Aug. 31, 1926. 1,598,381

J. F. MAKOWSKI

PLASTER BOARD HANDLING APPARATUS

Filed Dec. 24, 1923 3 Sheets-Sheet 1

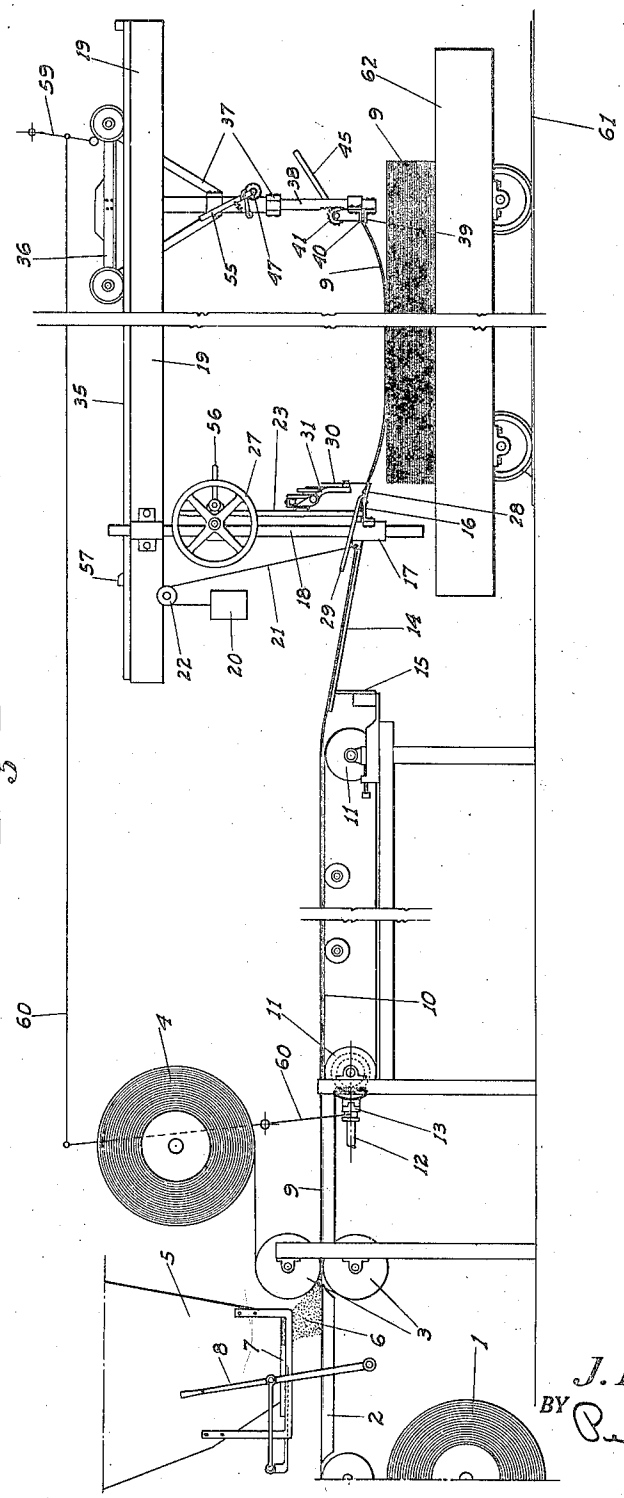

Fig. 1

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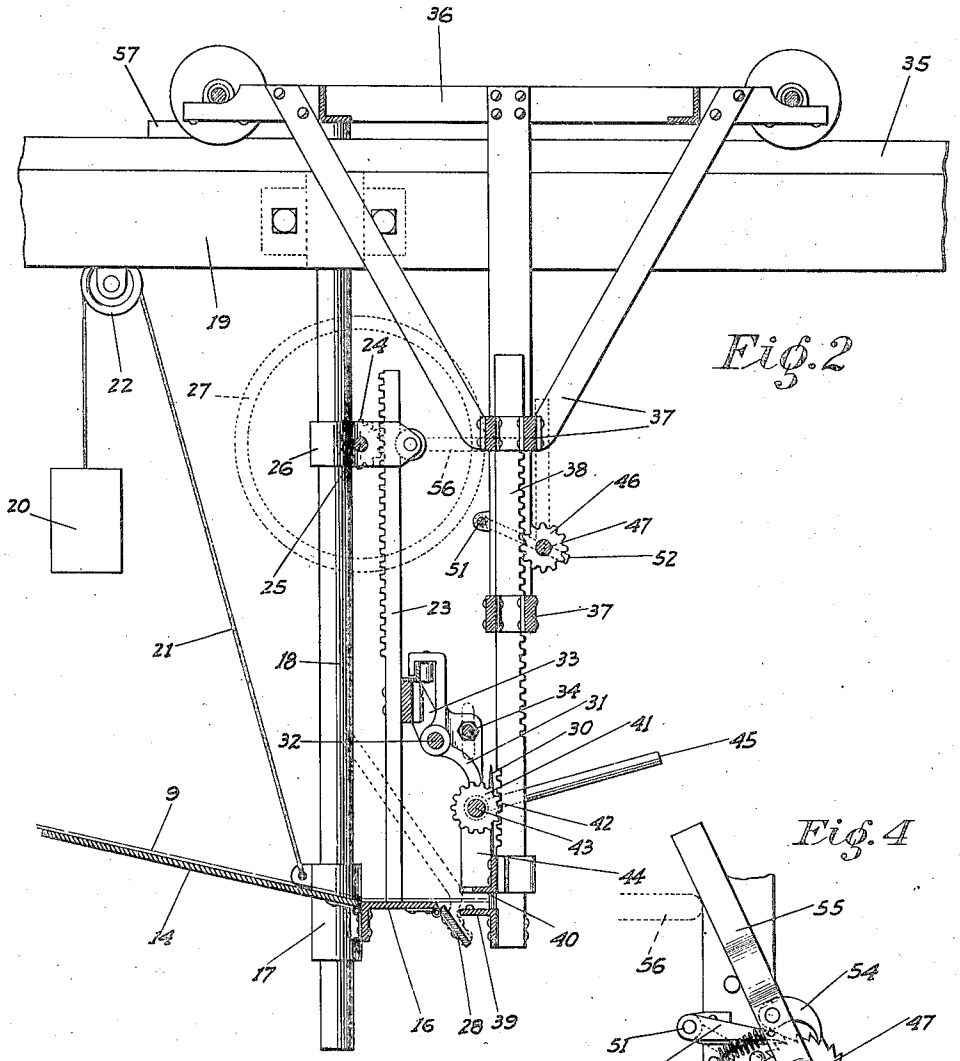

