Nov. 6, 1951 H. P. STEINBRECHER 2,574,131

BLOCK MATERIAL HANDLING MACHINE

Filed Nov. 13, 1946 2 SHEETS—SHEET 1

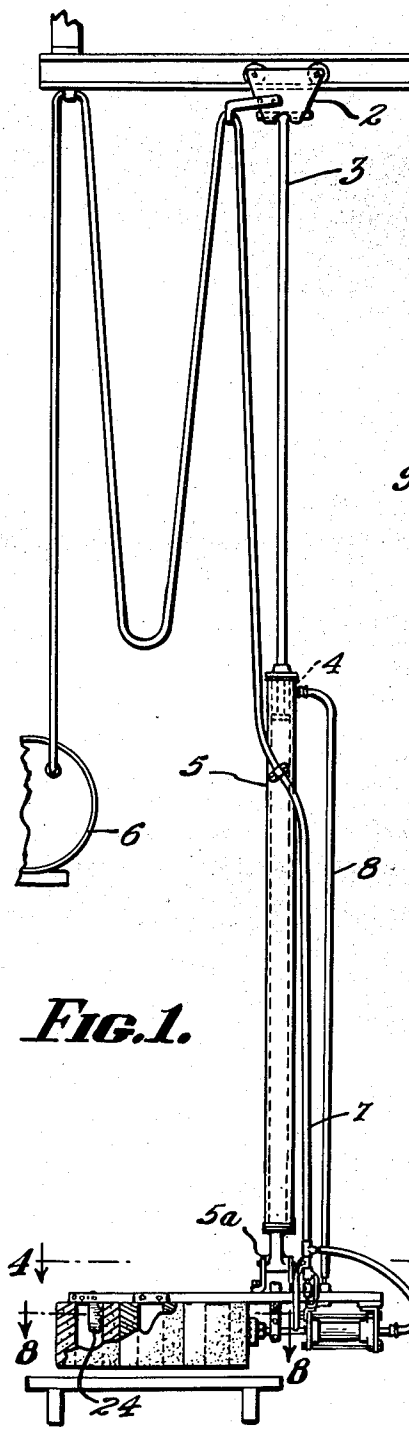


FIG. 1.

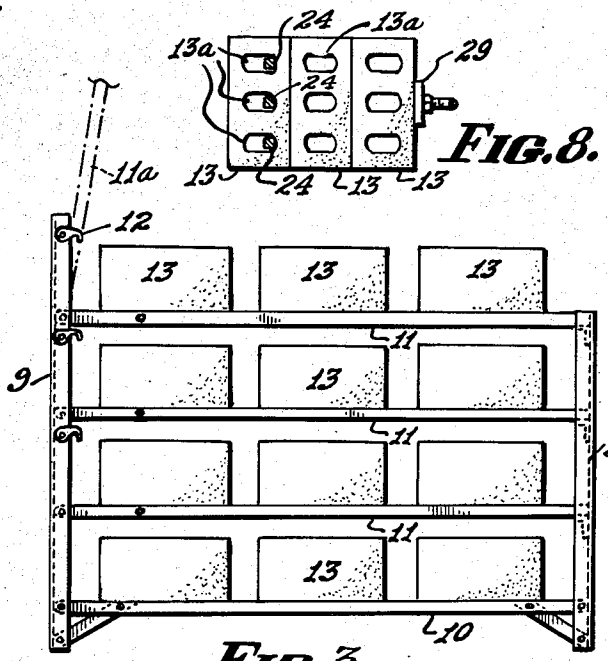


FIG. 8.

FIG. 3.

