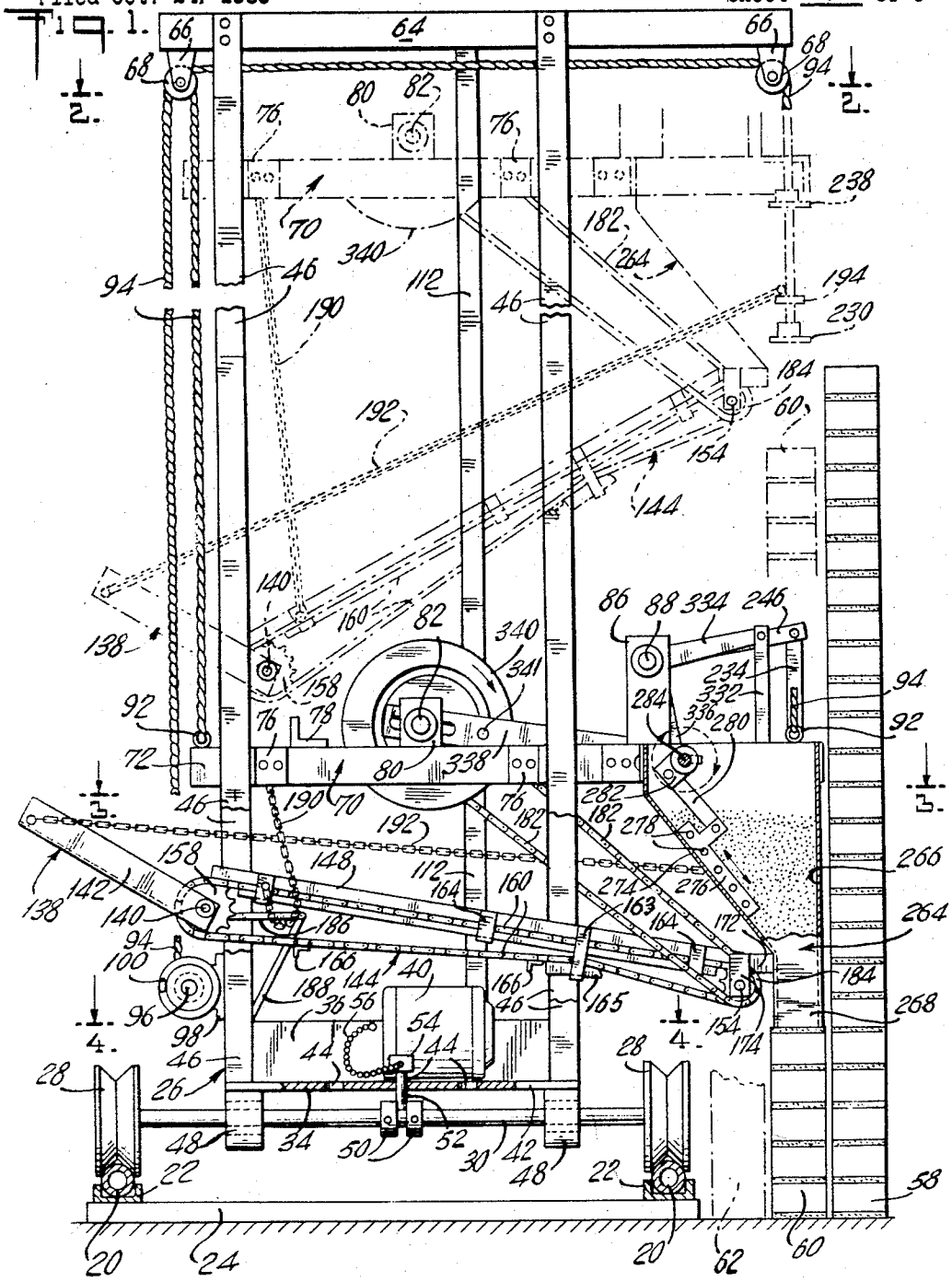
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BRICKLAYING MACHINE

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Fig. 1.



INVENTOR
DOUGLAS M. DEMAREST
BY
Nolte & Nolte
ATTORNEYS

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Fig. 2.

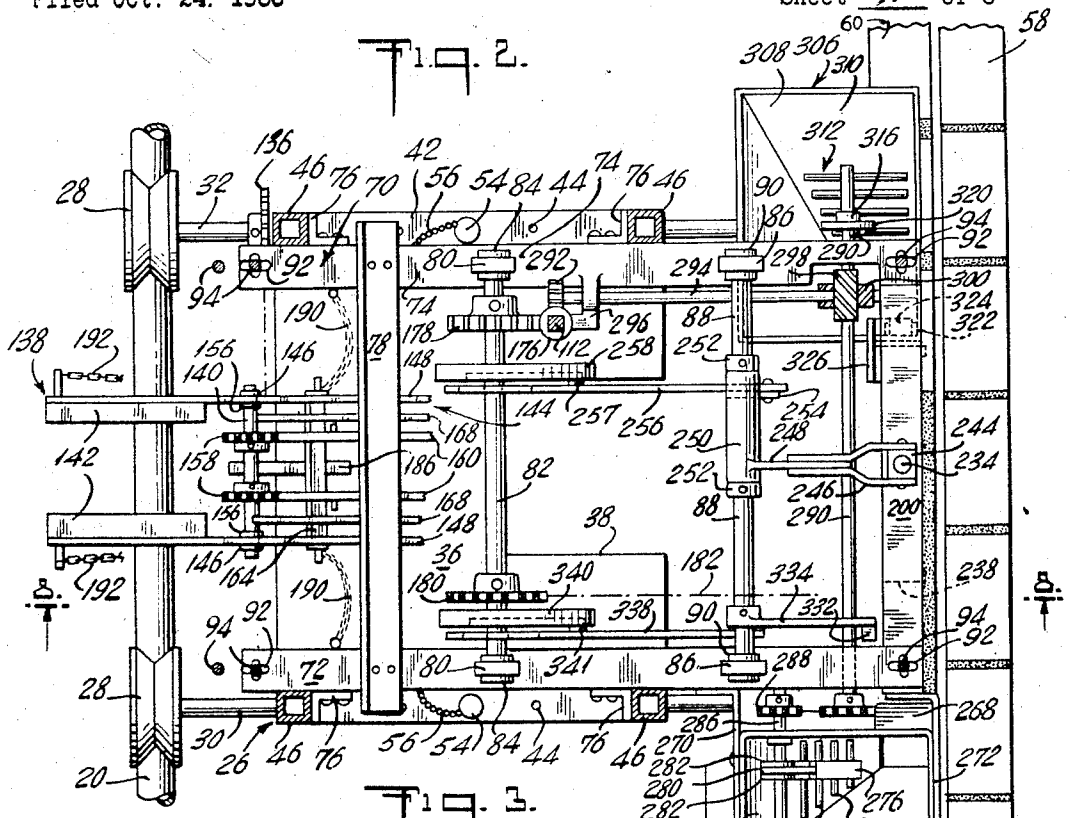
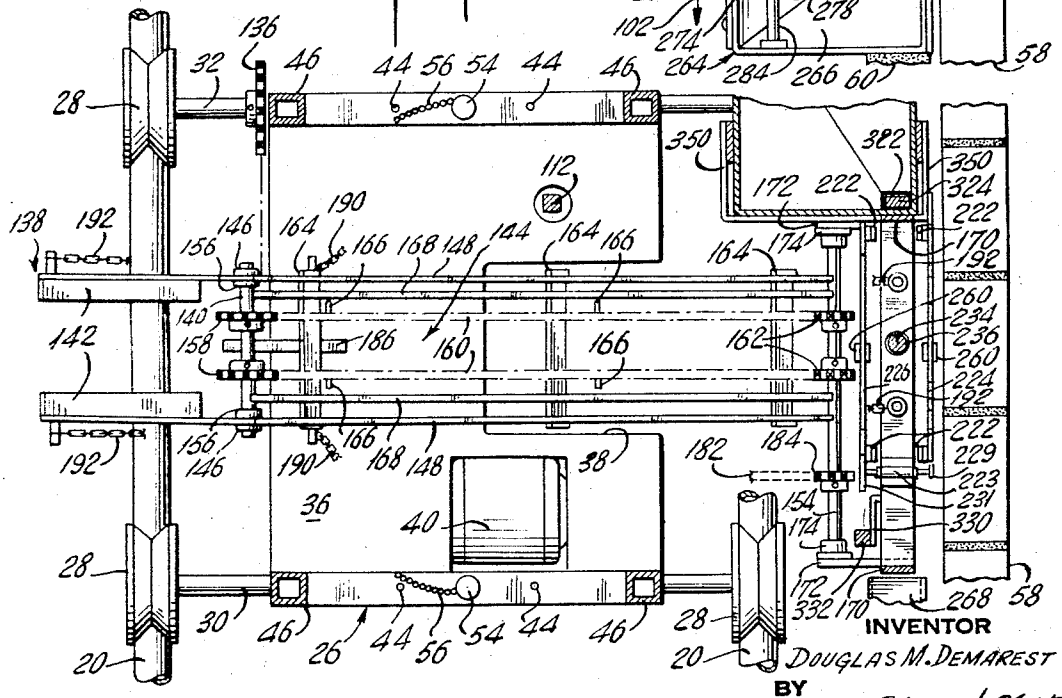


Fig. 3.



INVENTOR
DOUGLAS M. DEMAREST
BY
Nolte & Nolte
ATTORNEYS

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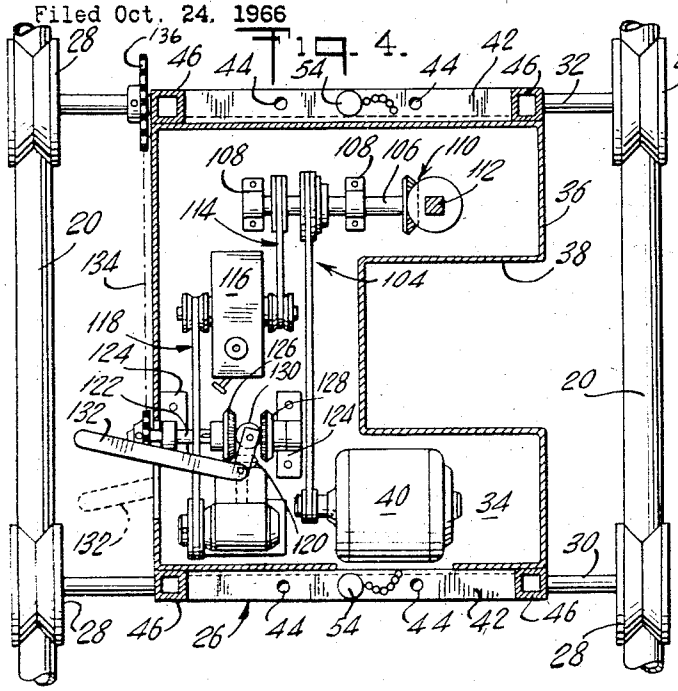


Fig. 4.