Fig. 2

Fig. 4

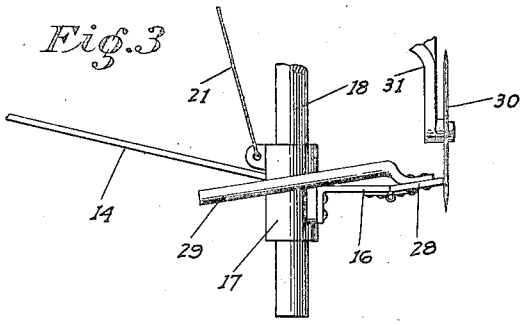

Fig. 3

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Fig. 5

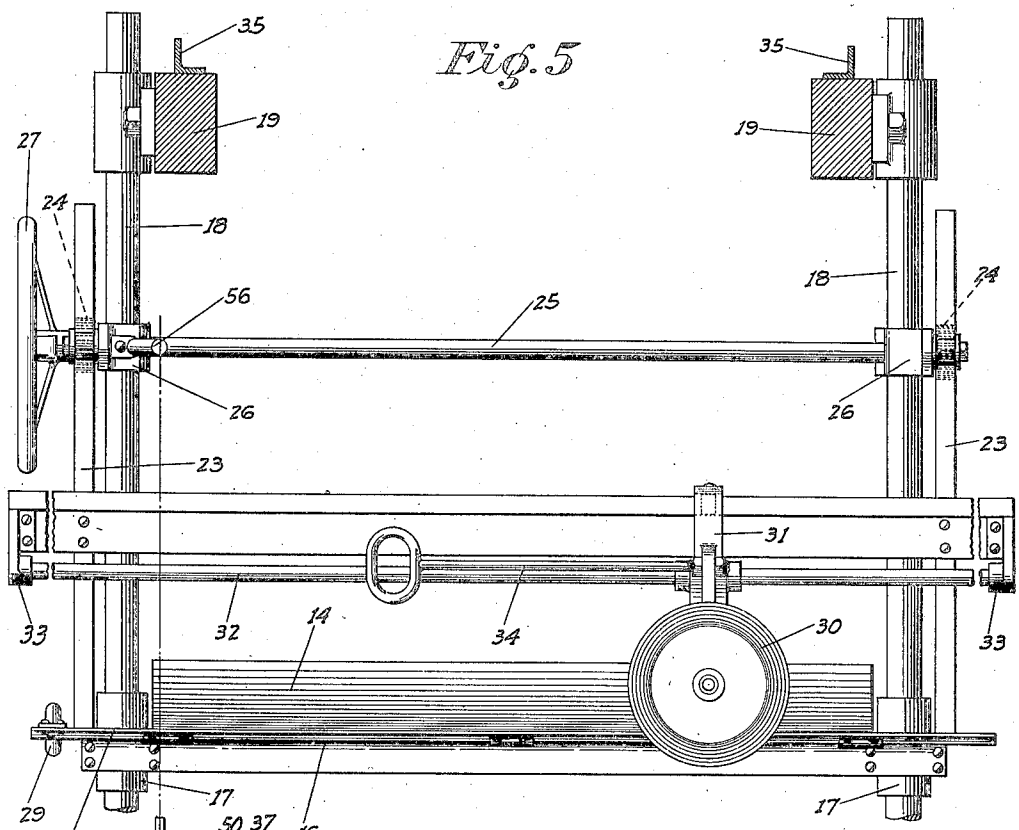
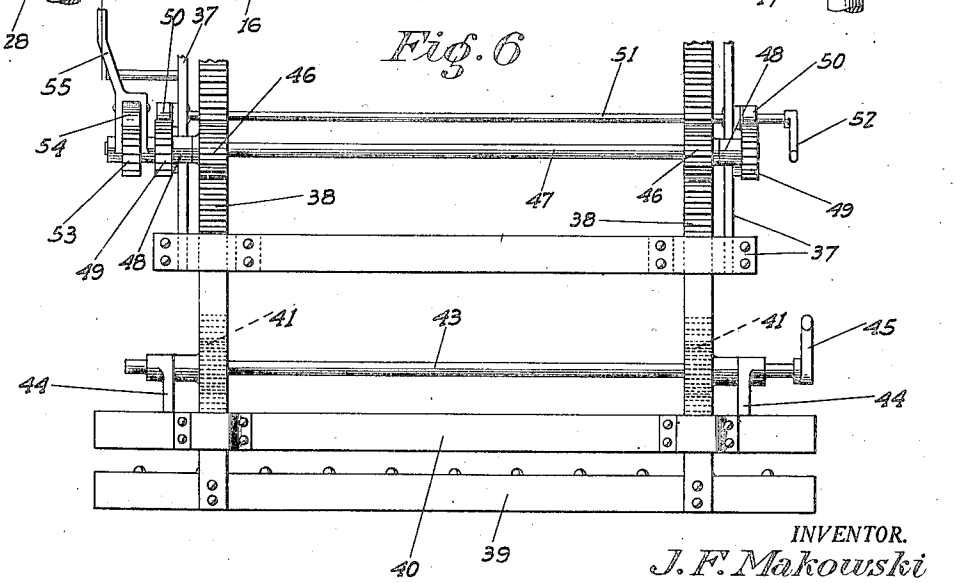


Fig. 6



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UNITED STATES PATENT OFFICE.

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PLASTER-BOARD-HANDLING APPARATUS.