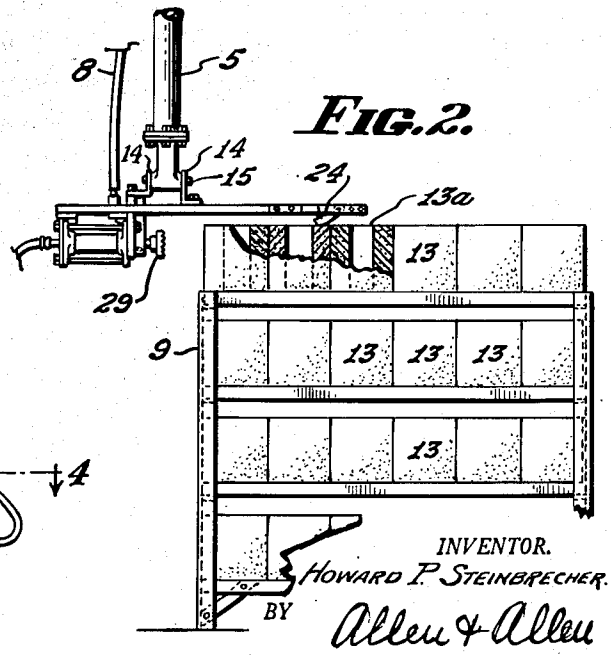


FIG. 2.

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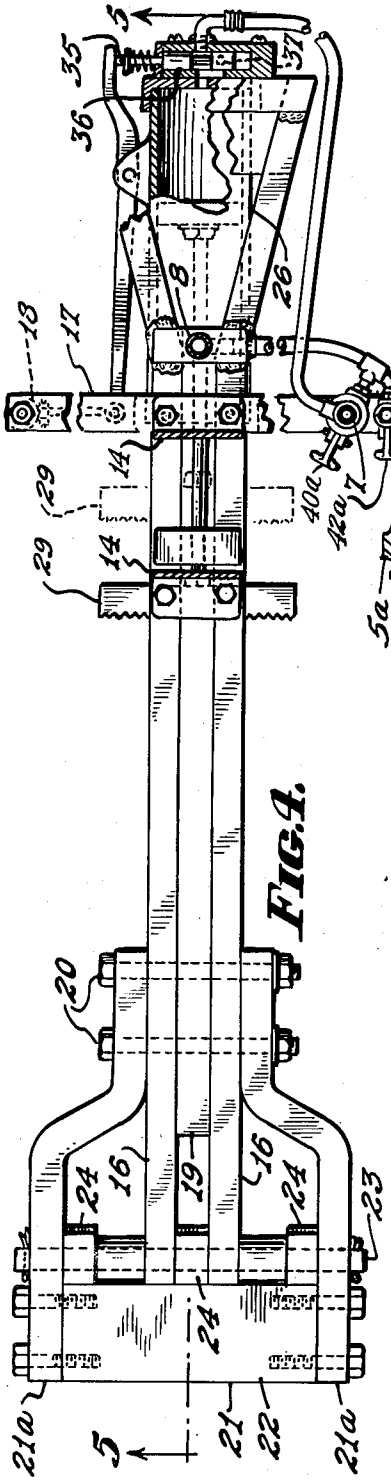


FIG. 4.

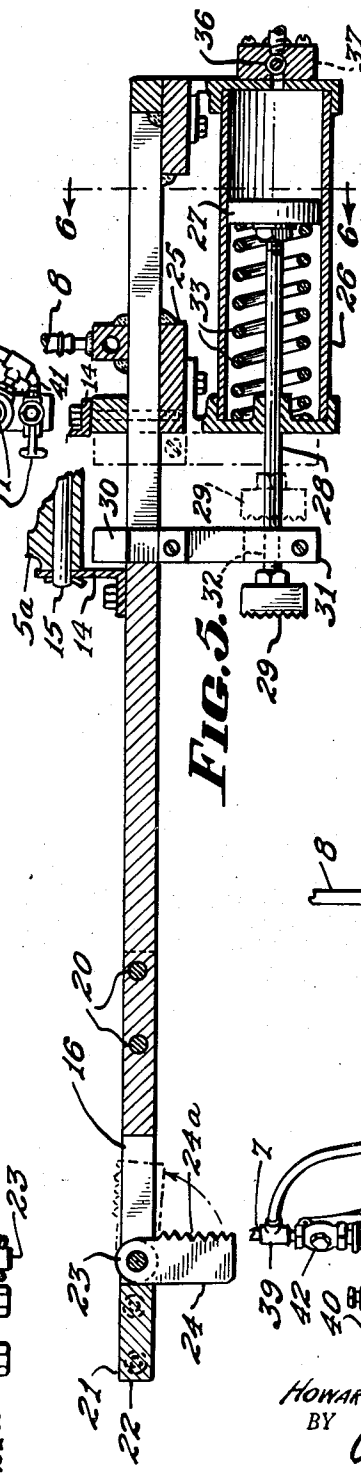


FIG. 5.

