

July 14, 1942.

W. E. DAVIS

2,289,698

APPARATUS FOR MANUFACTURING COMPRESSED EARTHEN BLOCKS

Filed Nov. 12, 1938

2 Sheets-Sheet 1

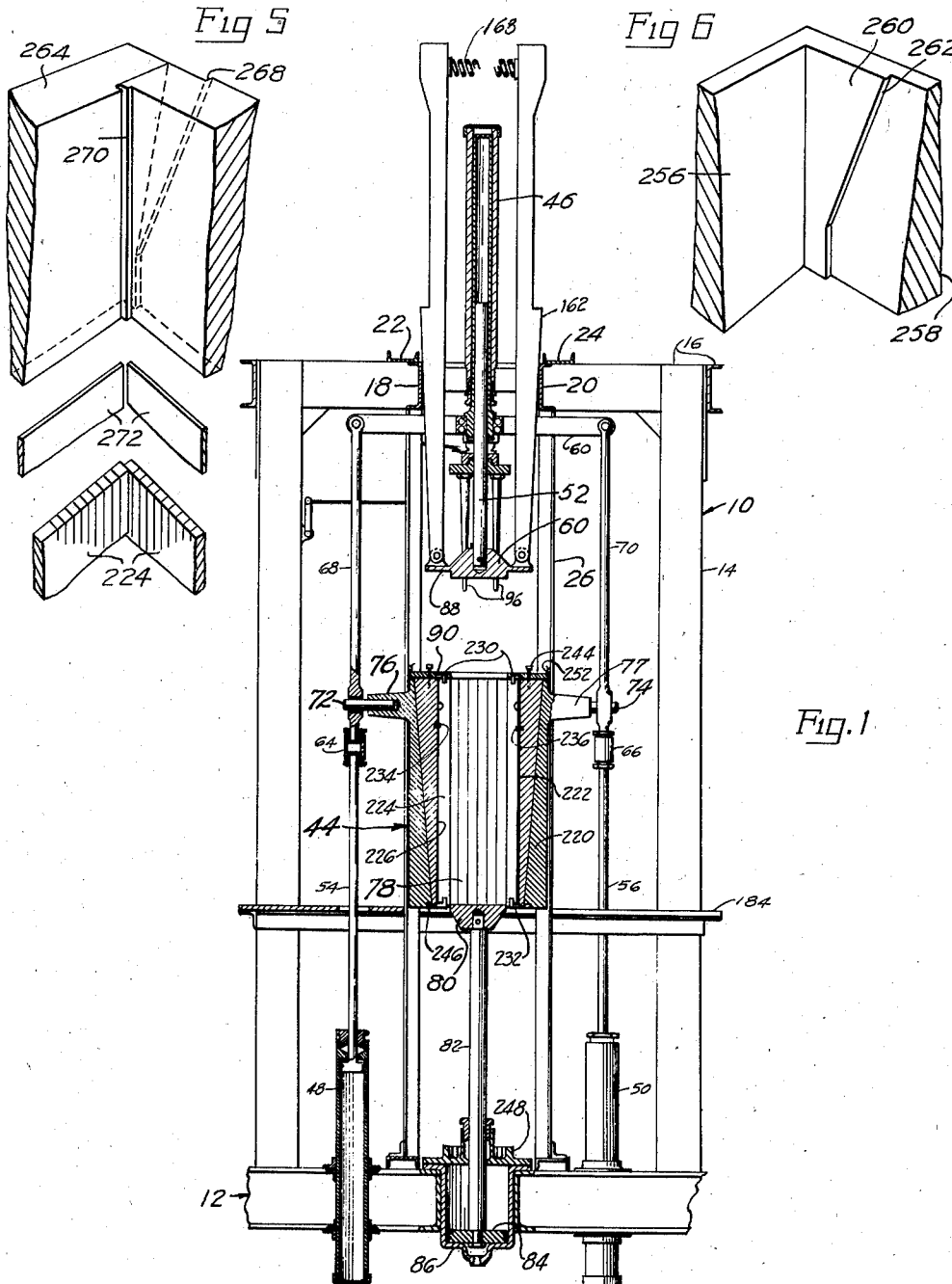


Fig. 1

INVENTOR.

WARREN ELMO DAVIS

BY *James W. Colver*

ATTORNEY.