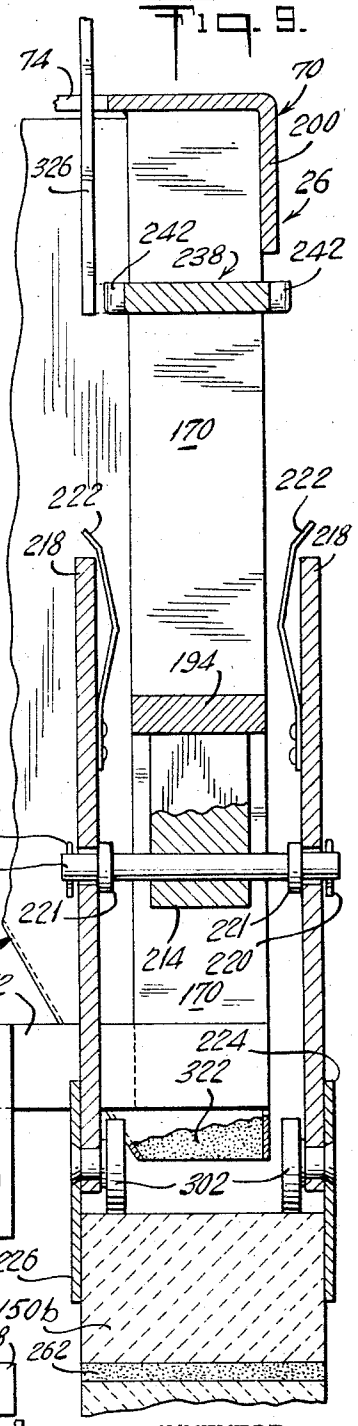


Fig. 9.

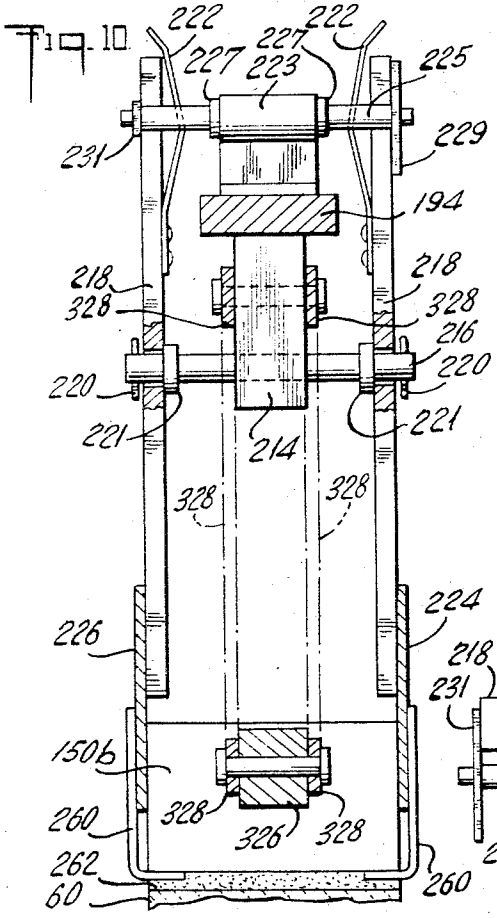


Fig. 10.

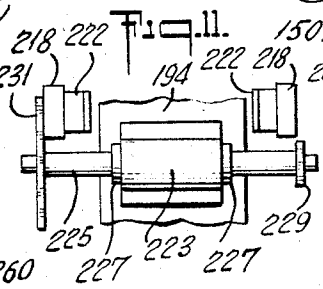


Fig. 11.

INVENTOR
DOUGLAS M. DEMAREST
BY Nolte & Nolte
ATTORNEYS

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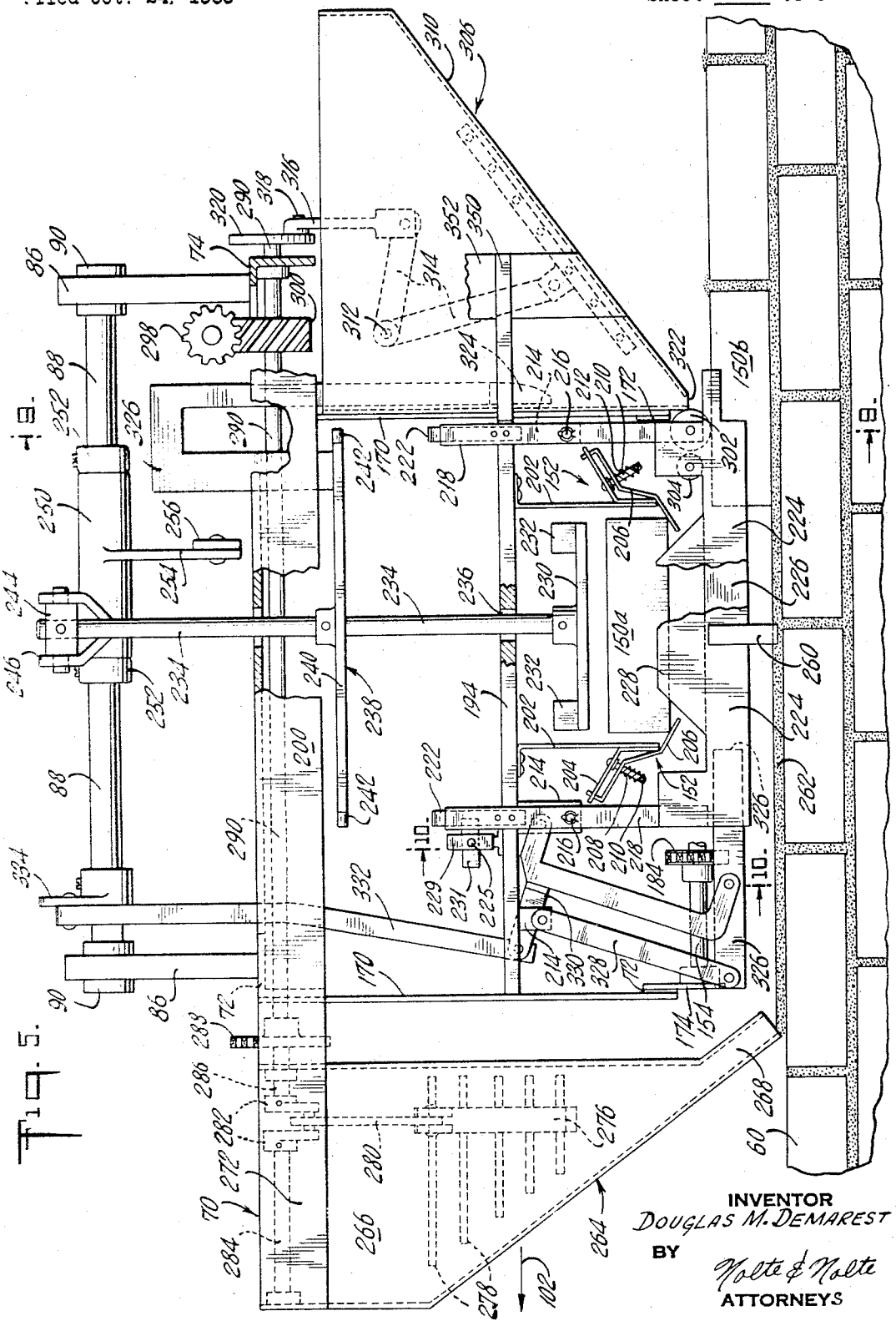


Fig. 5.

INVENTOR
DOUGLAS M. DEMAREST
BY
Nolte & Nolte
ATTORNEYS

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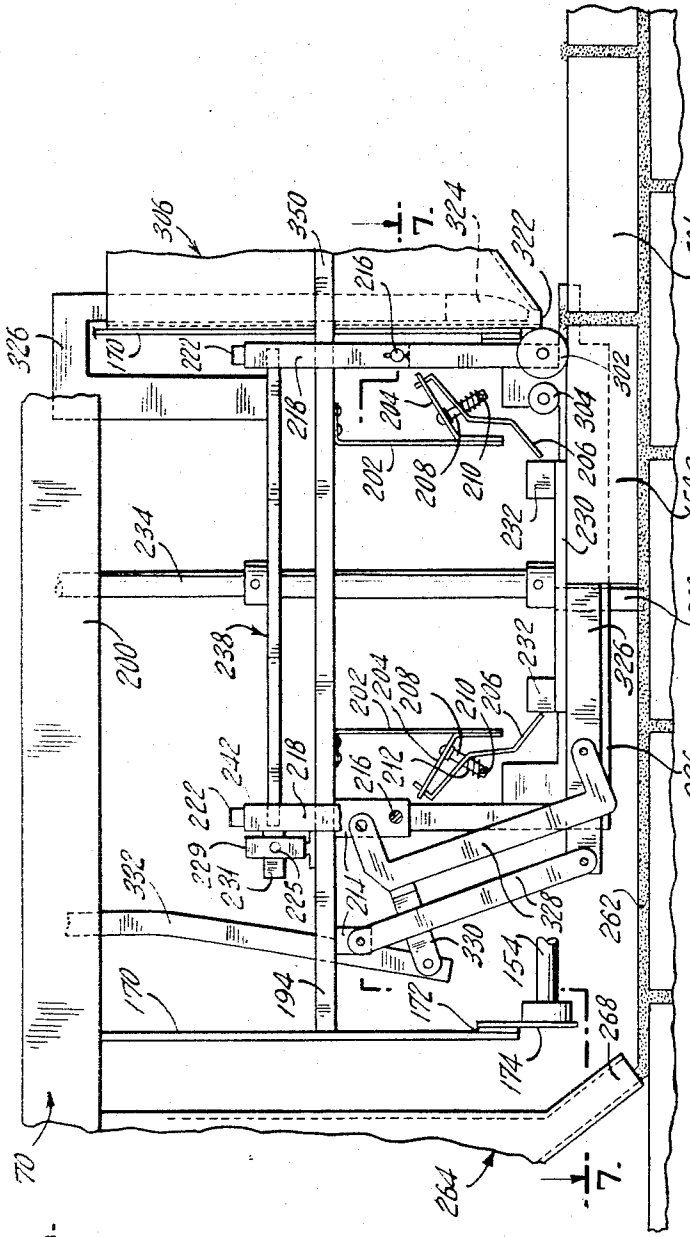


FIG. 6.