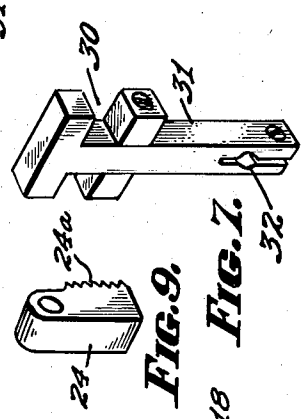


FIG. 9.

FIG. 7.

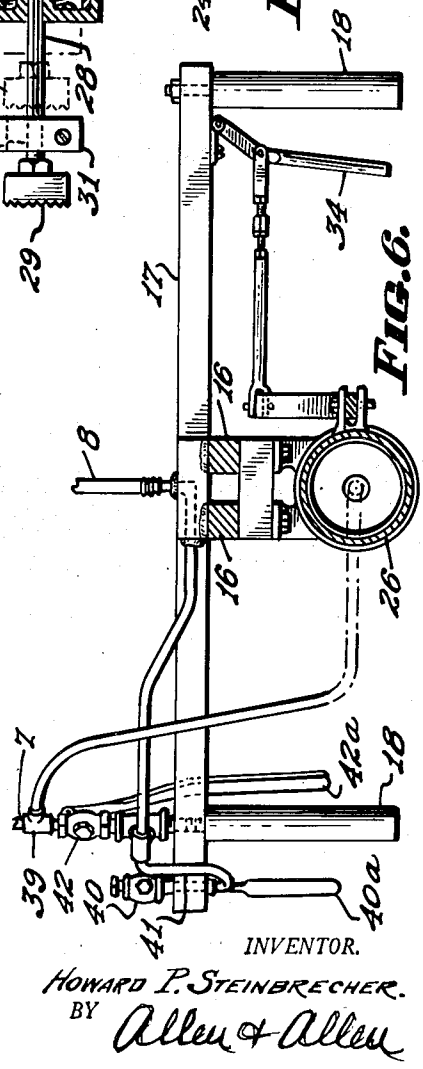


FIG. 6.

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UNITED STATES PATENT OFFICE

2,574,131

BLOCK MATERIAL HANDLING MACHINE

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Application November 13, 1946, Serial No. 709,586

6 Claims. (Cl. 294—62)

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My invention relates to mechanism for picking up blocks of material and moving them, more particularly as a step in the manufacture thereof. Particularly with concrete blocks which are very heavy there is a decided problem in the factory operations, and various solutions have been offered none of which appear to adequately provide for the same.

Thus in making of concrete block the blocks must be set on racks to cure after having been formed. It is then necessary to remove the blocks, and to do so one at a time is too time consuming particularly if done by hand. The problem is to provide a mechanical means for picking up a set of such blocks, and moving the set from the rack to a storage or loading point. This mechanical means must be one which will not permit a block to drop during transportation. The blocks are heavy and casualties are quite likely if one is dropped. Also the mechanical means must be foolproof, and such that if a set of blocks is picked off of the curing rack it is not required for the operator to continue to maintain a clamp or the like in operation in order to prevent dropping the blocks.

The concrete blocks are not produced in a size which is so uniform that all blocks have the same precise dimensions. A clamp which embraces a set of blocks is thus likely to fail to engage adequately on one of them and it may fall. Finally the concrete blocks while cured before being moved are not as hard as they will become upon some lapse of time, and usually are formed with hollow passages through them. A clamp which grips the sides of a block and tends to squeeze the blocks close to the bounding wall of one of the hollow passages will tend to collapse it.