Application filed December 24, 1923. Serial No. 682,484.

This invention relates to improvements in devices for the handling, cutting and stacking of plaster wall-board during its manufacture, and particularly represents certain differences and improvements over the structure shown in my U. S. Patent No. 1,515,397, dated November 11th, 1924.

The apparatus which forms the subject of the present invention was especially designed to enable the wall board being made with what is known as unretarded paper for the covers or outer surfaces of the board, instead of the retarded paper now used for the purpose.

The use of this unretarded paper in the manufacture of wall board has certain advantages over the other, both as regards cost and other features of a technical nature. It is however more sensitive and tender to handle when first contacted with the wet plaster and saturated with the moisture therein, and the principal object of this invention therefore is in general to provide an apparatus so constructed that unretarded paper may be successfully used in the making of the board and may be handled during such making in a manner to reduce to a minimum any danger of the paper tearing across when the wet heavy boards are being moved along from between the feed rolls for cutting and stacking.

In connection with the above named object, I have provided a means whereby a sheet of the board is maintained constantly at the same level relative to the top board of the stack over which said sheet is being drawn.

This avoids having to lower the entire stack and its supporting means in order to maintain such relative level, as was the case with the previous apparatus.

This is an important feature, since it not only avoids having to handle the relatively great weight of the stack and its supporting member, but prevents the board which is being drawn onto said stack, and which is temporarily supported at its ends and also by the stack, from having too great a sag between its points of support—something which might result in the giving way of the paper.

This arrangement also enables me to use ordinary wheeled trucks on which to stack the board as it is made, and as it is a simple matter to provide for the rolling of a loaded truck out of the way and replacing it with an empty truck, the handling of the board is greatly expedited, and the continuous operation of the apparatus will be interfered with but little by the change of trucks.

A further object is to provide a board supporting surface with the edge of which the movable board-cutting member co-acts, so that any sag or depression along the line of cut is avoided.

At the same time, this supporting surface may be moved out of the way when the cutting operation is finished, so as to leave a short length of the board projecting in the clear and in position to be readily grasped by the jaws of the pulling means.

A further object of the invention is to produce a simple and inexpensive device and yet one which will be exceedingly effective for the purposes for which it is designed.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a side elevation, foreshortened in places, of the complete apparatus, showing a board as being drawn over and onto a stack of the same.

Fig. 2 is an enlarged vertical section of the vertically movable apron and cutting elements, and the truck carrying the vertically movable jaw or gripping means, showing the latter in position to engage the adjacent end of the board.

Fig. 3 is a fragmentary side view of the apron structure, showing the movable cutter and the movable board-supporting surface in position to co-act with said movable cutter.

Fig. 4 is a similar view showing the jaw raising operating mechanism, mounted on the truck.

Fig. 5 is a front view of the apron and cutting structures.

Fig. 6 is a similar view of the jaw structure, the truck from which said structure depends being omitted.

Referring now more particularly to the characters of reference on the drawings, the numeral 1 denotes the lower roll of paper which is unwound over a horizontal platform 2 and then between rolls 3, and 4 is

the upper roll of paper which in its unwinding passes directly about the upper one of the rolls 3 and then between both rolls, above the paper from the roll 1.

Above the platform 2 is the feed chute or hopper 5, for the wet plaster 6, which drops onto the surface of the paper resting on said platform, being then squeezed out and distributed throughout the width of the paper as the latter passes between the rolls and is drawn along.

The quantity of plaster fed from the hopper is governed by a sliding gate 7 controlled by a lever 8, itself controlled by an operator stationed at that point.

As soon as the paper, with the plaster therebetween, passes between the rolls 3 it becomes the plaster board, and it will hereinafter be referred to as such, or rather as merely the board, designated by the numeral 9.

A short distance beyond the rolls 3 the board passes onto an endless travelling and horizontally disposed belt 10, the full width of the paper, and of considerable length, preferably twelve feet or more.

The belt is mounted on rollers 11 of ordinary nature, one at least is driven from a shaft 12, which has a clutch structure 13 interposed therein, the shaft, clutch and driving means being shown somewhat conventionally, since this mechanism of itself forms no part of my invention.