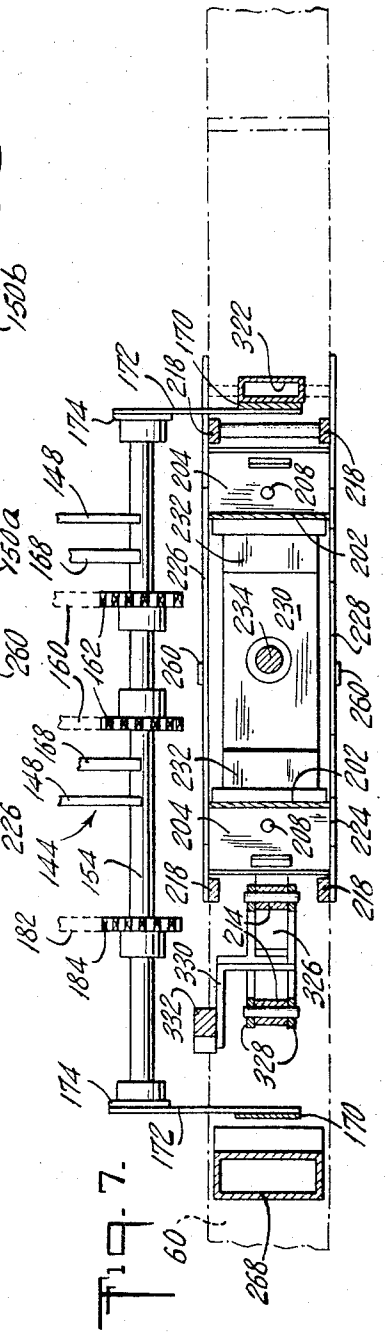


FIG. 7.

INVENTOR
DOUGLAS M. DEMAREST
BY
Nolte & Nolte
ATTORNEYS

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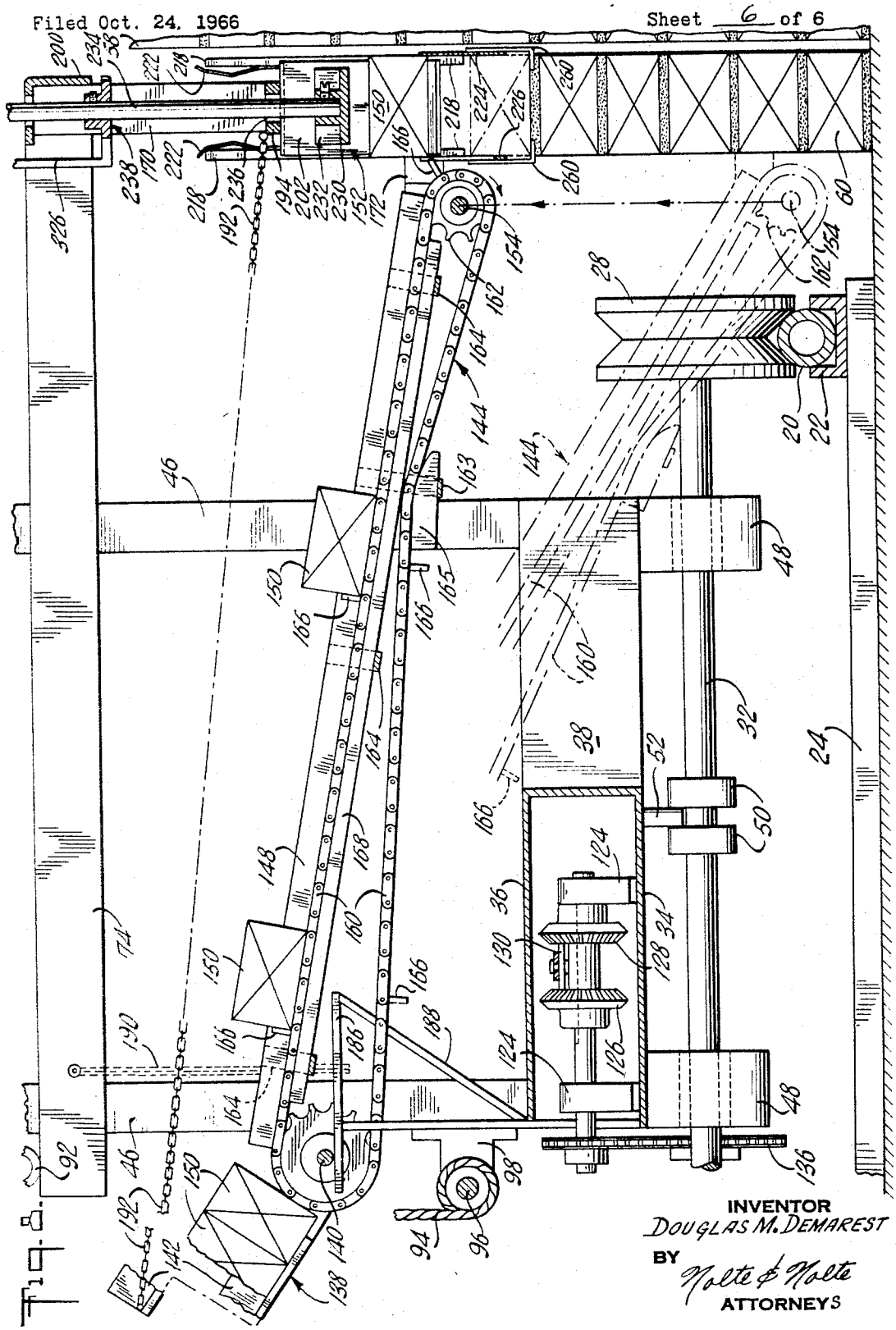


Fig. 1.

INVENTOR
DOUGLAS M. DEMAREST
BY Nolte & Nolte
ATTORNEYS

United States Patent Office 3,438,171 Patented Apr. 15, 1969

3,438,171

BRICKLAYING MACHINE

Douglas M. Demarest, Port Washington, N.Y., assignor to Demarest Machine, Inc., Port Washington, N.Y., a corporation of New York

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Int. Cl. E04g 21/14; E04f 21/00
U.S. Cl. 52—749 18 Claims

ABSTRACT OF THE DISCLOSURE

A bricklaying machine which is capable of directly transporting bricks one after the other from a receiving station of the machine along a straight-line path to a brick-depositing station where each brick is received to be deposited in a given course of a brick wall which is under construction.

The present invention relates to machines for laying bricks or any similarly shaped bodies, such as cement blocks during construction of a wall.

It is a primary object of the present invention to provide a bricklaying machine which is of an exceedingly simple, rugged construction, which is composed of a relatively small number of components which coact in a very reliable manner while at the same time requiring a relatively small amount of power for its operation, and which is in its entirety of a relatively light weight, so that the entire machine can be easily handled.

In particular it is an object of the present invention to provide a bricklaying machine which is capable of directly transporting bricks one after the other from a receiving station of the machine along a straight-line path to a brick-depositing station where each brick is received to be deposited in a given course of a wall which is under construction. In this way it becomes possible with the machine of the present invention to eliminate an elevator for raising bricks received from a conveyor to the elevation of the particular course which is to receive the bricks of a wall which is under construction.

It is also an object of the present invention to provide a bricklaying machine with a construction which will guarantee that all of the bricks are precisely located in a common vertical plane.

It is furthermore an object of the present invention to provide a bricklaying machine which is capable of successively laying a series of vertical walls at a given distance one from the next.

Yet another object of the present invention is to provide a bricklaying machine with a construction which will guarantee that the successive courses of a given wall are situated one above the other at least at a given minimum distance from each other.

The bricklaying machine of the present invention includes a rear receiving station at which a supply means is located for receiving a supply of bricks which are to be successively deposited in a given course. Situated forwardly of and spaced from the supply means is a depositing station which is situated at the course of a wall which is under construction, and a holding means is located at this depositing station for releasably holding the successive bricks which are to be deposited in a given course. A conveyor means of the invention has a front end situated directly next to the holding means and a rear end situated directly next to the supply means, and this conveyor means of the invention conveys the bricks one by one from the supply means to the holding means along a substantially straight-line path, delivering the bricks directly from the supply means to the holding means. This latter holding means of the invention has front and rear brick-guiding plates which respectively slidably engage the front and rear faces of a brick during deposition thereof in a given course, and a plunger means coacts with the holding means to displace a brick therefrom into the course which is to receive the brick. These front and rear brick-guiding plates engage the front and rear faces, respectively, of at least one previously laid brick, so as to assure the proper positioning of each brick in the plane of the wall in precise alignment with the previously laid bricks. The brick-guiding plates are supported for at least limited movement toward and away from each other, and a camming means is connected with the plunger means for movement therewith and cams the brick-guiding plates inwardly toward each other into engagement with a previously laid brick during the time when a brick is displaced from the holding means by the plunger means.

The invention is illustrated by way of example in the accompanying drawings which form part of this application and in which:

FIG. 1 is a partly fragmentary and partly sectional side elevation of one possible embodiment of a bricklaying machine according to the present invention;

FIG. 2 is a sectional plan view of the structure of FIG. 1 taken along line 2—2 of FIG. 1 in the direction of the arrows;

FIG. 3 is a sectional plan view of the structure of FIG. 1 taken along line 4—4 of FIG. 1 in the direction of the arrows;

FIG. 4 is a sectional plan view of the structure of FIG. 1 taken along line 4—4 of FIG. 1 in the direction of the arrows;

FIG. 5 is a front elevation of that part of the structure of the invention which deposits the successive bricks into the courses of a wall which is under construction;

FIG. 6 fragmentarily illustrates the parts of FIG. 5 at a position they take subsequent to their position shown in FIG. 5;

FIG. 7 is a sectional plan view taken along line 7—7 of FIG. 6 in the direction of the arrows;

FIG. 8 is a fragmentary sectional elevation taken along line 8—8 of FIG. 2 in the direction of the arrows and showing the structure on a scale which is larger than that of FIG. 2;

FIG. 9 is a sectional side elevation taken along line 9—9 of FIG. 5 in the direction of the arrows and showing the structure on an enlarged scale as compared to FIG. 5;

FIG. 10 is a sectional elevation taken along the line 10—10 of FIG. 5 in the direction of the arrows and also showing the structure on an enlarged scale as compared to FIG. 5; and

FIG. 11 is a fragmentary plan view of structure shown at the upper part of FIG. 10.

General framework

During the construction of a brick wall the entire machine of the invention moves continuously in a direction parallel to the wall and, more specifically, in a direction parallel to the particular course of the wall which is being laid. The machine of the invention will construct one wall at a time, course-by-course, with the successive courses being placed one upon the other as the height of the wall increases.