The object of my invention is to provide a device which will readily handle a group of blocks, particularly concrete blocks with holes through them of the standard type, and which takes care of the problems now stated.

The invention will be illustrated by a particular embodiment, which will be fully described, but it will be understood that the inventive aspects so illustrated may take other forms of equivalent nature. Reference is here made to the appended claims for statement of the novelty.

In the drawings Fig. 1 is an elevation showing the complete device as applied to removing a group of three large sized concrete blocks from a curing rack illustrating as a traveling carrier an overhead rail and carriage.

Figure 2 is a view of the block gripping end of the device showing the operation of applying it.

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Figure 3 is an elevation of a curing rack at right angles to the partial view thereof in Figure 2.

Figure 4 is a section on the line 4—4 of Figure 1 on a larger scale.

Figure 5 is a section on the line 5—5 of Figure 4.

Figure 6 is a section on the line 6—6 of Figure 5.

Figure 7 is a perspective of the supporting slide for the plunger.

Figure 8 (sheet 1) is a detail on line 8—8 of Figure 1.

Figure 9 is a perspective of one of the gripping dogs.

I have illustrated a rail 1 supporting a carriage 2 which can be pulled along the rail, said structure constituting the support for the handling device. Instead of this a crane arm could be employed, for example. Depending from the carriage is a supporting rod 3, the end of which is provided with a head 4 that serves as a piston in an elongated cylinder 5. A source of compressed air, or other fluid under pressure is indicated at 6, and a flexible pressure hose 7 is employed to convey the air to the valve mechanism of the device. A tube 8 extends from the valve mechanism to the cylinder 5 thus permitting the piston to be forced down in the cylinder, raising the cylinder, and with it the attached parts now to be described.

While it will be understood that my device can be employed to lift bricks, small blocks, etc., it has been designed particularly for handling heavy concrete block. A familiar practice in the making of such block is to place them on a rack for curing. The type of rack shown (Fig. 3) has corner irons 9 secured together at the base by a bottom plate 10. At measured levels above the bottom plate, plates 11 are provided hinged to the corner irons at one side, and hooking over studs on the corner irons at the other side. The details of this construction are not important. Such a rack is arranged so that when material is removed from each plate, this plate can be swung up out of the way, as indicated in dotted lines at 11*a* Figure 3, and gripped by hooks 12 on the corner irons where pivoted. However, it is not necessary to dismantle or open up the rock in this way for my device to operate.

As illustrated the plates are filled with concrete blocks 13 which are in the act of solidifying. A standard large size block is 8 inches by 8 inches by 16 inches. The blocks have holes 13*a* therein, and are laid on the plates with the holes extending vertically of the blocks. A conventional practice is to have four plates, and mount

three rows of blocks abutting one another in groups of six on each plate. The task is to lift these blocks without injury thereto and move them away in groups of more than one. The present mechanism is designed to lift three of these large blocks at a time. If the blocks were smaller, more could be lifted by the same mechanism. By change in size of the mechanism, this would be modified, as will be evident.

Referring now to Figures 4 and 5 more particularly, the lower end of the cylinder **5** is equipped with a mounting piece **5***a* to which are secured brackets **14** by a hinge pin **15**. An arm consisting in this case of two spaced metal bars **16**, is secured to the brackets. The arms are connected at the operator's end of the device by a cross bar **17** which has handle grips **18** thereon whereby the device is manipulated. At its opposite end the arm is bolted over an intermediate bar **19** by means of bolts **20** which mount the head **21** on the end of the arm. This head is formed of two side plates **21***a* connected at the outer end by a cross plate **22**, and serving together with the outer ends of the two bars forming the arm, to support a cross pin **23**. This pin serves as a pivot for gripping fingers.

In the type illustrated, there are three gripping fingers **24**. In other types of these machines there is no head on the end of the arm and a single gripping finger is used. The gripping fingers are pivoted so that they can rock in one direction (toward the handle end of the arm) but when permitted to swing down to a vertical position cannot be swung any further toward the head end of the arm because of abutting against the cross plate **22**. The fingers will preferably have a knurled face **24***a*.

