Sept. 27, 1966 B. L. MIZER ETAL 3,274,660

SLUMP BLOCK PRODUCING MACHINE

Filed Oct. 17, 1960 2 Sheets-Sheet 1

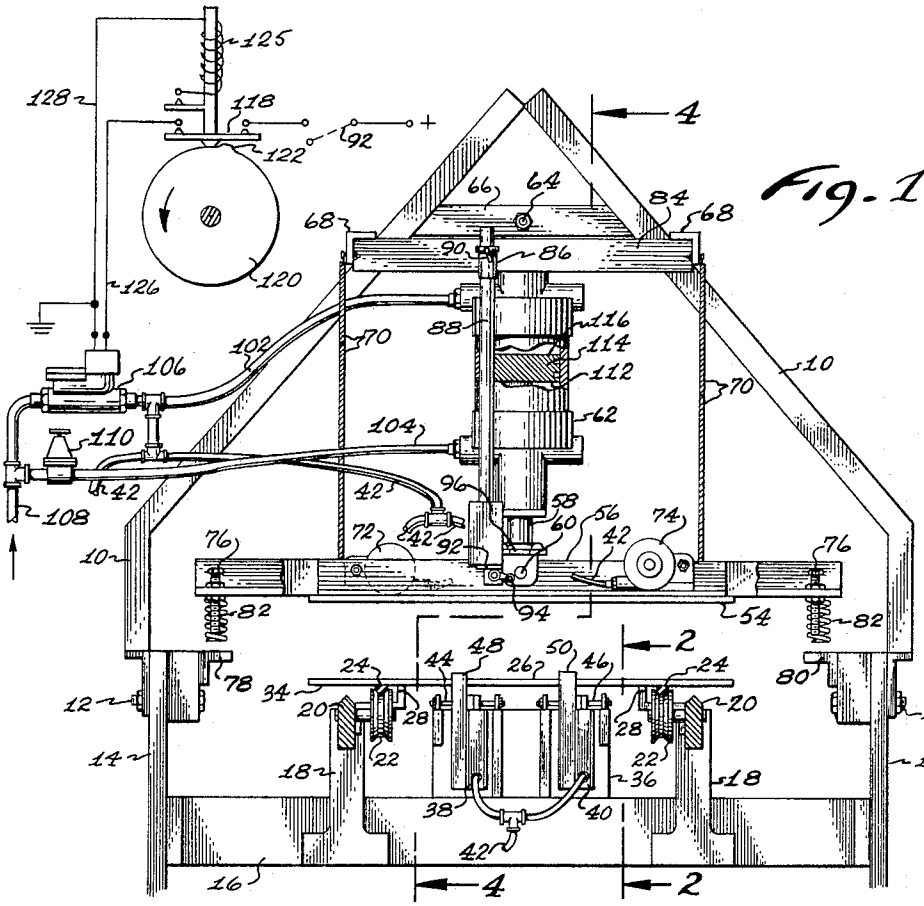


Fig. 1

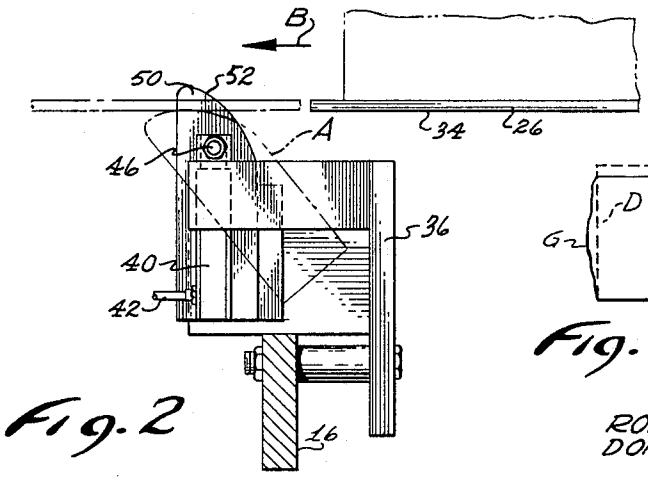


Fig. 2

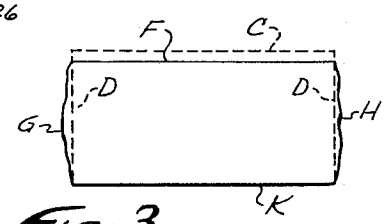


Fig. 3

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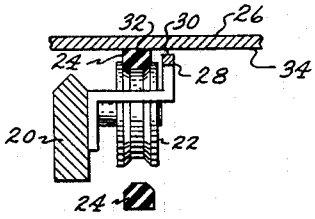