In order to guide the machine in its movement parallel to the wall which is under construction, a pair of tubular tracks 20 (FIG. 1) are provided, and these tracks may be carried in suitable channel members 22 which are in turn supported on mutually spaced cross-ties 24. During the construction of the lowermost part of a wall, these ties 24 can rest directly on the ground, and the footing on which the wall is built will extend generally to a distance

of about 5 inches above the surface of the ground, so that the lowermost course will be situated at an elevation of approximately 5 inches from the ground. As the height of the wall increases up to the maximum height at which the machine can lay the courses of bricks, it is possible to interrupt the operations and erect scaffolding at various elevations to carry the structure which is shown in FIG. 1, so that in this way it is possible to continue to build the wall to any desired elevation.

A carriage means **26** (FIGS. 1–4) is provided to guide the entire machine along the tracks **20**, and this carriage means **26** includes the grooved wheels **28** which engage the tubular tracks **20**. The carriage means **26** includes a leading pair of grooved wheels **28** fixed to a transverse shaft **30** and a trailing pair of grooved wheels **28** fixed to a trailing shaft **32**. During the laying of a given course the leading shaft **30** will always lead the trailing shaft **32**.

A platform **34** (FIG. 1) is situated over the space between the shafts **30** and **32**, and this platform **34** forms the bottom wall of a housing **36** in which is housed the driving structure shown most clearly in FIG. 4 and described in greater detail below. The hollow housing **36** is of the substantially C-shaped configuration shown in FIG. 4 so that at its front portion it has the opening **38** shown most clearly in FIG. 4 also for a purpose described below. A driving motor **40** is situated at the exterior of the housing **36** directly on a portion of the platform **34** which extends beyond the housing **36**. This motor **40** can be connected to any suitable source of electrical energy which can be turned on and off at the option of the operator in any suitable way.

The leading and trailing walls of the housing **36** respectively fixedly carry the flat horizontal flanges **42** which are respectively situated over and extend along the shafts **30** and **32**, and each of these flanges is formed with a plurality of openings passing therethrough. In the illustrated example there are three openings **44** in each flange **42**.

The flanges **42** as well as the housing **36** itself are fixed to four upright hollow columns **46** which may be of square or rectangular cross section, as shown in FIGS. 2–4. The platform **34** carries bearings **48** (FIG. 1) through which the shafts **30** and **32** respectively extend. Thus, these shafts are capable of rotating in the bearings **48** while at the same time the shafts support the columns **46** which serve to carry the housing **36** over the carriage means **26** which supports the entire machine.

Each shaft **30** and **32** fixedly carries a pair of collars **50** (FIG. 1) and these collars are spaced from each other to define a given gap between themselves. A pin **52** is adapted to be received at its bottom end in the space between each pair of collars **50**, as indicated in FIG. 1. There are a pair of such pins **52** situated at the leading and trailing ends of the housing **36** and having enlarged head ends **54** capable of being grasped by the operator and connected by chains **56** to the housing **36** so that the pins **52** will not become lost. By situating the pins **52** in a selected pair of openings **44**, passing therethrough into the space between the pairs of each collars **50**, it is possible to determine the transverse position of the housing **36** and the columns **46** with respect to the shafts **30** and **32**. Thus when the pins **52** are removed the entire structure carried by the carriage means **26** can be shifted to the right or left, as viewed in FIG. 1, perpendicularly with respect to a wall under construction and with respect to the direction of movement of the carriage means **26**. The two rows of openings **44** are respectively situated directly over the shafts **30** and **32**, so that selected openings **44** can be aligned with the gaps between the collars **50**, whereupon the pins **52** can be replaced to maintain the entire structure at a selected position transversely of the carriage means **26**.

As was pointed out above, the bricklaying machine of the invention will construct one wall at a time. When the rearmost pair of openings **44**, shown at the left in FIGS. 1–4 are situated over the gaps between the pairs of collars **50**, the bricklaying structure proper will be situated at its greatest distance to the right of the carriage means **26**, as viewed in FIG. 1, and at this time it is possible to to use the machine to construct the wall **58** indicated in FIG. 1. Thereafter, if desired, a second wall **60** can be constructed at a relatively small distance to the left of the wall **58**, as viewed in FIG. 1, and for this purpose the pins **52** will be removed from their openings and the entire structure will be shifted to the left along the shafts **30** and **32** so that the machine will then have the position shown in FIG. 1. It is then possible to remove the pins **52**, after the wall **60** has been constructed, and to situate the front openings **44** in alignment with the gaps between the pairs of collars **50**, after which the pins **52** are replaced and in this way it becomes possible to construct a third wall **62**, in the manner indicated schematically in FIG. 1.

It is to be noted that because of the fact that the entire machine is of a relatively light weight it is possible for the entire framework carried by the shafts **30** and **32** to be shifted along the latter so as to locate the bricklaying structure proper at a selected distance with respect to the wheels **28**. It is also to be noted that the housing **36** itself, by way of its connection with the four columns **46**, serves to maintain, by determining the location of the bearings **48**, the shafts **30** and **32** at a given distance from each other.

As is indicated in FIG. 1, the top ends of the columns **46** are fixed, as by suitable rivets or the like, to an upper horizontal framework **64** which fixedly carries downwardly directed pulley brackets **66** which in turn carry pulleys **68**, these pulleys being supported for free rotary movement.

Situated between the upper framework **64** and the housing **36** is a movable support means **70** which forms a primary support means from which practically all of the structure is supported, and this support means **70** of the invention is in the form of a vertically movable framework for which the columns **46** form a guide means to guide the support means **70** for vertical movement while the support means **70** remains in a horizontal plane parallel to that in which the upper framework **64** is located.

The framework **70** includes a leading elongated transverse bar **72** (FIG. 2) and a trailing transverse bar **74**, and these bars are respectively fixed to angle members **76** which slidably engage the columns **46**, so that in this way these columns guide the support means **70** for vertical movement. As is apparent from FIG. 5, the transverse bars **72** and **74** of the support means **70** are in the form of angle irons. They have outer vertical flanges to which the angle members **76** are fixed. Their upper horizontal flanges extend inwardly toward each other from their outer vertical flanges.

As is shown most clearly in FIG. 2, the pair of bars **72** and **74** are maintained at a given distance from each other by a longitudinal bar **78** which extends horizontally across the bars **72** and **74** and which may be, for example, riveted to their upper horizontal flanges, so that in this way the spacing between the bars **72** and **74** adjacent their rear ends is maintained, and in addition the rear angle members **76** are maintained in slidable guiding engagement with the rear pair of columns **46**. Forwardly of the bar **78** the bars **72** and **74** fixedly carry upwardly directed bearing blocks **80** which serve to support for rotary movement an intermediate shaft **82** which fixedly carries in engagement with the end faces of each bearing block **80** a pair of collars **84**, so that in this way also the spacing between the pair of bars **72** and **74** is maintained. In the same way the bars **72** and **74** fixedly carry, in the region of their front ends, upstanding rigid members **86** which carry suitable bearings for a front rotary shaft **88** which carries pairs of collars **90** engaging the ends of the members **86**, so that in this way also the spacing and parallel relationship between the bars **72** and **74** is maintained.

The upper horizontal flanges of the bars **72** and **74** fixedly carry adjacent their ends suitable eye members **92** (FIG. 1), and ropes or cables **94** are connected to the eye

members **92** and extend over the pulleys **68** and then downwardly along the rear of the machine, these ropes being wound onto a shaft **96** supported for rotation by suitable bearing blocks **98** (FIG. 1) carried by the rear pair of columns **46**. The shaft **96** can be manually turned, as by turning of a suitable hand wheel **100** fixed to the shaft **96**, and the shaft **96** can fixedly carry suitable take-up spools onto which the several ropes **94** are wound and from which they are paid out. During winding of the ropes onto the spools carried by the shaft **96** the support means **70** will of course be raised, and during paying out of the ropes the support means **70** will be lowered. In order to maintain the support means **70** at a desired location the bars **72** and **74** and/or the angle members **76** may carry suitable set screws which may be tapped to press against the columns **46** for maintaining the support means **70** at a selected elevation. When it is desired to change this elevation, these set screws can be loosened and the handwheel **100** turned so as to change the elevation. The ropes **94** can be connected with suitable counterweights which balance the weight of the support means **70** and the structure carried thereby, so that the operator can easily turn the handwheel **100** for changing the elevation of the support means **70**. During normal construction the support means **70** will be raised upwardly in a stepwise manner from course to course, and then at the end of the construction of a given wall or a given section thereof the support means **70** will be lowered to its lowest elevation in order to start the next series of courses. The courses are always laid from bottom to top and in the direction indicated by the arrow **102** in FIGS. 2 and 5.

All of the moving components of the machine of the invention are driven from the single motor **40**. For this purpose, as shown in FIG. 4, the motor **40** drives a belt-and-pulley assembly **104** which serves to rotate a shaft **106** situated in the housing **36** and supported by suitable bearings **108** therein. At the front end of the shaft **106** is situated a pair of meshing bevel gears **110** one of which is fixed to the shaft **106** for rotation therewith and the other of which is fixed to a vertical noncircular shaft **112**, which may be of square cross section, as shown, and which is supported at its top and bottom ends in suitable bearings carried by the housing **36** and the upper framework **64**. During operation of the machine all of the movable components carried by the support means **70** are driven from the rotary non-circular shaft **112**. The support means **70** moves vertically with respect to the shaft **112**.

Returning to FIG. 4, it will be seen that through a second belt-and-pulley assembly **114** the drive is transmitted from the shaft **106** to a variable speed assembly **116** capable of providing different transmission ratios through manipulation of a suitable handle accessible at the exterior of and over the housing **36**, and the output of the variable speed assembly **116** drives a belt-and-pulley assembly **118** which in turn serves to drive through a suitable transmission a bevel gear **120** whose axis extends in the direction of travel of the carriage means **26**. Perpendicular to the axis of the bevel gear **120** is a horizontal shaft **122** supported for rotary movement by suitable bearings **124** carried by the housing **36** in its interior, and a pair of bevel gears **126** and **128** are fixedly carried by a sleeve which is splined or slidably keyed to the shaft **122** for axial movement therealong and which serves to maintain the bevel gears **126** and **128** at a spacing from each other which is slightly greater than the diameter of the gear **120**. The inner faces of the gears **126** and **128**, which are directed toward each other, engage a roller **130** supported for rotary movement by a manually operable bell crank **132** which is supported for swinging movement about a vertical axis by way of a suitable pivot carried by the housing which supports the bevel gear **120**.