Mounted on the arm in this case ahead of the cross bar or handle **17**, is a frame **25**, which mounts a cylinder **26**. This cylinder has a piston **27** the rod **28** of which projects toward the head end of the arm and is equipped at its exposed end with a clamping plate **29**. As shown this is a plate of relatively small area and knurled on its exposed face. As a support for the rod it is preferable to arrange a sliding structure on the arm. This may be done by providing a plate with a double T head **30**, to engage the two bars of the arm, and a depending portion **31** which has a slit end about a bore **32** which is set over the piston rod, and may be clamped thereto. This type of support moves with the piston rod and clamping plate.

The piston in this example is spring biased to move to a position of retracting the piston rod, by means of an internally housed spring **33**. The principle of the machine is to apply air under pressure to maintain the piston rod extended, in the absence of a deliberate maintenance by the operator of a condition in which the spring bias will come into play. It is apparent that instead of a spring it would be simple to use the pressure fluid for the same purpose.

The handle (Figure 6) is provided near one of the grips with an operating lever **34**, which by a linkage as shown moves a valve opening finger **35** (Figure 4). When the lever is actuated by the operator, the finger **35** will depress a spring biased valve **36**. Air is admitted to the cylinder **26** through this valve and the depression thereof will close off the air and open the interior of the cylinder through a port **37** in the valve body, to the atmosphere. As soon as the lever **34** is released the valve will move to original spring biased condition, forcing the piston through the

cylinder and projecting the piston rod and clamping plate.

The air connection supply line **7** which is coupled to the supply hose has a T **39** which connects the air to the cylinder for the clamping plate. There are two valves located adjacent the opposite handle grip to that now noted as being adjacent to the cylinder control lever **34**. One of these valves as at **40** controls exhaust of air from the supporting cylinder **5** of the device and is connected to the cylinder by pipes **41**, **42** and tube **8**. The other valve **42** admits air to the top of the cylinder **5** through the tube **8** already mentioned. This valve has an operating lever **42***a* which depends alongside the handle grip. The valve **40** has an operating handle **40***a* which depends on the other side of the handle grip.

With the mechanism as so constructed, the operator will grasp the handles of the device and move it to position convenient to a set of blocks on the curing rack. There is enough flexibility in the supporting rod structure to permit it to be swung somewhat from the vertical, and the arm of the device can be swung somewhat from side to side. This permits easy manipulation to bring the head on the arm to a position to move it over the top of a row of three blocks.

The operator first uses the fingers of one hand to shift the lever **34**, which opens the air cylinder for the clamp. The clamp will then be pulled toward the cylinder. Having done this and while maintaining his finger on the lever, the operator will push the arm over the top of three of the blocks. The gripping finger or fingers will drag along the tops of the blocks (Figure 2) and the operator will stop the movement when the fingers drop into the holes in the third block. He will then release the lever **34**, whereupon the clamping plate **29** will move forward and engage the face of the outer one of the row of three blocks, and clamp the three blocks together.

It will be noted that a lack of uniformity in dimensions of the blocks will not affect the grip on each block. The blocks are relatively rough with a large frictional coefficient. The engagement by the fingers **24** within the holes **13***a* (Fig. 8) does not tend to collapse the block engaged, as it would if the fingers engaged over the rear wall of the third block. The act of clamping the blocks between the finger or fingers and the clamping plate will result upon release of the lever **34**, and will be retained so long as this lever is not manipulated.

The operator may then pull the device to whatever point desired and can cause the blocks to be raised up by admitting air to the top of the supporting cylinder **5**.

For moving brick or small blocks, the same device could be used, except that in this instance there would have to be a spacing in order to permit the fingers to fall behind the correct number of bricks to fill the clamp.

To lower the arm the release valve **40** can be manipulated whereupon gravity will result in the cylinder **5** moving down over the piston.

The arm itself, possesses novelty apart from the mode of suspension thereof and the mode of suspension possesses novelty apart from the particular type of arm. The two combined with valve controls directly at the hand grips which are used to move the arm about is particularly convenient.