Fig. 5

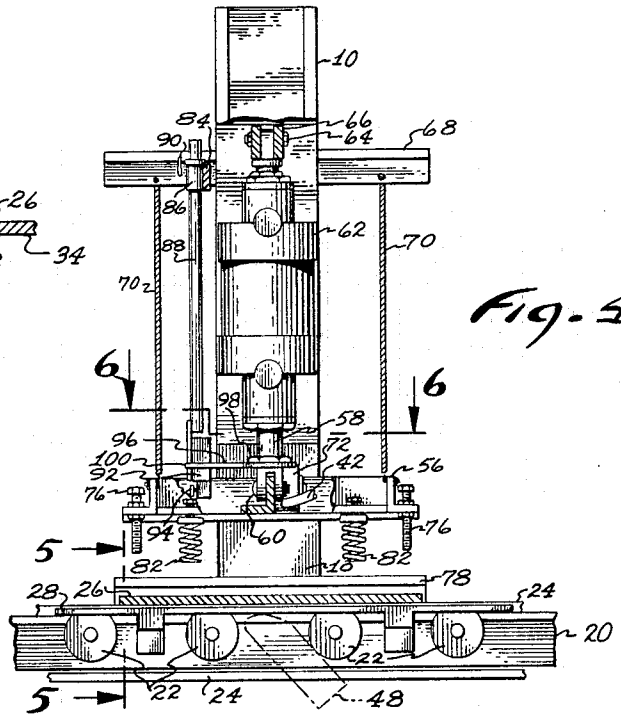


Fig. 4

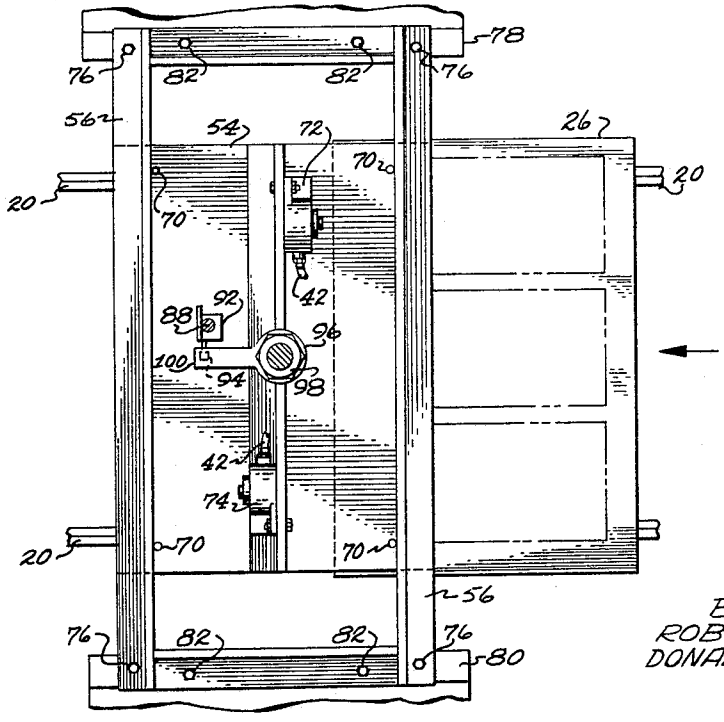


Fig. 6

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SLUMP BLOCK PRODUCING MACHINE

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4 Claims. (Cl. 25—41)

This invention relates to a slump block producing machine and more particularly to a slump block producing machine capable of producing slump blocks of blocks formed by a conventional high production concrete production machine immediately after the conventionally formed blocks have been delivered therefrom.

The term, "slump block," as used herein, defines a concrete block produced from mortor containing a slightly greater amount of moisture than is normally used in conventional concrete blocks and the term, "slump block," also defines a block, the side wall surfaces of which, are slightly bowed or slumped outwardly of flat vertical planes common to conventional high production concrete blocks.