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Fig 2

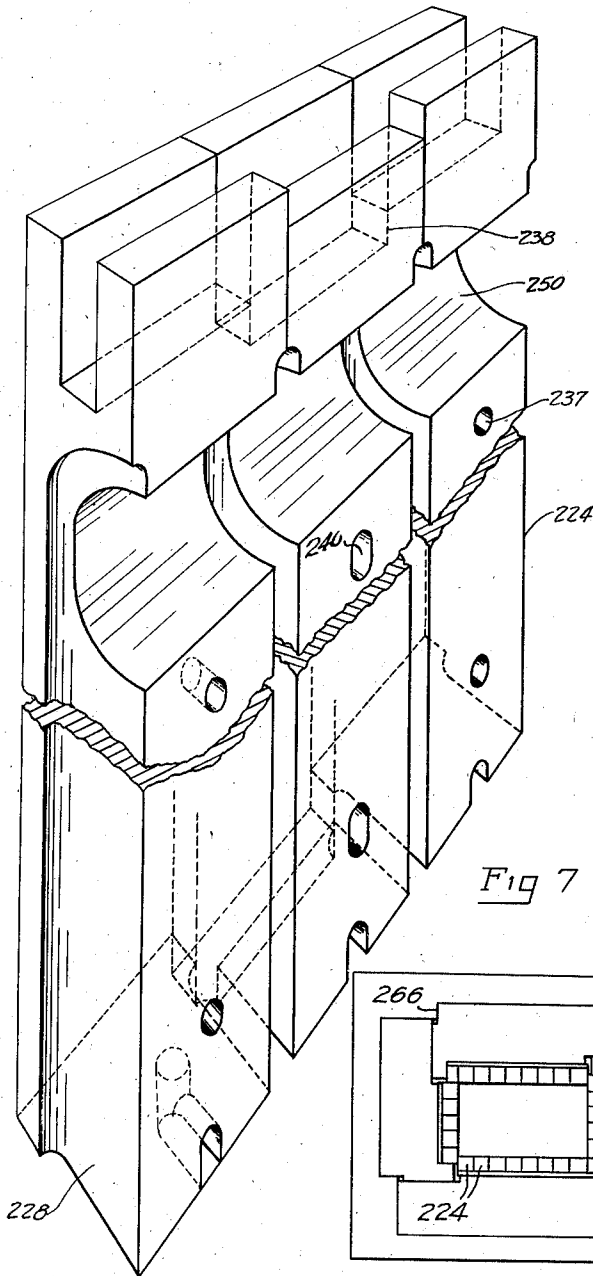


Fig 3

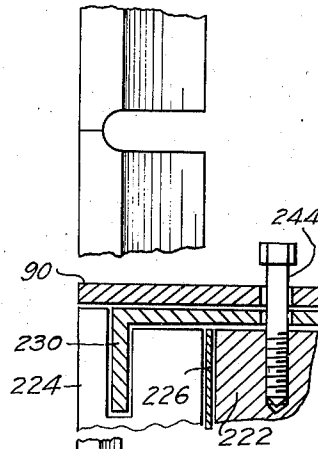


Fig 4

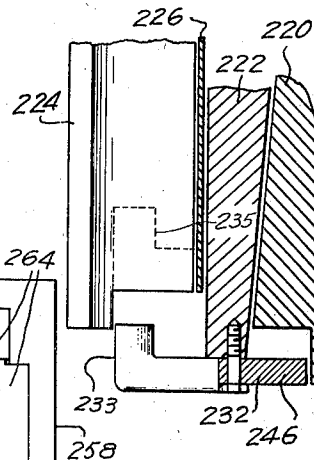
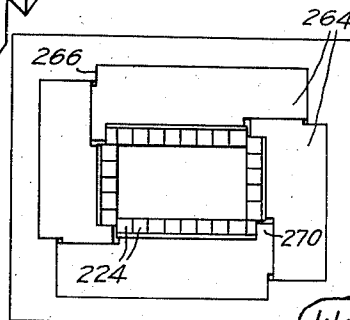


Fig 7



INVENTOR.
WARREN ELMO DAVIS
BY *James C. Colvin*
ATTORNEY

UNITED STATES PATENT OFFICE

2,289,698

APPARATUS FOR MANUFACTURING COMPRESSED EARTHEN BLOCKS

Warren Elmo Davis, Manhattan, Kans.

Application November 12, 1938, Serial No. 240,106

4 Claims. (Cl. 25—122)

This invention relates to an improved apparatus for forming compressed earthen blocks or bricks and has particular reference to an improved form-box for shaping such blocks under pressure.