The operator can turn the handle **132** between the solid and dotted line positions indicated in FIG. 4 so as to locate either the gear **126** or the gear **128** in mesh with the gear **120**. Depending upon which of these gears meshes with the gear **120** the shaft **122** will rotate in one direction or the other, and at the exterior of the housing **36** this shaft **122** fixedly carries a sprocket which drives a chain **134** which coacts with a second sprocket **136** fixed on the shaft **32** so as to drive the latter and in this way propel the carriage means **26** and the entire machine carried thereby. Thus, during the laying of a course of bricks the handle **132** will be located in one position so that the entire machine will be continuously driven in the direction of the arrow **102** while a course is being laid, and then in order to return the machine to the starting position for the next course the position of the handle is changed and the direction of movement of the carriage means **26** is reversed.

Brick-conveying structure

The machine of the invention is provided with a rear receiving station at which is located a supply means **138** from which the bricks are supplied one by one to a conveyor means **144**. The supply means **138** is indicated in FIGS. 1, 2, 3 and 8. The conveyor means **144** of the invention includes a rear shaft **140** which extends in the direction of travel of the carriage means **26**, and this rear shaft **140** serves to pivotally support a brick slide formed by a pair of angle irons **142** whose front ends are formed with openings through which the shaft **140** passes so that the angle irons **142** are freely swingable about the shaft **140** at the rear of the conveyor means.

The conveyor means **144** has its rear shaft **140** supported for rotary movement by a pair of plates **146** which slidably engage the outer side surfaces of the angle members **142** which form the slide for the bricks. These plates **146** are fixed to a pair of bars **148** which are parallel to and spaced from each other and which slidably engage at their inner surfaces the ends of the bricks **150** during movement of the latter from the rear receiving station where the supply means **138** is located to a front depositing station where a holding means **152** (FIG. 8) is located, this holding means serving to releasably hold the successive bricks **150** until they are deposited in a given course at the front depositing station which is aligned with and spaced forwardly of the rear receiving station. The front ends of the bars **148** are fixed with plates which extend downwardly therefrom and which are formed with openings through which a front shaft **154** of the conveyor means passes, this front shaft thus being free to rotate with respect to the front plates which carry the bars **148** between which the bricks **150** are guided. The distance between these bars, at their inner surfaces, equals the length of the bricks so that each brick is guided at its ends by the pair of bars **148** while at the same time being longitudinally positioned and oriented thereby with respect to the machine. The rear shaft **140** fixedly carries a pair of collars **156** which engage the inner side surfaces of the angle members **142**, and these angle members have directed toward each other horizontal flanges which support the bricks at their ends, while the vertical flanges of the angle members **142** are situated in the same planes as the guide bars **148**, so that in this way as each brick is removed from the supply means **138** it will not be longitudinally shifted during its movement to the releasable holding means **152**.

The conveyor means **144** includes a pair of rear sprockets **158** fixedly carried by the rear shaft **140** for rotation therewith and coacting with a pair of endless chains **160** which extend around a pair of front sprockets **162** which are fixed to the front shaft **154** for rotary movement therewith, and thus the conveyor means **144** is of an endless construction with the chains **160** thereof continuously moving during operation of the machine. The upper runs of the chains **160**, which are parallel to each other, move at all times forwardly from the supply means **138** to the releasable holding means **152**.

The side bars **148** are fixedly connected to each other

by way of cross members **164** which extend through the space between the upper and lower runs of each endless chain **160**. The chains **160** fixedly carry flights **166** which project outwardly from the space between the upper and lower runs of each chain. The flights **166** which are fixed to one chain are aligned with those fixed to the other chain. The flights **166** have with respect to each other the spacing indicated in FIG. 8, so that during operation of the conveyor means of the invention the successive pairs of aligned flights **166** will engage the successive bricks **150** at the supply means **138** to raise the lowermost brick **150** away from the supply means and convey it together with the upper runs of the chains in the manner shown most clearly in FIG. 8. Thus, the spacing of the flights will maintain the bricks at a given distance from each other as they are conveyed between the end-guiding bars **148** which engage the ends of the bricks during movement thereof. The cross members **164** support bottom guide bars **168** which are situated outwardly beyond the flights **166**, as shown most clearly in FIG. 3, these bars **168** having top edges which engage the bottom surfaces of the bricks **150** to support them for movement while they are advanced by the flights **166** which are fixed to the chains **160**. In this way the chains themselves do not carry the bricks which instead simply rest slidably on the top edges of the guide bars **168**. The lowermost brick **150**, such as that shown in FIG. 8, for example, at the supply means **138** is directly engaged by the moving chains **160** until the next pair of aligned flights **166** move into engagement with this lowermost brick so as to displace it from the supply means **138**, after which the entire series of bricks carried thereby slides downwardly by gravity.

In accordance with the invention conveyor means **144** directly conveys the bricks from the supply means along a straight-line path directly to the holding means **152**, and for this purpose the support means **70** is common to and supports the holding means **152** as well as the front end of the conveyor means **144** so as to maintain the front end of the conveyor means **144** at all times at a given position with respect to a releasable holding means **152** which is described below. For this purpose the support means **70** includes a pair of downwardly extending support plates **170**, one of which is shown fixed to and extending downwardly from the angle iron **72** in FIG. 5. Both plates **170** are shown in horizontal section in FIG. 7. These plates **170** are fixed at their bottom ends to rearwardly directed plates **172**, and the pair of rearwardly directed plates **172** are fixed at their rear ends to downwardly directed relatively short plates **174** which carry suitable bearings to support the shaft **154** for rotary movement at the front end of the conveyor means **144**. The relative positions between the sprockets **162**, the guide bars **168** which engage the lower surfaces of the bricks and the guide bars **148** which engage the ends of the bricks is indicated in FIG. 7. It is apparent, therefore, that with this construction the shaft **154** will at all times have its axis situated in a vertical plane parallel to the wall which is being constructed, and this shaft **154** is supported by the support means **70** for vertical movement therewith without changing its position relative thereto, so that since the support means **70** also carries the holding means **152**, in the manner described below, the front end of the conveyor means **144** of the invention will at all times have a predetermined position with respect to the releasable holding means **152**.

In order to drive the conveyor means, the square drive shaft **112** carries a worm **176** (FIG. 2), and this worm **176** drives a wormwheel **178** which is fixedly carried by the rotary shaft **82**. This rotary shaft **82** fixedly carries a sprocket wheel **180** which serves to drive an endless sprocket chain **182**, and this chain **182** extends around and meshes with a sprocket **184** which is fixed to the shaft **154** and situated outwardly beyond the leading guide bar **148**, as shown most clearly in FIG. 7, so that in this way the conveyor means **144** is continuously driven during operation of the machine.

Because the shaft **154** at the front end of the conveyor means **144** is maintained at all times at a given position with respect to the support means **70** during vertical movement of the latter, the entire conveyor means **144** is swingable about the horizontal axis of the shaft **154**, and in order to support the conveyor means at its rear end of such swinging movement a second support means is operatively connected with the rear end of the conveyor means and is in turn connected in part with the support means **70**. Part of the second support means is formed by a relatively rigid horizontal bar **186** fixed to the top end of a bar **188** which is fixed at its bottom end to the rear end of the housing **36** at an upper wall thereof, as shown most clearly in FIG. 8. This relatively rigid horizontal supporting bar **186** is situated beneath and directly supports the rear shaft **140** of the conveyor means **144** when the conveyor means is conveying bricks to a lower portion of a wall which is under construction. At this time the support means **70** is at a relatively low elevation and in order to situate the shaft **154** at the lower elevation shown in dot-dash lines in FIG. 8, the housing **36** is formed with the front opening **38** referred to above, so as to clear the conveyor means in the manner shown in FIG. 8 in dot-dash lines. In this way it is possible for the conveyor means to extend at its front end down to approximately the elevation of the tracks **20**, and thus the lowermost courses can be deposited at an extremely low elevation. In order that the lower runs of the chains **160** will reliably clear the housing **36** when the conveyor means has its front end situated at a lower elevation than its rear end, an intermediate cross member **163** (FIG. 8) is fixed to the bars **148** and has a lower portion fixedly carrying a pair of slide blocks **165** which have upper curved surfaces deflecting the lower runs of the chains **160** upwardly toward the upper runs thereof, in the manner shown most clearly in FIG. 8, so that in this way the lower runs will reliably clear the housing **36** when the conveyor means is in the lower position shown in dot-dash lines in FIG. 8. It is to be noted that the flights **166** are carried by the outer side faces of the chains **160** so that they do not in any way interfere with the guide blocks **192** which deflect the lower runs of the chains in the manner shown in FIG. 8.

After one of the lower courses has been completed, the operator will turn the shaft **96** so as to raise the support means **70** by a distance equal to the depth of one course, in preparation for the laying of the next course, and of course in this way the front shaft **154** of the conveyor means will be displaced upwardly through a given increment. As course after course is laid the elevation of the front end **154** of the conveyor means will become higher and higher, while this front shaft **154** remains in a vertical plane, as indicated in FIG. 8, and the result is that initially the rear shaft **140** will slide rearwardly along the bar **186** of the second support means. The shaft **140** will be situated at its rearmost location when the shaft **154** is at the same elevation as the shaft **140**. However, the shaft **154** will move upwardly to elevations higher than the rear shaft **140**, as shown in the dot-dash line upper position of the conveyor means **144** in FIG. 1, so that as the front shaft **154** continues to advance upwardly the shaft **140** will again slide forwardly along the support bar **186**.

In order to limit the extent of upward movement of the front end of the conveyor means **144** with respect to its rear end, the second support means which supports the conveyor means at the region of its rear end includes, in addition to the bar **186**, a substantially nonstretchable flexible means composed in the illustrated example of a pair of chains **190**. These chains **190** are fixed at their upper ends to the pair of angle irons **72** and **74** in the region of the rear ends thereof, and at their bottom ends the chains **190** are respectively fixed to the side bars **148**

at the region of the rear ends thereof. Thus, when the front end of the conveyor means **144** reaches, with respect to the rear end thereof, the higher elevation shown in dot-dash lines at the upper part of FIG. 1, the slack in the chains **190** will be completely eliminated so that during the continued upward movement of the support means **70** the rear end of the conveyor means will be raised away from the bar **186** and the entire conveyor means will move upwardly with the support means **70**.

In order to maintain the supply means **138** at its downwardly-inclined attitude with respect to the rear end of the conveyor means, a second nonstretchable flexible means interconnects the supply means **138** with the support means **70**. For this purpose a pair of chains **192** are respectively fixed at their rear ends to the side angle members **142** which form the brick-supporting slide of the supply means **138**, and at their forward ends the chains **192** are fixed to a cross bar **194** which extends between and is fixedly carried by the pair of support plates **170** (FIG. 6). In this way, as may be seen from a comparison of the lower and upper positions of the conveyor means in FIG. 1, the inclination of the supply means **138** will be maintained substantially unchanged during the vertical movement of the conveyor means **144**.