Slump blocks are sometimes desirable from an architectural standpoint since they have uneven contoured surfaces and tend to break the monotony of conventional smooth flat surfaced block or wall construction.

It has heretofore been a problem to produce slump blocks on high production concrete block producing machines such as the well-known "Besser" machines. These machines normally produce very accurate smooth straight sided blocks at a very high rate, and most concrete block producing plant operators have recognized the desirability of utilizing such machines for producing slump blocks so that separate facilities may not be needed to produce these slump blocks. It has been a problem to provide means usable in connection with such high production machines which will convert the accurate blocks, thus produced, into slump blocks at a production rate approximating or normal to that of the high production machine.

Concrete block producing machines normally deliver several concrete blocks on rather extensive pallets and the blocks must be produced so that they have an excessive vertical dimension in order that they may subsequently be compressed into slump blocks. Considerable difficulty has been encountered in performing this operation and at the same time achieving uniform height of the slump blocks throughout the over-all area of the pallet on which the blocks are delivered. Additionally, great difficulty has been encountered in forcing blocks, produced by a high production machine, into slump configuration within the time allowed during each cycle of operation of such a concrete block producing machine.

Accordingly, it is an object of the invention to provide a slump block producing machine which is located to compress blocks delivered by a conventional high production block machine into slump blocks at a rate compatible with the operation of the concrete block producing machine.

Another object of the invention is to provide a very simple slump block producing machine which may readily be located above and in adjacent relationship with the conventional delivery conveyor of a high production concrete block producing machine.

Another object of the invention is to provide a slump block producing machine having a novel means for suspending and vertically actuating a pressure plate which is utilized to compress conventional concrete blocks into slump blocks over the delivery conveyor of a high production concrete block producing machine.

Another object of the invention is to provide a slump block producing machine having novel means for supporting a block laden pallet on the delivery conveyor of a high production concrete block machine while producing vibration of the pallet which supports blocks thereon, and while a pressure plate is concurrently vibrated and forced downwardly on the upper surfaces of blocks so that they are quickly converted from conventional high production concrete blocks into high production slump blocks.

Another object of the invention is to provide a slump block producing machine operable above and adjacent to the delivery conveyor of a high production concrete block producing machine and wherein novel means is provided for actuating and leveling a pressure plate, which engages the upper surfaces of several blocks carried by a pallet on said conveyor whereby, engagement of said pressure plate with said blocks is accurately controlled evenly to apply vertical force on said blocks so that they are uniformly and accurately compressed into slump block configurations.

Further objects and advantages of the invention may be apparent from the following specification, appended claims and accompanying drawings in which:

FIG. 1 is a side elevational view of a slump block producing machine of the present invention shown supported on the delivery conveyor frame structure of a conventional high production concrete block producing machine.

FIG. 2 is an enlarged fragmentary sectional view taken from the line 2—2 of FIG. 1.

FIG. 3 is a side elevational view of a slump block showing by broken lines, the relative outline and dimensions of an original high production concrete block from which the slump block is produced.

FIG. 4 is a fragmentary sectional view taken from the line 4—4 of FIG. 1.

FIG. 5 is an enlarged fragmentary sectional view taken from the line 5—5 of FIG. 4; and

FIG. 6 is a fragmentary sectional view taken from the line 6—6 of FIG. 4.

As shown in FIG. 1 of the drawings, the slump block producing machine of the invention is provided with a suspension frame **10** secured by bolts **12** to an output conveyor frame **14** of a conventional high production concrete block producing machine. Supported between the members **14** is a cross member **16** having upstanding members **18** which support rails **20**.

Mounted on these rails **20** are rollers **22** which support conventional flexible pallet delivery belts **24**. These belts **24** move pallets **26** away from the conventional high production concrete block machine and the belts are similar to those employed in connection with the conventional "Besser" concrete block producing machines.

The belts **24** are slightly resilient and also slightly compressible. According to the present invention, stop bars **28** are located at a level slightly below the lower surface of the pallet carried by the belts **24**. As shown in FIG. 5 of the drawings, these bars **28** are provided with upper surfaces **30** which may be a small fraction of an inch below the normal upper surfaces **32** of the belts **24**. The upper surfaces **30** of the bars **28** are adapted to support the pallet **26** when pressure is exerted on blocks carried by the pallet during the process of creating slump blocks. When such pressure is exerted on the pallet **26**, the belt **24** is slightly compressed whereupon the lower surface **34** of the pallet **26** engages the upper surface **30** of the bars **28**, all as will be hereinafter described in detail.