As shown in Figure 2, it is clear that with an arm of proper length, the rack structure will not interfere with the gripping and lifting operation

on the blocks in any row, the nature of the fingers being such that they swing to ride under the rack bars. As a matter of fact, the lower rows of blocks in a rack could be removed first.

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

1. In a material handling machine of the type described; a gripping arm; a gripping finger pivotally mounted near one end of said arm, said finger being so mounted that it will not swing past a vertical position when used for clamping, said finger being free to swing toward the other end of said arm about its pivotal mounting; a clamping plate movably mounted near said other end of said arm; said clamping plate having an operating device carried by said arm, said operating device being arranged to automatically continually urge said plate toward said finger; means under control of an operator for moving said clamping plate away from said finger, said means acting only during actual manipulation by the operator; and means for suspending said arm from an overhead support, said suspension means being fastened to said arm towards that end near which said clamping plate is mounted, whereby said arm may be brought into operative position with respect to material to be handled by lateral movement of said arm across said material, said finger being swung towards said plate by contact with said material, said finger being adapted to fall by gravity to a vertical position when out of contact with said material.

2. In combination: a suspending device; said suspending device comprising a cylinder, a piston in said cylinder, and a rod fixed to said piston and to an overhead support provided for said device, the parts being arranged so that entrance of fluid under pressure at the upper end of the cylinder will cause it to rise over the suspending rod toward said support; a clamp; said clamp comprising an arm, a gripping finger pivotally mounted at one end of said arm, said finger being so mounted that it will not swing past a vertical position when used for clamping, a clamping plate movably mounted at the other end of said arm, and an operating device for said plate mounted on said arm and arranged to automatically continually urge said plate toward said finger; said arm being fastened to said cylinder towards the end at which said plate is mounted; an operating element having grips thereon, said element being fixed to said arm adjacent that portion of said arm which is fastened to said cylinder; valve means for directing the flow of fluid into the upper end of said cylinder, said valve means being provided with manual operating means; and means under control of an operator for moving said clamping plate away from said finger, said means acting only during actual manipulation by the operator; said last mentioned means and said manual operating means being located adjacent said grips.

3. A gripping member for the purpose described comprising an arm, a gripping finger pivotally mounted near one end of said arm, said finger being so mounted that it will not swing past a vertical position when used for clamping, said finger being free to swing toward the other end of said arm about its pivotal mounting, a clamping plate movably mounted near said other end of said arm, an operating device carried by said arm and adapted to automatically continually urge said plate toward said finger, and means under control of an operator for moving said clamping plate away from said finger, said means acting only during actual manipulation thereof by the operator.

4. The device of claim 3 in which said operating device comprises a cylinder and piston for fluid under pressure, the piston having a rod, said clamping plate being mounted on the rod, and guide means fixed on the rod, said means slidably engaging said arm.

5. The device of claim 3 including an operating bar crosswise to said arm and fixed thereto at a point adjacent said other end, and grips on said bar, said means under control of the operator having a distinct manipulation part located adjacent a said grip, but not a part thereof, for convenient manipulation.

6. A gripping member for the purpose described comprising an arm, a gripping finger pivotally mounted near one end of said arm, said finger being so mounted that it will not swing past a vertical position when used for clamping, said finger being free to swing toward the other end of said arm about its pivotal mounting, a clamping plate movably mounted near said other end of said arm, an operating device carried by said arm and adapted to urge said plate toward said finger, and means under control of an operator for moving said clamping plate away from said finger.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
449,724	Aiken	Apr. 7, 1891
1,346,160	Barlow	July 13, 1920
1,427,469	Hoefflinger	Aug. 29, 1922
1,490,235	Smith et al.	Apr. 15, 1924
1,800,385	Hayes	Apr. 14, 1931
2,038,518	Badger et al.	Apr. 28, 1936
2,247,787	Schmidt	July 1, 1941

FOREIGN PATENTS

Number	Country	Date
165,261	Germany	Dec. 13, 1903