An object of the invention resides in the provision of an improved apparatus for manufacturing compressed earthen construction blocks in which the blocks are subjected to a compressing and moisture expressing action such that subsequent firing of the blocks or bricks is unnecessary and the blocks are ready for use immediately after manufacture or, in some cases, after a short period of atmospheric drying, depending upon the physical composition and moisture content of the earth from which the blocks are made.

A further object resides in the provision of an improved form-box for shaping said blocks under pressure and for releasing said blocks without injury when the pressure is released.

In the accompanying drawings, in which like reference numerals are used to designate similar parts throughout, there is illustrated, by way of example, a suitable apparatus for making blocks or bricks in a satisfactory manner. The drawings, however, are for the purpose of illustration only and are not to be taken as limiting or restricting the invention.

In the drawings:

Fig. 1 is a vertical sectional view of a press and form-box constructed according to the invention.

Fig. 2 is a perspective view on an enlarged scale of the form-box filter-bars shown in Fig. 1.

Fig. 3 is a top plan view of fragmentary portions of two adjacent filter-bars shown in Fig. 2.

Fig. 4 is a side elevational view of fragmentary portions of one of the filter-bars shown in Fig. 2, associated structure being shown in section.

Fig. 5 is an exploded perspective view of fragmentary portions of a modified form-box differing in detail from the form-box illustrated in Figs. 1 to 4, inclusive.

Fig. 6 is a perspective view of a fragmentary portion of another part of the form-box shown in Fig. 5.

Fig. 7 is a top plan view of the form-box shown in Figs. 5 and 6.

Referring to the drawings in detail; the numeral 10 generally indicates the frame of the improved hydraulic block forming machine, and the numeral 12 generally indicates a suitable base or support therefor. The frame may conveniently be built up of steel construction mem-

bers of selected standard sections, riveted or welded together to constitute a strong and rigid support for the operating mechanism of the device.

The frame 10 comprises four corner members 14 which may conveniently be made of angle irons, four channel members 16 secured to the upper ends of the corner members or stanchions which, together with the cross members 18, 20, 22 and 24, constitute an upper header for the frame, and four parallel vertical guide members, as indicated at 26, which may also be conveniently formed of standard section straight angle irons. All of the vertical frame members are rigidly secured at their lower ends to the base 12. The particular form of press frame has been illustrated and described merely by way of example to disclose the invention. The inventor however is not limited to any particular form of press construction.

A form-box, generally indicated at 44, is arranged to slide up and down in the vertical guide rails 26 and is moved during the block forming cycle by a hydraulic motor comprising the vertical cylinders 46, 48 and 50 which contain reciprocal pistons connected with the form-box by the respective piston rods or rams 52, 54 and 56.

In the arrangement illustrated, the cylinder 46 is secured at its lower end to the cross bars 18 and 20 of the upper frame header and its ram 52 is connected at its lower end to a cross head 60 positioned above the form-box 44, while the cylinders 48 and 50 are secured intermediate their length, to the base 12. The cylinders 48 and 50 are positioned directly under the respective ends of the cross head 60 and have their piston rods 54 and 56 connected by means of resilient connections 64 and 66, with the lower ends of link rods 68 and 70 pivotally connected with the opposite ends of the cross head 60 and extending downwardly therefrom. The link rods 68 and 70 pivotally connected at their lower ends with the form-box 44 by suitable means such as the gudgeon pins 72 and 74 received in sockets provided in bosses 76 and 77 projecting from the form-box near its upper end.

From this description it is apparent that an injection of hydraulic fluid under pressure into the upper closed end of the cylinder 46 will force the form-box downwardly in the guide rails 26, while an injection of hydraulic fluid under pressure into the closed lower ends of the cylinders 48 and 50 will force the form-box upwardly.

The form-box is provided with an aperture 78 extending vertically therethrough to receive the

material of the construction blocks and in which the blocks are formed. A platten or pedestal 80 is positioned at the lower end of this aperture to seal the bottom of the aperture. The platten 80 is carried upon the upper end of a rod 82, the lower end of which is connected to a piston 84 reciprocable in a cylinder or ram-pot 86 supported on the base 12 by the cross bars 34 and 36 immediately below the form-box 44, so that an injection of hydraulic fluid under pressure into the closed lower end of the cylinder 86 will force the platten 80 upwardly in the form-box apertures 78 to compress material in said aperture.