Mounted on the cross bar **16** is a vibrator assembly **36** comprising pivotally mounted vibrators **38** and **40**. These vibrators **38** and **40** are pneumatically operated vibrators coupled to a compressed air supply tube **42**. The assembly **36** is provided with a pair of pivot pins **44** and **46** upon which the vibrators **38** and **40**, respectively, are mounted. These vibrators are thus pivotally mounted so

that they may move into broken line positions A when a laden pallet **26** moves thereover in a direction as indicated by the arrow B, all as shown in FIG. 2 of the drawings.

Coupled to the vibrators **38** and **40** are pallet engaging members **48** and **50** disposed to engage the lower surface **34** of each pallet **26** as it passes thereover in the direction of the arrow B. These pallet engaging members **48** and **50** are provided with curved surfaces **52**, as shown in FIG. 2 of the drawings, whereby engagement of the pallet **26** therewith automatically pivots these members and the respective vibrators into the broken line position A, shown in FIG. 2 of the drawings. When pivoted into such position, the curved surface **52** continues to engage the lower surface **34** of the pallet **26** since gravity tends to act upon the vibrators **38** and **40** in a manner to maintain efficient contact of the engaging members **48** and **50** with the lower surface **34** of the pallet **26**. Thus, the vibrators **38** and **40** transmit vibration to each pallet **26** as it passes thereover and into position below a compression plate **54**, shown in FIGS. 1 and 4 of the drawings.

The pressure plate **54** is supported by a frame **56** and is coupled to a plunger **58** of a fluid cylinder **62** by means of a clevis pin **60**. The fluid cylinder **62** is pivotally supported and suspended by a bolt **64** extending through cross member **66** of the suspension frame **10**. Thus, the pressure plate **54** is pivotally suspended from the bolt **64** and is thus capable of freely aligning with upper surfaces of concrete blocks carried by the pallet **26** supported on the belts **24**, herein before described.

Cross arms **68** of the suspension frame **10** support coil springs **70** which are coupled to the frame **56** and resiliently lend support and suspension stability thereto.

Mounted on the frame **56** are pneumatic vibrator motors **72** and **74** which are coupled to the compressed air conduit **42**, as will be hereinafter described in detail.

The pressure plate frame **56** is provided with adjustable stop screws **76**. Four of these screws **76** are provided and disposed to bear at their lower ends upon rails **78** and **80**, carried by the members **14**, shown best in FIG. 1 of the drawings. The lower ends of the stop screws **76** provide a fixed stop for the pressure plate **54** relative to the pallet **26** in order accurately to control the height of slump blocks produced in accordance with the present invention. These stop screws **76** are vertically adjustable to provide the precise parallel alignment of the pressure plate **54** relative to a pallet **26** therebelow.

Four springs **82** are carried by the pressure plate frame **56** and extend downwardly to a position slightly below the lower ends of the stop screws **76** whereby they provide initial leveling of the frame **56** as it moves downwardly. The lower ends of these springs **82** first engage the rails **78** and **80** in order to pivotally align the pressure plate frame **56** in substantially parallel relation with the upper surfaces of blocks carried by the pallet **26** before the pressure plate **54** engages these blocks. In operation, the springs **82** are compressed during the downward movement of the frame **56** until the lower ends of the adjusting screws **76** engage the rails **78** and **80**.

Fixed to a bar member **84** of the frame **10** is a sleeve **86** having a rod **88** adjustably mounted therein. A set screw **90** screwthreadably connected to the sleeve **86** is disposed to fix the rod **88** in various adjusted positions therein, as desired.

Supported on the lower end of the rod **88** is a limit switch **92** having a contact roller **94** engageable with an arm **96** which is fixed to the plunger **58** by means of a jam nut **98**. The arm **96** is provided with an end portion **100** adapted to contact the roller **94** for operating the switch **92**, which is also shown schematically in FIG. 1 of the drawings.

The roller **94** is disposed to be engaged by the end portion **100** of the arm **96** when the pressure plate **54** has been extended downwardly to a predetermined position a few thousands of an inch above a location at which all of the stop screws **76** bear solidly upon the rails **78** and **80**, all as will be hereinafter described relative to the operation of the slump block producing machine of the invention.