Brick-depositing structure

As was indicated above, and as is shown in FIG. 2, the pair of elongated angle members **72** and **74** of the support means **70** are interconnected in the region of their rear ends by a cross member **78**, the shafts **82** and **88** also serving to interconnect the angle members **72** and **74** by way of their mounting on the bearing blocks **80** and **86**, as pointed out above. At their front ends the pair of angle irons **74** are interconnected with each other by an angle members **200** which is shown in transverse section at the upper right portion of FIG. 9. The trailing downwardly directed supporting plate **170**, which supports one end of the front shaft **154** of the conveyor means **144** in the manner described above, is not fixed to the right angle member **74**. Instead it is spaced inwardly of the latter and is fixed directly to the inner surface of the angle member **200** as by being welded thereto, for example, and this trailing member **170** also is shown most clearly in FIG. 9. The longitudinal support member **194** extends between and is fixed to the members **170**, and this member **194** carries the releasable holding means **152**.

As may be seen from FIGS. 5 and 6, the releasable holding means **152** includes a pair of end support members **202** fixed to and extending downwardly from the lower surface of the bar **194**. At their bottom ends the members **202** fixedly carry the angle members **204** which are notched at their upper free ends so as to receive the upper outer ends of a pair of end support plates **206** of the releasable holding means. These end support plates serve to support the ends of a brick, such as the brick **150***a* indicated in FIG. 5. For this purpose the plates **206** are formed with bores through which pins **208** freely extend with a substantial clearance. These pins **208** carry cross pins **210** in the region of their bottom ends, and these cross pins engage the lower ends of a pair of coil springs **212** which are coiled about the pins **208**. The upper ends of the coil springs **212** press against the end supporting plates **206** so as to urge them to swing to the positions indicated in FIG. 5 where they engage the bottom ends of the members **202**. Thus, the spring means **212** urges the end-support plates **206** to the releasable holding position indicated in FIG. 5. The clearance with which the pins **208** extend through openings of the plates **206** is sufficiently great to permit these plates to swing about their upper ends, which extend through the notches of the plates **204**, downwardly to the release positions indicated in FIG. 6.

The transverse supporting bar **194** also has fixed to its lower surface, as by welding, a pair of blocks **214**, one of which is illustrated in FIG. 9. These blocks are formed with parallel bores passing therethrough and serving to fixedly mount on the blocks a pair of pins **216**. These pins **216** extend with substantial clearance through openings of vertical bars **218**, and the pins **216** carry at each of their outer end portions a latter pin or other cross pin **220** and a collar **221** between which a bar **218** is located with clearance so as to retain on the pins **216** the vertical bars **218** which are loosely mounted in this way on the pins **216** so as to have at least a limited extent of movement toward and away from each other. FIG. 10 illustrates the second or leading block **214** which is situated, as viewed in FIGS. 5 and 6, to the left of the block **214** shown in FIG. 9, and FIG. 10 shows the second pin **216** and the second or leading pair of vertical bars **218**. Thus each pin **216** carries a pair of vertical bars **218**.

At their inner surfaces these bars **218** respectively carry over the pins **216** leaf springs **222** the configuration of which is most clearly apparent from FIG. 9. These leaf springs may, for example, be riveted at their lower ends to the inner surfaces of the bars **218**.

At the region of the leading bars **218**, shown in FIGS. 10 and 11, supporting bar **194** carries a bearing **223** in which a shaft **225** is turnable but prevented from axial movement by collars **227**. At its ends, shaft **225** carries rectangular front and rear locating plates **229** and **231** which are at right angles to each other and, when turning of shaft **223**, can be selectively placed in overlapping relation with the front and rear bars **218**, respectively.

At the region of their lower ends the front pair of bars **218** are fixed to a front brick guiding plate **224**, while the rear pair of bars **218** are fixed in the region of their bottom ends to a rear brick guiding plate **226**. The front plate **224** is adapted to slidably engage the front face of a brick, such as the brick **150***a* of FIG. 5, during depositing of the latter into a course, and the rear plate **226** simultaneously will slidably engage the rear surface of this brick to guide the latter. It is to be noted that the front plate **224** has an upwardly directed extension **228** of substantially trapezoidal configuration extending to an elevation higher than the horizontal upper edge of the plate **226**, so that when each brick is delivered to the holding means **152** it will clear the rear plate **226**, passing over the latter to be received by the end-supporting plates **206**, while the upper extension **228** of the plate **224** will limit the extent of forward movement of each brick which is delivered from the conveyor means to the releasable holding means.

As may be seen from FIG. 5, the plates **224** and **226** extend into overlapping relationship with respect to a brick **150***b*, which is the last-laid brick of the course, so that in this way it is possible for the brick guiding plates to coact with at least one of the previously laid bricks in a manner described below.

In order to displace each brick from the releasable holding means **152** downwardly into the course which is to receive the brick, a plunger **230** is provided, this plunger being situated over the brick which is releasably held by the releasable holding means and having a length which is substantially the same as that of the brick while having a width somewhat narrower than the width of the brick, as may be seen from FIGS. 5 and 8. The plunger **230** fixedly carries at its ends upwardly directed projections **232** for the purpose described below. The plunger is fixed to the bottom end of a reciprocating plunger rod **234** which passes with considerable clearance through an opening **236** which is formed in the supporting bar **194**. Over the bar **194** the reciprocating plunger rod **234** fixedly carries a camming means **238** in the form of a plate **240** fixedly carrying in the region of its outer ends outwardly directed camming portions **242** which coact with the leaf springs **222** in a manner described below.

At its top end the plunger rod **234** is pinned to a block **244** which at its ends has journal pins which project into bearing openings of a forked support **246** which serves to support the plunger **234** for free swinging

movement about the turning axis of the block **244** in the fork **246**, and, as is apparent from FIGS. 2 and 5, this fork support **246** is carried by an integral extension **248** which projects from a sleeve **250** through which the shaft **88** freely passes. This shaft carries the locating collars **252** for determining the axial position of the sleeve **250** on the shaft **88** while at the same time permitting the sleeve **250** to turn freely on the shaft **88**.

The sleeve **250** has a second integral extension **254** which is pivotally connected to one end of the motion transmitting bar **256** which is formed in the region of its rear end and between its upper and lower edges with an elongated slot through which the shaft **82** freely passes, so that in this way the motion-transmitting bar **256** can shift forwardly and rearwardly transversely with respect to the longitudinal shaft **82** which by extending through this slot of the bar **256** guides the latter for forward and rearward movement. The bar **256** carries a cam-follower projection **257** received in a camming groove which is formed in one face of a rotary cam **258** (FIG. 2) which is fixed to the shaft **82** for rotation therewith, so that in this way in accordance with the configuration of the camming groove of the plate **258** which receives the follower which is fixed to the motion transmitting bar **256**, this bar will be reciprocated back and forth to swing the sleeve **250** about the shaft **88** and thus raise and lower the plunger **230** in proper timed sequence with the movement of the other components.

When the above-described actuating means, formed by the cam **258**, the bar **256**, the oscillatory sleeve **250**, and the rod **234** connected thereto, acts on the plunger means **230** to reciprocate the latter along its vertical stroke in a downward direction from the upper position shown in FIG. 5 to the lower position shown in FIG. 6, the plunger **230** will engage the brick **150***a* and will displace it downwardly into the course which has just received the brick **150***b*, and the brick **150***a* will be situated just ahead of the brick **150***b*. As may be seen from FIG. 6, the brick **150***a* has already been deposited in the course, and FIG. 6 also illustrates how the extensions **232** of the plunger **230** coact with the plates **206** to prevent them from snapping over the plunger **230**, so that the plunger **230** can be retracted without any difficulty back up to the starting position thereof shown in FIG. 5, during the upward stroke of the plunger.

In order to properly situate the brick **150***a* precisely in alignment with and in the same plane as the brick **150***b*, and thus in the same plane as all of the preceding bricks, the camming means **238** will engage with its camming projections **242** the leaf springs **222** with the result that the upper ends of the bars **218** are cammed outwardly away from each other, and the bars by engaging the cross pins **220** at the ends of the pins **216** are thus cammed inwardly toward each other at their lower ends which carry the brick-guiding plates **224** and **226**, thus situating these plates in positions pressing against the previously laid brick, which in the example of FIG. 5 is the brick **150***b*. FIGS. 5, 10 and 11 show the leading rear bar **218**, which is connected to the plate **224**, engaging locating plate **231** while the front leading bar **218** hangs in a freely vertical direction and is clear of the front locating plate **226**. Bars **218** are cammed by the camming means **238** in the manner described above, these bars **218** press plates **226** and **224** against the previously laid brick, and plate **231** guarantees that the rear surfaces of the bricks, engaged by plate **226**, will all be in a common plane while any variations in brick thickness will be apparent only at the front surface of the bricks. In this case the rear surface of the wall is the visible, finish surface thereof. The elevation of the camming means **238** on the plunger rod **234** above the plunger **230** is such that during the downward movement of a brick by the plunger **230** the brick will be precisely guided into proper alignment with the previously laid brick as a result of the action of these plates **224** and **226** which are precisely located by the previously laid brick during the downward movement of a new brick into the course. When the front surface of the wall is its finish surface, shaft **225** is turned 90° to locate plate **229** in front of leading front bar **218**, and plate **231** will be clear of leading rear bar **218**, so that all front surfaces will be in a common plane and variations in brick thickness will appear at their rear surfaces.

In order to limit the downward movement of each brick into the course which receives the same, the plates **224** and **226** respectively carry limiting fingers **260** which are shown most clearly in FIG. 10. These rigid fingers are in the form of angle members having inwardly directed free end portions directed toward each other and situated so as to engage the lower surface of a brick which is deposited into a course by the plunger **230**, and thus limit the downward movement of the brick. In this way a certain minimum thickness of the mortar bed **262** beneath a course of bricks is guaranteed, and when the operator sets the machine to start the laying of a new course the bottom surfaces of the fingers **260** will be situated a slight distance above the bricks of the previously laid course so as to provide a clearance, such as that shown in FIG. 10, which will guarantee in this way that there will be a sufficient depth of mortar between the successive courses.