The upper end of the form-box aperture may be closed by a movable cover member or pressure head 88 which bears, when in closing position, on the upper surface of a pressure plate 90 loosely secured to the upper end of the form-box.

The form-box may be varied in size as may be desired but a box providing an aperture approximately 30 inches long, 8 inches wide and 4½ inches deep has been found highly satisfactory since these dimensions produce a block approximately 8 x 4½ x 12 inches weighing about thirty pounds, which has been found to be the size and weight consistent with the most rapid wall construction without undue fatigue of the workmen. One modification of the box 44 particularly shown in Figs. 1 and 2 comprizes a solid outer casing 220 having upwardly, outwardly tapered walls providing an internal cavity of rectangular cross-section increasing in size from the bottom to the top of the form-box; four wedge shaped inner members, as indicated at 222, which rest against the tapered inner walls of the casing and have substantially vertical parallel inner walls, and a plurality of fluted vertical filter bars as indicated at 224, and particularly illustrated in Fig. 2, resting against the inner walls of the wedge members, or preferably, against a sheet of brass or other non-corrosive metal 226 disposed between the outer surfaces of the filter bars and the inner walls of the wedge members. The walls of the casing 220 are made slant so that the resulting outward movement of the wedge members and filter bars assists in freeing the formed block for ejection from the form-box. An inclination of the order of one inch in eighteen inches has been found to be operable for this purpose. The filter bars 224 are provided with flat inner faces but for the most of their length have their outer edges cut away as at 228 in Fig. 2, to provide a vertical opening or flute at the rear of the space between each two adjacent bars, as is particularly shown in Fig. 3, the said flutings extending to within very close proximity to the inner faces of the bars facing the aperture 78. The bars are secured to the wedge members 222 by means of angle irons, as indicated at 230 and 232, located at the top and bottom of the bars respectively, each having one flange overlying a portion of the upper or lower surface of the corresponding wedge member and its other flange received aligned vertical notches provided in the ends of the corresponding filter bars. Preferably the lower angle iron is formed as a row of bent prongs 233 fitting into wells 235 in the lower ends of the filter bars to leave the lower ends of the flutings entirely uncovered. The filter bars may be additionally supported in vertical position by horizontal strips or rows of pins as indicated at 234 and 236, received in registering slots or holes 237 in the rear faces of the filter bars and in the inner faces of the cor-

responding wedge members 222 and extending through the sheets 226. As is particularly shown in Figs. 1 and 2, alternate filter bars are made somewhat longer than the intermediate bars, projecting about ¼ inch below the ends of the intermediate bars, as shown in Fig. 2. The notches in the ends of the alternate bars receiving the vertical flanges of the angle irons 230 are made ¼ inch deeper than the depth of the flange, as is indicated at 238 in Fig. 2, and the slots in the alternate bars receiving the strips 234 and 236 are made ¼ inch wider than the thickness of the strips or pins, as is particularly shown at 240 in Fig. 2. The depth of the flange receiving notches in the intermediate bars is made substantially the same as the width of the corresponding angle iron flanges and the width of the strip receiving notches is made substantially the same as the thickness of the corresponding strips so that the intermediate bars are held substantially fixed with respect to the wedge members 222 while the alternate bars are permitted a slight vertical movement relative to the fixed bars, approximately ¼ inch having been found satisfactory. The upper end of all of the filter bars abut against the under surface of the pressure plate 90 and this pressure plate has a lost-motion connection 244 with the wedge members 222 permitting approximately ¼ inch of relative movement, and the wedge members have a lost-motion connection, as indicated at 246, with the casing 220 permitting approximately ½ inch of relative movement. As the form-box 44 is moved toward its lowermost position, the wedge members and filter bars move upwardly and slightly outwardly in the casing 220, thereby increasing the dimensions of the filter bar surrounded space by reason of the inclination of the contacting walls of the wedge members and the casing, and freeing the formed block from contact with the filter bars. As the form-box approaches its lowermost position the lower ends of the long filter bars contact the upper surface of the base abutment 248 and are forced upwardly approximately ¼ inch with respect to the intermediate bars to break the adhesion of the block material that has been forced into the narrow spaces between the filter bars, these spaces being one sixty-fourth of an inch or less in width and the filter bars being of such width that the filtering spaces shall be sufficiently numerous to permit proper exodus of the excess water expressed from the block material in the form-box, while retaining the solid material during the compressing operation.