The cylinder **62** is operated by compressed air which communicates through a tube **102** with the upper end of the cylinder **62** and through a tube **104** connected to the lower end of the cylinder **62**. The plunger **58** is provided with a double acting piston **114** so that it may be powered downwardly or upwardly according to operation of a solenoid valve **106**.

This valve **106** communicates with a compressed air supply tube **108** and is a normally closed valve disposed to furnish a supply of air under pressure to the tube **102** and the tube **42** for energizing the cylinder **62** and the vibrators **38**, **40**, **72** and **74**. Thus, the solenoid valve **106**, when energized, supplies compressed air to the upper end of a cylinder **62** tending to force the plunger downwardly and at the same time energizes all of the hereinbefore mentioned vibrators.

Interconnecting the tube **108** and the tube **104** is a pressure regulator **110**. This pressure regulator reduces pressure of compressed air from the tube **108** to the tube **104** so that air acting on a lower surface **112** of the piston **114** is less than that acting on the upper surface **116** thereof. It will be understood that when the solenoid valve is in normally closed position, air pressure is exhausted from the upper side **116** of the piston **114** due to the fact that the air pressure acting on the lower side **112** causes the piston to move upwardly and to exhaust the remaining air in the cylinder outwardly through the tube **102**, tube **42**, and to the vibrator motors **38**, **40**, **72** and **74**. Further, it will be understood that when the solenoid valve **106** is open, air pressure in the tube **102** is greater than air pressure in the tube **104**, the piston **114** is forced downwardly in the cylinder **62** thereby overcoming regulated air pressure acting on the side **112** of the piston **114**, whereupon the frame **56** is moved a short distance downwardly in order to permit the pressure plate **54** to exert force on blocks carried by a pallet **26** to force them into a slump condition.

In series with the switch **92**, as shown schematically in FIG. 1 of the drawings, is a cam operated switch **118** which is operated by a rotary cam **120** driven in unison with the controls of the high production concrete producing machine which delivers concrete blocks on the pallet **26** and which is coupled to intermittently activate the conveyor belts **24** on the rollers **22**.

This cam **120** is provided with a lobe **122** which is disposed to close the switch **118** and also a holding coil switch **124** which energizes a holding coil **125** so that the switch **118** is held closed until the switch **92** is opened.

A conductor **126** is provided to interconnect the solenoid valve **106** and the switch **118** when closed and another conductor **128** is coupled to one end of the holding coil **125** and is also coupled to the solenoid valve **106**.

The slump block producing machine of the invention operates substantially as follows:

Concrete blocks of conventional shape are produced by the high production concrete block producing machine and are delivered on the conveyor belt **24** on the upper sides of pallets **26**. The concrete blocks delivered by the machine are preferably made of a high slump material which includes slightly more moisture than the usual mix used to produce conventional concrete block.

The production machine is set so that its compression head stops at a position to produce blocks which are a fraction of an inch taller than the conventional blocks of a standard modulus. It is desirable that these blocks are, for example, three eighths of an inch taller than standard blocks to allow for compression and slumping thereof.

As shown in FIG. 3 of the drawings, the blocks delivered on the pallet **26** have an upper surface rep-

resented by the broken line C and side surfaces represented by broken lines D.

Several such concrete blocks are delivered on a pallet **26** by means of the belts **24** and when the pallet **26** approaches the pallet engaging members **48** and **50**, the cam lobe **122**, as shown in FIG. 1 of the drawings, also approaches the actuating point in its cycle wherein the switch **118** is closed.

As the pallet **26** carrying the blocks moves over the engaging members **48** and **50** of the vibrators **38** and **40**, it also moves under the pressure plate **54**.