The bed of mortar **262** is derived from a leading mortar supply means **264** in the form of a suitable hopper **266** having an open top for receiving a supply of mortar and having a rearwardly inclined discharge end **268** from which the mortar continuously issues during travel of the machine in the direction of the arrow **102** shown in FIG. 5, so that in this way the mortar bed **262** is continuously deposited on the previously laid course. As may be seen from FIG. 3, a suitable bracket **270** is fixed to and projects forwardly from the angle member **72** and serves to support the hopper **266** of the leading mortar supply means **264**. In addition a suitable supporting strap **272** is fixed to the front surface of the hopper **266** and has at the region of the front end of the angle member **270** a rearwardly directed extension which is fixed either to the bar **200** or to the angle member **72**, or both. Actually this front strap **272** may be fixed to the outer face of the left supporting plate **170** which is fixed together with the strap **272** to the angle bar **72**.

As is apparent from FIGS. 2 and 5 the hopper **266** is composed of downwardly inclined walls which merge with the outlet **268**, and the rear downwardly inclined wall **274** slidably supports an agitator means in the form of an elongated bar **276** having transverse agitating members **278** projecting laterally therefrom. The bar **276** is pivotally connected to the lower end of a connecting rod **280** whose upper end is pivotally connected with a crank pin fixedly carried by a pair of crank members **282**, one of these crank members being fixed to a rotary shaft **284** which is directly carried by the leading wall of the hopper **266**, and the trailing crank member **282** is fixedly connected with a rotary shaft **286** which extends through the trailing wall of the hopper and which is supported for rotary movement by a bearing situated in the region of the front end of the angle iron **72**. This rotary shaft **286** fixedly carries a sprocket **288** driven by a suitable chain from a second sprocket which is fixed on a shaft **290** supported for rotary movement in suitable bearings which are carried by the angle members **72** and **74** of the support means **70**.

The same worm **176** (FIG. 2) which drives the worm wheel **178** also serves to drive a worm wheel **292** which is fixed to a rotary shaft **294** carried by suitable bearings **296** mounted on the trailing angle member **74**, and the front end of the rotary shaft **294** is fixed with a helical gear **298** which meshes with a second helical gear **300** which is fixed to the rotary shaft **290**, so that in this way a drive is transmitted to the agitating means formed by elements **276** and **278** to cause the latter to shift up and down on the rear inclined wall **274** and thus agitate the mortar as it flows down to the outlet **268**.

As may be seen from FIGS. 5 and 6, as well as FIG. 9,

the trailing pair of bars **218** support for rotary movement a pair of rollers **302** while portions of the plates **224** and **226** support directly ahead of the rollers **302** a pair of additional leading rollers **304** which are smaller than the rollers **302** so that their peripheries are situated with respect to the other in the manner shown in FIG. 5. Thus, as the machine travels in the direction of the arrow **102**, the leading rollers **304**, because they do not extend downwardly as far as the trailing rollers **302**, will reliably engage the top surface of a brick which has just been deposited, even if this top surface should project somewhat higher than the upper surface of the previously laid brick, and then the brick will be reliably engaged by the larger rollers **302** which will guarantee that the brick which has just been laid will be situated at the same elevation as the previously laid brick. This action is shown in FIG. 6 from which it will be seen that the limiting fingers **260** have just moved beyond the front end of the brick **150***a* as the larger rollers **302** moved into engagement therewith.

In order to situate mortar between the successive bricks of a given course, a trailing mortar supply means **306** is provided for the machine of the invention, and this trailing mortar supply means **306** is directly fixed to the trailing supporting plate **170** which is fixed to the transverse bar **200**, as pointed out above. The trailing angle iron **74** of the support means **70** extends over the trailing mortar supply means **306** so that the meshing helical gears **298** and **300** are in fact situated over the trailing mortar supply means **306**, and in this way the free tailing end of the shaft **290** can project freely over the open top end of the hopper **308** of the trailing mortar supply means **306**. This hopper **308** has a trailing inclined wall **310** on which is situated an agitating means **312** which may have a construction substantially identical with that of the agitating means in the hopper **266**, although it may be of a somewhat different size, as is apparent from FIG. 2, and this agitating means **312** simply slides back and forth along the inner surface of the inclined wall **310** so as to agitate the mortar which is placed from time to time in the hopper **308**. Within the hopper **308** is situated a transverse shaft **312** fixedly carried by the front and rear walls of the hopper **308** and serving to pivotally support a bell crank **314** the lower arm of which is pivoted to the agitating means **312** and the upper arm of which is pivoted to the bottom end of a connecting rod **316** which is pivoted at its upper end to a crank pin **318** carried by a rotary disc **320** which is fixed to the shaft **290** for rotation therewith, so that in this way the bell crank **314** will continuously swing about the shaft **312** and cause reciprocation of the agitating means **312**. The hopper **308** has a bottom restricted outlet end **322**, and a discharge plunger **324** has its bottom end in alignment with the outlet **322** for directing a quantity of mortar out of the hopper **308** when the outlet **322** has moved just beyond the previously laid brick **150***b* so that it is almost at the position shown in FIG. 6. In this way quantities of mortar will be successively deposited ahead of the leading end of a brick which has just been deposited in the course.

In order to actuate the plunger **324** the camming means **238** is fixed with a substantially U-shaped extension **326** which passes freely around the leading wall of the hopper **308** into the interior of the latter and which terminates in the plunger **324**, so that in this way this plunger **324** will operate in unison with the camming means **238**.

The structure of the invention also includes an end-tamping means which is mechanically actuated in proper timed relation with the remaining components. This end-tamping means includes a horizontal tamping bar **326** pivotally connected at its front and rear faces to upwardly directed parallelogram linkage members **328** which are in turn pivotally connected to blocks carried by the lower surface of the supporting bar **194**. Part of this parallelogram linkage structure is indicated in FIG. 10. The trailing parallelogram linkage bars **328**, which have at their upper ends extensions pivotally connected with block **214** shown in FIG. 10, are fixed to an arm **330** which is in the form of an angle member having one leg fixed to the trailing links **328** and which has a rear leg extending substantially in the direction of travel of the machine to a location where it is pivoted to the bottom end of a motion-transmitting link **332** which at its top end is pivoted to the free end of a lever arm **334** of a bell crank which is fixed to the shaft **88** and which has a downwardly directed arm **336** (FIG. 1) which is pivoted to the front end of a reciprocating motion transmitting bar **338** formed with a longitudinal slot situated between its side edges and through which the shaft **82** also freely passes in the same way that it passes through the slot of the motion transmitting bar **256**. As may be seen from FIG. 2, this motion transmitting bar **338** is fixed with a cam follower member **341** received in a camming groove of a second rotary cam **340** which is fixed to the shaft **82** for rotation therewith, so that during rotation of a cam **340** the bar **338** will be reciprocated to swing the bell crank **334**, **336**, together with the shaft **88**, about the axis of the latter, thus displacing the link **332** from the upper position shown in FIG. 5 to the lower position shown in FIG. 6. The result is that the parallelogram linkage will displace the tamping bar **326** in a direction opposed to the direction of machine travel so as to tamp the just-laid brick **150***a* toward the previously laid brick **150***b*.

Thus, each relatively small quantity of mortar which is received from the trailing mortar supply means ahead of the last-laid brick, such as the brick **150***b*, will be compressed between this latter brick and the newly laid brick **150***a* during the tamping thereof by the tamping member **326** which is maintained in its horizontal attitude by way of the parallelogram linkage. It is to be noted that at the end of its stroke the tamping means **326** has its free end situated over and slightly beyond the limiting fingers **260**, so that each brick is reliably situated in a position where the fingers **260** have been advanced beyond the brick by the time the end-tamping of the brick has been completed. Furthermore, it is to be noted that this end-tamping takes place simultaneously with the downward pressure which is applied to the brick by way of the rollers **302** and plunger **230**, so that in this way a precise location of each brick both vertically and horizontally, and of course precisely in the plane of the wall as a result of the plates **224** and **226**, is achieved.

The end-tamping means will be advanced from the position of FIG. 6 into the starting position of FIG. 5 during the continued operation of the machine, and of course the plunger means will also be retracted to its starting position from a position of FIG. 6, and in timed relation with the upward movement of the plunger means another flight **166** of the conveyor means **144** will deliver the next brick into the releasable holding means **152** beneath the plunger **230** and onto the holding plates **206**.

It is thus apparent that with the structure of the invention the laying of the bricks of a given course will proceed in a fully automatic manner. All that the operator need do is to see to it that there is a supply of mortar in both of the mortar-supply means as well as a supply of bricks on the brick supply means **138**. When the end of a given course is reached the operator will stop the forward movement of the machine either by turning off the motor **40** or by situating the control lever **132** in a neutral position where neither one of the bevel gears **126** and **128** engage the bevel gear **120**, and at this time the operator will turn the shaft **96** to raise the support means **70** until the limiting fingers **260** are situated at the proper height for the next course. Then the lever **132** is shifted into its reverse position which will retract the machine back to the starting position for the next course, and then the operator will return the lever **132** into its forward position to commence the forward movement of the machine so as to lay the next course.

During the return movement of the machine to the starting position for the next course the drive to the shaft **106** can be disconnected by a suitable clutch which can be provided for connecting and disconnecting the drive from the belt and pulley assembly **104** to the shaft **106**, or, if preferred, such a clutch can be omitted and the operator can simply remove the bricks from the conveyor means **144** and can maintain the supply means **138** either empty of bricks or can simply maintain the lowermost brick upwardly away from the path of movement of the flights **166**, so that in this way the structure can continue to operate freely without any movement of any bricks during the return movement of the machine.

When one wall is completed the operator can remove the pins **52** and situate the entire machine along the shafts **30** and **32** for erection of the next wall.

As was indicated above, the trailing mortar-supply means **306** is directly mounted on the trailing support plate **170**. In order to provide added stability to the mounting of the trailing mortar supply means **306**, a pair of horizontal angle members **350** are fixed to the trailing plate **170** and carry a substantially U-shaped support member **352** which extends beneath and engages the wall **310** so as to participate in the support of the trailing mortar-supply means **306**.

In the lower dot-dash line position of the conveyor shown in FIG. 8, where it is downwardly inclined, there may be a tendency for bricks to slide down the conveyor, and in order to avoid this, weld beads are situated on the top edges of the bars **168** every 5 inches or so. Thus, the bricks must be pushed over these beads by the flights **166** and cannot prematurely slide beyond the flights. Also, the conveyor can be provided with leaf springs at each side and at the bottom of the conveyor which engage the bricks and past which they must be pushed by the flights, so that in this way also downward sliding movement of the bricks away from the flights is avoided.

Metal wall ties are used to hold wythes of walls together. These are usually placed every sixth course, or the walls can be tied with a header course of brick (cross bricks which are not laid by the machine of the invention).

It will be understood that this machine can be used for concrete blocks as well as bricks, and all references to bricks apply equally to other blocks irrespective of their material and size, such as cement blocks, glass blocks, etc.