When the form-box is in its lowermost position the pressure plate 90 is raised approximately ¾ inch above the upper surface of the casing 220 and is returned to contact with the upper surface of the form-box by engaging a plurality of stops, one on each of the guide rails 26 as indicated at 252, when the form-box is returned to its uppermost position. In the modified form of form-box shown in Figs. 5, 6 and 7 the inner walls of the casing 258 are provided near the corners of the casing aperture with integral vertically extending off-sets 260 provided with respective inclined outer edges 262 so that the off sets are somewhat wider at the top than at the bottom. The walls of the aperture are sloped outwardly from bottom to top at an angle substantially the same as the angle of inclination of the edges 262. Each of the four tapered wedge members 264 is provided along one outer end portion with a vertically extending recess 266 of substantially the

same shape and size of the off sets 260 so that when the wedge members are assembled in the casing the off sets 260 occupy and substantially fill the corresponding recesses 266 and the inclined edges 268 of the recesses are in contact with the inclined edges 262 of the off sets. With this arrangement when the wedge members move up and down with respect to the casing they will move at an angle since their movement is confined between the respective edge 262 and the parallel opposed wall of the casing aperture, as is particularly shown in Fig. 7, the wedge members overlap at their ends in such a manner that the recessed end of each wedge member overlaps the end portion of the inner face of the adjacent wedge member disposed at an angle of 90 degrees thereto. At its recessed end each wedge member is provided with a vertical inward extension 270 which is received in a recess in the adjacent wedge member. A row of filter bars, such as the bars 224 of Fig. 2, are arranged along the clear portion of the inner surface of each wedge member between the corresponding extension 270 and the corner bar of the adjacent row, the inner face of which corner bar is opposed to the bar contacting edge of the above mentioned extension 270. The filter bars are preferably separated from the wedge members by sheets 272 of non-corrosive material.

With this arrangement during the movements of the wedge members with respect to the casing each corner filter bar remains at the same distance from its opposed extension 270 so that the filter bars of each row are confined between the corresponding corner bars and wedge member extensions and the rows are maintained intact but move away from each other separating at the corners of the aperture.

While a suitable mechanical embodiment for the purpose of disclosing the invention has been thereinabove described and illustrated in the accompanying drawings, it is to be understood that the invention is not limited to the particular method and apparatus so illustrated and described but that such changes in the size, shape and arrangement of the various parts may be resorted to as come within the scope of the appended claims.

Having now described the invention so that others skilled in the art may fully understand the same, what it is desired to secure by Letters Patent is as follows:

1. A form-box for an earth block forming machine comprising, an outer casing having tapered inner walls surrounding an opening of rectangular

cross section increasing in size from the bottom to the top thereof, four wedge-shaped members resting against the inner walls of said casing and having substantially parallel inner walls, a plurality of relatively narrow filter bars disposed against the inner walls of said wedge-shaped members and surrounding an aperture of rectangular cross section of substantially the same size from one end to the other, a lost-motion connection between each wedge shaped member and said casing, and lost-motion connections between at least some of said filter bars and the wedge shaped members with which they are associated.

2. A form-box as set forth in claim 1 in which alternate filter bars are slightly longer than the intermediate filter bars and movable to a limited extent relative thereto to break loose debris forced between said filter bars during the block forming operation.

3. A form-box for an earth block forming machine comprising, an outer casing having tapered inner walls surrounding an opening of rectangular cross section increasing in size from the bottom to the top thereof, four wedge-shaped members resting against the inner walls of said casing and having substantially parallel inner walls, a plurality of relatively narrow filter bars disposed against the inner walls of said wedge-shaped members and surrounding an aperture of rectangular cross section of substantially the same size from one end to the other, and a sheet of non-corrosive metal interposed between said wedge members and said filter bars.

4. A form-box for an earth block forming machine comprising, a rectangular outer casing having a rectangular opening extending there-through provided with inclined wall surfaces, a member having one inclined surface disposed against each wall of said opening, said members being movable relative to said casing to change the size of said opening, a row of filter bars along the inner surface of each member, means securing said filter bars to said members, inclined guide edges on the walls of said opening, corresponding edges on the outer surfaces of said members, and a projection on the inner surface of each member at one end thereof to maintain said rows of filter bars clamped between the corresponding projections and a filter bar of the row opposed to each projection during movement of said members and said filter bars with respect to said casing.

WARREN ELMO DAVIS.