flanges while the presser bars are swung in again to engage the case flanges and press them against the sides of the brick.

6. Apparatus for applying a channel shape sheet metal case having upwardly extending flanges to a refractory brick, comprising a support for such a case, presser bars on opposite sides of said support and extending above it, means pivotally mounting said bars on parallel horizontal axes adjacent the support, a fluid pressure cylinder below said support, a piston in the cylinder having a piston rod projecting vertically from one end of the cylinder, links pivotally connecting the outer end of the piston rod to the lower ends of the presser bars, means for supplying fluid to the cylinder to move the piston therein so as to swing the upper ends of said bars toward and away from each other, means for pulling the case flanges farther apart in readiness to receive a brick between them, and means for then holding said flange-pulling means out of engagement with the case flanges while the presser bars are swung in again to engage the flanges and press them against the sides of a brick between them.

7. Apparatus for applying a channel shape sheet metal case having upwardly extending flanges to a refractory brick, comprising a support for such a case, presser bars disposed on opposite sides of said support and extending above it, means supporting the bars adjacent said support, actuating means connected to said bars for moving them toward and away from each other, a claw pivotally mounted on a horizontal axis on each presser bar and projecting inwardly therefrom, the claws having inner ends shaped to engage the inner surfaces of the case flanges when those inner ends are tilted downward, a fluid pressure cylinder mounted on each presser bar, a piston in the cylinder having a projecting piston rod operatively connected to the adjacent claw for tilting its inner end downward after the presser bars have moved toward each other, whereby when the bars are moved away from each other the claws will pull the case flanges farther apart in readiness to receive a brick between them, and means controlling delivery of fluid to said cylinder to tilt the claws away from the case flanges and hold them away while the presser bars are moved toward each other to engage the case flanges and press them against the sides of a brick in the case.

8. Apparatus for applying a channel shape sheet metal case having upwardly extending flanges to a refractory brick, comprising a support for such a case, presser bars on opposite sides of said support and extending above it, means pivotally mounting said bars on parallel horizontal axes adjacent the support, a fluid pressure cylinder below said support, a piston in the cylinder having a piston rod projecting from the top of the cylinder, links pivotally connecting the upper end of the piston rod to the lower ends of the presser bars, means for supplying fluid to the lower end of the cylinder to raise the piston therein so as to swing the upper ends of said bars toward each other, a claw pivotally mounted on a horizontal axis on each presser bar and projecting inwardly therefrom, the claws having inner ends shaped to engage the inner surfaces of the case flanges when those inner ends are tilted downward, a fluid pressure cylinder mounted on each presser bar, a piston in the last-mentioned cylinder having a projecting piston rod operatively connected to the adjacent claw for tilting its inner end downward after the presser bars have moved toward each other, means actuated every other time that the bars move toward each other for supplying fluid to one end of each claw cylinder to cause said tilting, whereby every other time that the bars are moved away from each other the claws will be in position to pull the case flanges farther apart in readiness to receive a brick between them, and means actuated every time the flanges are spread apart for supplying fluid to the opposite end of each claw cylinder to tilt the claws away from the case flanges and hold them away while the presser bars are swung in again to engage the case flanges and press them against the sides of a brick in the case.

9. Apparatus for applying a channel shape sheet metal case having upwardly extending flanges to a refractory brick, comprising a pair of upright end members, a base connecting the lower ends of the end members, a horizontal support for said case secured to said end members, presser bars on opposite sides of said support extending lengthwise thereof and above and below it, means pivotally connecting said bars to said end members on parallel horizontal axes, a fluid pressure cylinder mounted on said base below said support, a piston in the cylinder having a piston rod projecting from the top of the cylinder, links pivotally connecting the upper end of the piston rod to the lower ends of the presser bars, means for supplying fluid to the lower end of the cylinder to raise the piston therein so as to swing the upper ends of the bars toward each other, a claw extending lengthwise along the upper end of each presser bar and projecting laterally from both sides of the bar, means pivotally connecting the claws to the presser bars on parallel horizontal axes, the claws having inner ends shaped to engage the inner surfaces of the case flanges when those inner ends are tilted downward, a fluid pressure cylinder mounted on each presser bar, a piston in the last-mentioned cylinder having a projecting piston rod operatively connected to the adjacent claw for tilting its inner end downward after the presser bars have been moved toward each other, means actuated every other time that the bars move toward each other for supplying fluid to one end of said claw cylinders to cause said tilting, whereby every other time that the bars are moved away from each other the claws will be in position to pull the case flanges farther apart in readiness to receive a brick between them, and means actuated every time the flanges are spread apart for supplying fluid to the opposite end of each claw cylinder to tilt the claws away from the case flanges and hold them away while the presser bars are swung in again to press the case flanges against the sides of a brick in the case.

10. Apparatus for applying to a refractory brick a channel shape sheet metal case having the bottom and upwardly extending flanges provided with projections on their inner faces, comprising a support for the bottom of such a case, movable means for hooking over the upper edges of the case flanges and pulling them farther apart in readiness to receive a brick between the

flanges, means for holding said flange-pulling means out of engagement with the case flanges after a brick has been placed in the case, and means for pressing the case flanges tightly against the sides of the brick after said flange-pulling means have been released from the flanges, whereby to press said projections into the brick.

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