What is claimed is:

1. In a brick laying machine, supply means situated at a rear receiving station of the machine for receiving a supply of bricks, holding means situated in a front brick depositing station of the machine for releasably holding a brick in readiness to be deposited in a given course of a brick wall which is under construction, said holding means being situated forwardly of and in alignment with said supply means, conveyor means extending between the supply means and holding means and having a rear end for receiving bricks individually from said supply means and a front end for delivering the bricks individually to said holding means, said rear end of said conveyor means being situated directly at said supply means for directly receiving the bricks therefrom, and said front end of said conveyor means being situated directly at said holding means for directly delivering the bricks to said holding means, said conveyor means conveying the bricks directly from said supply means along a substantially straight line path to said holding means, a first support means common to and operatively connected with said holding means and said front end of said conveyor means for supporting said holding means and said front end of said conveyor means and for maintaining said front end of said conveyor means at a predetermined position with respect to said holding means, said support means supporting said front end of said conveyor means for turning movement about a horizontal axis whose position remains unchanged with respect to said holding means, a second support means operatively connected to said conveyor means at said rear end thereof during turning of said conveyor means about said horizontal axis while the elevation of said front end of said conveyor means and said holding means changes during vertical movement of said holding means and front end of said conveyor means with said first mentioned support means, elevating means being operatively connected to said first mentioned support means for raising the latter during construction of a wall, said second support means including a guide means guiding said rear end of said conveyor means for horizontal rearward and forward movement at a given elevation during the construction of a lower portion of the wall and progressively advancing upwardly during construction of the wall, said second support means further including a substantially non-stretchable, flexible means connected to said first mentioned support means and connected to said conveyor means in the region of the said rear end thereof for raising said rear end of said conveyor means together with said first mentioned support means when said front end of said conveyor means reaches a given elevation higher than said rear end of said conveyor means, so that after said latter elevation is reached by said front end of said conveyor means said elevating means continues to raise said first mentioned support means, said flexible means raising said rear end of said conveyor means away from said guide means of said second support means and limiting the extent of upward inclination of said conveyor means during the continued elevation thereof together with said first mentioned support means.

2. The combination of claim **1** and wherein said conveyor means includes front and rear rotary shafts which extend horizontally and are parallel to each other and which are respectively situated at the front and rear ends of said conveyor means, said front shaft having an axis coinciding with the axis about which said front end of said conveyor means turns and said front shaft being carried by said first-mentioned support means, said guide means of said second support means including an elongated bar which extends from said receiving station forwardly away from the latter and which extends beneath and engages said rear shaft to support the latter until said rear end of said conveyor means is raised away from said bar by said flexible means, said conveyor means including a pair of elongated side bars which are parallel to each other and through which said shafts respectively extend, said side bars maintaining said shafts at a given distance from each other and said flexible means being connected to said side bars in the region of the rear end of said conveyor means, said side bars respectively having directed toward each other a pair of inner side faces which slidably engage the ends of the bricks which are successively conveyed by said conveyor means from said supply means to said holding means, so that said side bars longitudinally orient the bricks while they are conveyed by said conveyor means.

3. The combination of claim **2** and wherein said supply means includes a brick-supporting slide which is downwardly inclined toward said rear end of said conveyor means and which is pivotally carried by said rear shaft thereof, and substantially non-stretchable elongated flexible means extending between said slide and said first-mentioned support means for maintaining said slide in its downwardly inclined attitude with respect to said rear end of said conveyor means during raising of the latter with said first-mentioned support means.

4. The combination of claim **1** and wherein a support means is common to said holding means and said front end of said conveyor means for supporting both said holding means and said front end of said conveyor means while maintaining said front end of said conveyor means at a given position relative to said holding means, raising means operatively connected with said support means for vertically raising the latter during construction of a wall, so that said front end of said conveyor means and

said holding means move upwardly during construction of the wall, said conveyor means having at its rear end a rotary shaft and said support means including a brick-supporting slide pivotally carried by said shaft and downwardly inclined with respect to the rear end of said conveyor means for successively delivering brick thereto by sliding gravitational movement of the bricks successively downwardly toward the rear end of said conveyor means, and elongated substantially non-stretchable flexible means fixed to said slide and to said support means for maintaining the downwardly inclined position of said slide relative to said rear end of said conveyor means substantially unchanged during raising of said conveyor means together with said support means.

5. The combination of claim 1 and wherein a support means supports said holding means, said holding means including a pair of end-supporting plates swingably carried by said support means for supporting the ends of a brick, spring means coacting with said plates for yieldably urging them upwardly to given positions where they releasably hold a brick over a course which is to receive the brick, plunger means situated over said holding means and being movable back and forth in a vertical stroke for displacing a brick held by said end-supporting plates in opposition to said spring means downwardly beyond said plates into the course which is to receive the brick, said holding means further including a front guiding plate which engages a front face of the brick and rear guiding plate which engages a rear face of the brick during downward movement thereof, said front plate extending to an elevation higher than said rear plate for limiting the forward movement of the brick into said holding means when the latter receives a brick from said front end of said conveyor means.

6. The combination of claim 5 and wherein said front and rear brick-guiding plates respectively engage the front and rear faces of at least one previously laid brick for situating the brick which is displaced by said plunger means in the same plane as said previously laid brick.

7. The combination of claim 6 and wherein said support means supports said brick-guiding plates for at least limited movement inwardly toward and outwardly away from each other, camming means connected to said plunger means for movement therewith, said camming means camming said brick-guiding plates into engagement with said previously-laid brick during downward displacement of said plunger means to move a brick from said end-supporting plates into the course which receives the latter brick, a pair of locating plates respectively carried by said support means for movement to plane-determining positions for determining the planes in which said brick-guiding plates are located, and selecting means operatively connected to said locating plates for selectively placing only one of the latter plates in its plane-determining position.

8. In a bricklaying machine as claimed in claim 1 a mortar-depositing assembly for depositing mortar in a given course of bricks during laying of the latter, said mortar-depositing assembly including at least one hopper which contains a supply of mortar and which has a lower discharged end through which mortar issues, and agitating means situated in said hopper for agitating mortar therein.

9. The combination of claim 8 and wherein said hopper has at least one lower wall inclined toward said discharge end thereof, and said agitating means resting on said inclined lower wall for reciprocating movement thereon.

10. The combination of claim 8 and wherein said mortar-depositing assembly includes a leading hopper for laying a bed of mortar beneath a course of bricks and a trailing hopper for depositing mortar between the bricks of a given course, and a pair of said agitating means respectively situated in said leading and trailing hoppers for agitating mortar therein.

11. The combination of claim 10 and wherein a plunger means coacts with said trailing hopper for periodically displacing a given amount of mortar therefrom to be situated between successive bricks of a given course.

12. In a bricklaying machine, holding means for releasably holding a brick in a position to be downwardly deposited in a given course of a wall which is under construction, plunger means movable back and forth in a vertical stroke and coacting with said holding means for displacing a brick downwardly out of the latter into the course which is to receive the brick, front and rear brick-guiding plates respectively slidably engaging front and rear faces of a brick during displacement thereof by said plunger means out of said holding means, said plates engaging at least one previously-laid brick during downward displacement of a brick by said plunger means, support means supporting said guide plates for at least limited movement inwardly toward and outwardly away from each other, camming means carried by said plunger means for movement therewith and coacting with said guide plates for camming the latter toward each other into engagement with a previously laid brick during downward displacement of a brick out of said holding means by said plunger means, a pair of locating plates respectively carried by said support means for movement to plane determining positions for determining the planes in which said brick-guiding plates are located, and selecting means operatively connected to said locating plates for selectively placing only one of the latter plates in its plane-determining position.

13. In a bricklaying machine, holding means for releasably holding a brick in a position to be downwardly deposited in a given course of a wall which is under construction, plunger means movable back and forth in a vertical stroke and coacting with said holding means for displacing a brick downwardly out of the latter into the course which is to receive the brick, front and rear brick-guiding plates respectively slidably engaging front and rear faces of a brick during displacement thereof by said plunger means out of said holding means, said plates engaging at least one previously-laid brick during downward displacement of a brick by said plunger means, support means supporting said guide plates for at least limited movement inwardly toward and outwardly away from each other, camming means carried by said plunger means for movement therewith and coacting with said guide plates for camming the latter toward each other into engagement with a previously laid brick during downward displacement of a brick out of said holding means by said plunger means, a pair of locating plates respectively carried by said support means for movement to plane-determining positions for determining the planes in which said brick-guiding plates are located, and selecting means operatively connected to said locating plates for selectively placing only one of the latter plates in its plane-determining position, leading mortar depositing means for depositing a bed of mortar beneath a brick prior to displacement thereof by said plunger means into the course which receives the brick, trailing mortar depositing means situated behind said leading mortar depositing means in the direction of movement of said support means along the course which is being laid, said trailing mortar depositing means depositing mortar ahead of the last deposited brick of a given course, and end tamping means for tamping the leading end of the brick displaced onto the bed of mortar by said plunger means and urging the latter brick towards the last deposited brick of the course against the mortar deposited from said trailing mortar depositing means, so that the mortar deposited from the latter becomes situated between the successive bricks of a given course.

14. The combination of claim 13 and wherein said end-tamping means includes a horizontally movable tamping bar and a parallelogram linkage operatively connected with said bar for displacing the latter horizontally, and actuating means actuating both said plunger means and

said linkage in a given timed relationship with respect to each other.

15. The combination of claim **13** and wherein a pair of agitating means are respectively located in the interiors of both of said mortar-depositing means for agitating mortar therein.

16. The combination of claim **13** and wherein front and rear brick-guiding plates engage at least one previously laid brick and slidably engage the front and rear faces, respectively, of a brick displaced downwardly by said plunger means to guide the latter downwardly into the same plane as the previously-laid brick, and a pair of limiting fingers respectively fixed to said brick-guiding plates and having bottom ends directed inwardly toward each other beneath a brick which is displaced downwardly by said plunger means to limit the downward movement of the latter brick.

17. The combination of claim **16** and wherein said tamping means has a tamping end which engages the leading end of a brick which is being laid in a given course, and said tamping means having a horizontal stroke where said tamping end thereof is initially situated ahead of said limiting fingers and is displaceable to a location behind said fingers during the continued movement of said support means along the course which is being laid, so that at the end of the horizontal tamping of a brick said fingers are situated ahead of the brick.

18. The combination of claim **13** and wherein an extension is operatively connected with said plunger means for movement therewith and extends into said trailing mortar-depositing means for displacing mortar periodically out of the latter in timed relation with the movement of said plunger means.

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FRANCIS K. ZUGEL, *Primary Examiner.*

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