When the lobe **122** of the cam **120** closes the switch **118**, the solenoid valve **106** is energized to an open position and compressed air is furnished to the vibrators **38** and **40** and the vibrators **72** and **74**. Also, the piston **114** in the cylinder **62** is forced downwardly carrying the pressure plate frame **56** and the pressure plate **54**. This pressure plate **54** is disposed in suspended swingable position by the pivotal bolt **64**, as hereinbefore described, and the lower ends of the springs **82** engage the rails **78** and **80** as the pressure plate closely approaches the upper surfaces of the concrete blocks on the pallet **26**. While the pressure plate is moved downwardly, it contacts the upper surfaces C of the blocks and gradually, with aid of vibration supplied by the vibrators, the block is compressed to a slump condition wherein its upper surface is disposed at F and its sides are caused unevenly to bow out into somewhat convex wall structures G and H as shown in FIG. 3 of the drawings. Thus, the slump block is formed by vibration and pressure in a free standing position on the pallet on which it was originally formed by the high production concrete block machine. It will be seen that this method may be carried out substantially in accordance with the cycle rate of the production machine and that the conventional conveyor belt **24** may be slightly compressed when pressure is applied to these blocks whereby compression of the belts permits the pallet **26** to rest on the bars **28** which solidly support the pallet during compression slumping of the blocks thereon.

When the pressure plate **54** has been forced downwardly to a predetermined position to locate the upper surface of the blocks at the level F, shown in FIG. 3 of the drawings, the roller **94** of the limit switch **92** is contacted by the end portion **100** of the arm **96** thereby opening the switch **92** and deenergizing the holding coil **125** which permits the switch **118** to open and deenergize the solenoid valve **106**.

When the solenoid valve is deenergized, it closes and regulated pressure, acting on the lower side **112** of the piston **114**, forces the piston upwardly which causes compressed air on the upper side **116** of the piston to be forced out of the cylinder **62** and through the tube **102** and tube **42** through the vibrators **38**, **40**, **72** and **74**. Thus, the plunger **58** is retracted together with the frame **56** while the four coil springs **70** tend normally to hold the frame **56** in substantially level position so that it approaches the concrete blocks in a substantially level position as it moves downward to engage the upper surfaces thereof. It will be understood that the rails **28** provide a positive stop for downward movement of the pallet **26**, when under pressure, while the ends of the adjustment screws **76** provide a positive stop for the downward movement of the pressure plate **54** whereby, a precise height of the slump block is controlled so that the distance between the upper surface F and the lower surface K is accurately controlled.

It will be appreciated that the present invention includes a method of producing slump blocks comprising; the production of conventional concrete blocks by a high production machine and permitting said high production machine to produce a block substantially taller than the ultimate elevation of the slump block. Then delivering the production concrete block from the machine and applying vertical pressure and vibration to said conventional block until it is compressed and externally bowed or deformed into a slump block configuration. Said pressure and vibration is stopped when the elevation of the slump block is at a desired dimension which is substantially less than the original dimension, or height of the conventional concrete block originally produced by the high production concrete block machine.

The method also comprises the subjection of the blocks to vibration of the pallet as well as vibration of a pressure plate on the upper surfaces of the blocks while the pallet is supported or restrained vertically and while the pressure plate moves downwardly concurrently with vibration thereof.

It has been found that the pressure plate **54** may be made of various materials, however, plexiglass has been found most suitable since the usual concrete mix does not tend to adhere thereto as readily as it does to other known materials. Additionally, during the process of making the blocks, it has been found that intermittent swabbing of the lower surface of the pressure plate alleviates the tendency of the upper surfaces of the blocks to leave deposits on lower surface of the plate **54**. The swabbing operation may include the application of a slight film or coat of oil by any suitable swabbing device.

Since the pressure plate **54** is only momentarily engaged with the upper surfaces of the concrete blocks, it will be recognized that the swabbing of this plate comprises a method step which is important in accordance with the foregoing method in high production of slump blocks when produced from conventional concrete blocks delivered from a high production machine. Thus, the method includes the application of pressure by a pressure plate on the upper surfaces of the blocks; the pressure plate being conditioned so that it does not adhere to the upper surfaces of the blocks.

It will be obvious to those skilled in the art that various modifications of the slump block producing machine and method of the invention may be resorted to in a manner limited only by a just interpretation of the following claims.

We claim:

1. In a slump block producing machine the combination of: a delivery conveyor of a conventional high production concrete block machine; a vertically movable pressure plate disposed above said conveyor and adapted vertically to move into engagement with the upper surfaces of concrete blocks disposed on a pallet carried by said conveyor; actuating means coupled to said pressure plate and supporting the same; a frame for supporting said actuating means whereby said pressure plate is suspended thereby; said actuating means pivoted to said last mentioned frame so that the plane of said pressure plate is readily conformable to the planes of concrete blocks supported on a pallet therebelow; first vibrating means disposed to vibrate a pallet on said conveyor below said pressure plate; and second vibrating means coupled with said pressure plate for vibrating it; first means operable by a high production concrete block machine in connection with said conveyor said first means coupled to said actuating means and said first and second vibrating means for automatically initiating operation of said pressure plate actuating means and said first and second vibrating means; limit switch means disposed to be actuated in accordance with downward movement of said pressure plate for deenergizing said actuating means and said first and second vibrator means when said pressure plate reaches a predetermined vertical position; stop means in connection with said pressure plate; members stationarily disposed to be engaged by said stop means for mechanically limiting the downward travel of said pressure plate, said conveyor comprising compressible belts supporting a pallet thereon and bars slightly below the upper surfaces of said belts disposed to support the lower surface of a pallet when said pressure plate engages and compresses blocks on the upper surface thereof.

2. In a slump block producing machine the combination of: a delivery conveyor of a conventional high pro-

duction concrete block machine; a vertically movable pressure plate disposed above said conveyor and adapted vertically to move into engagement with the upper surfaces of concrete blocks disposed on a pallet carried by said conveyor; actuating means coupled to said pressure plate and supporting the same; a frame for supporting said actuating means whereby said pressure plate is suspended thereby; said actuating means pivoted to said last mentioned frame so that the plane of said pressure plate is readily conformable to the planes of concrete blocks supported on a pallet therebelow; first vibrating means disposed to vibrate a pallet on said conveyor below said pressure plate; and second vibrating means coupled with said pressure plate for vibrating it; first means operable by a high production concrete block machine in connection with said conveyor said first means coupled to said actuating means and said first and second vibrating means for automatically initiating operation of said pressure plate actuating means and said first and second vibrating means; limit switch means disposed to be actuated in accordance with downward movement of said pressure plate for deenergizing said actuating means and said first and second vibrator means when said pressure plate reaches a predetermined vertical position; stop means in connection with said pressure plate; members stationarily disposed to be engaged by said stop means for mechanically limiting the downward travel of said pressure plate, said conveyor comprising compressible belts supporting a pallet thereon and means slightly below the upper surfaces of said belts disposed to support the lower surface of a pallet when said pressure plate engages and compresses blocks on the upper surface thereof, said actuating means being a pneumatic cylinder having a plunger supporting said pressure plate; said vibrators also being pneumatically powered; solenoid valve means coupled to said first means for energizing said actuating means and said vibrators.

3. In a slump block producing machine, the combination of: a delivery conveyor of a conventional high production concrete block machine; a vertically movable pressure plate disposed above said conveyor and adapted vertically to move into engagement with upper surfaces of concrete blocks disposed on a pallet carried by said conveyor; actuating means coupled to said pressure plate for actuating the said pressure plate upwardly and downwardly; a frame for supporting said actuating means and said pressure plate; first vibrating means freely engageable with the bottom of a pallet on said conveyor and,

disposed to vibrate said pallet on said conveyor; and second means coupled with said pressure plate for vibrating it; said first vibrating means pivotally mounted on a substantially horizontal axis adjacent said conveyor and having means normally disposed above a lower surface of a pallet on said conveyor and, engageable with the lower surface of a pallet on said conveyor whereby said pallet when moved along on said conveyor pivots said last mentioned means downwardly about said horizontal axis and engages said last mentioned means with the bottom of said pallet.

4. In a slump block producing machine, the combination of: a delivery conveyor of a conventional high production concrete block machine; a vertically movable pressure plate disposed above said conveyor and adapted vertically to move into engagement with upper surfaces of concrete blocks disposed on a pallet carried by said conveyor; actuating means coupled to said pressure plate for actuating the said pressure plate upwardly and downwardly; a frame for supporting said actuating means and said pressure plate; first vibrating means freely engageable with the bottom of a pallet on said conveyor and, disposed to vibrate said pallet on said conveyor; and second means coupled with said pressure plate for vibrating it; said conveyor having compressible belt means disposed to carry pallets thereon; and further means slightly below the upper surfaces of said belts disposed to provide supporting stops for the lower surfaces of a pallet when said pressure plate engages blocks on a pallet carried by said belt means and thereby causes compression thereof.

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