Beyond the belt 10, the board passes onto an apron 14 of suitable length, the adjacent end of which rests, and may rock and slide on, a transverse supporting piece 15 mounted in a fixed position beyond the adjacent roller.

The opposite end of the apron is transversely hinged or pivoted to the adjacent edge of a short horizontal platform 16 which is rigidly mounted adjacent its transverse ends on vertical sleeves 17. These sleeves are slidable on vertical posts 18, preferably supported from and rigidly secured to overhead horizontal beams 19, which run lengthwise of the travel of the belt 10 and board 9 thereon. The posts are spaced far enough apart to allow of unrestricted passage of the board therebetween.

The weight of the apron, sleeves, and other parts connected thereto, is counterbalanced by means of weights 20 to which are connected cables 21 passing over pulleys 22 mounted on the adjacent beams 19 and then extending down to connections with the corresponding sleeves 17.

Vertical movement is imparted to the sleeves, and consequently to the members attached thereto, by means of vertical rack-bars 23 secured to the platform 16 and engaged by pinions 24 mounted on a shaft 25 journaled in bearing members 26 fixed on the posts 18.

A handwheel 27 is mounted on the shaft at one end to enable said shaft to be easily turned.

Hinged or pivoted along the transverse edge of the platform 16 opposite to the apron 14 is a short apron or board supporting surface 28, the upper faces of the apron 14, platform 16 and member 28 being arranged to form a continuous supporting surface without steps or offsets.

The member 28 is normally held in a substantially horizontal position by means of a handle 29 rigidly attached thereto, and which normally extends horizontally beyond the hinged edge of the member 28, thereby acting as a counterweight and holding the said member up so that its edge abuts against the adjacent edge of the platform 16, preventing further upward movement of the former.

A movable cutting member is provided to co-act with the free or outer edge of the member 28 when the latter is in its uppermost position, which comprises a vertical cutting disc 30, whose lower edge is below the plane of said outer edge of the member 28 when the latter is in the above named position.

The cutter 30 is turnably mounted on a frame structure 31 which is slidably mounted on a guide-bar 32 extending transversely of the racks 23 and secured thereto by means of brackets 33.

A transversely disposed and horizontal pull-rod 34 is attached to the frame 31, and is of such a length that it may be easily reached by an operator on one side of the machine when the cutter is on the other side. The guide bar 32 is preferably of such a length that the cutter may be moved clear of the member 28 at both ends thereof.

The beams 19 extends for a considerable distance beyond the apron structure, and parallel to the ground, and have rails 35 mounted thereon on which ride the wheels of a carriage or truck 36, from which depends inside or between the beams, a rigid frame structure 37 of suitable design, forming a guide for transversely spaced rack bars 38, to the lower ends of which, and extending therebetween, is secured a transverse and horizontal jaw member 39.

Slidably mounted on the racks above said lower jaw member is a cooperating and relatively movable jaw member 40 which is raised and lowered at will by means of pinions 41 meshing with certain teeth 42 of the racks,

The pinions are fixed on a shaft 43 journaled in boxes 44 mounted on the jaw 40, said shaft having on one end a handle 45 whereby the shaft may be rotated, thus causing the jaw 40 to move toward or away from, the jaw 39.

The racks 38 are also engaged with pin-

ions 46 mounted on a transverse shaft 47, journaled in brackets 48 or the like fixed on the frame structure 37.

Also mounted on said shaft are ratchet wheels 49 engaged by pawls 50, these parts being arranged to prevent rotation of the shaft in a manner which would permit lowering of the racks.

The pawls however are mounted on a shaft 51 turnable at will by means of a handle 52, so that said pawls, by turning the shaft, may be moved clear of the ratchet wheels at will. The handle 52 is arranged to normally act as a gravity or weight means for holding the pawls engaged, obviating the use of springs.

Likewise mounted on the shaft 47 is an additional ratchet wheel 53 engaged by a pawl 54 mounted on a lever 55 which is turnable on the shaft 47, said lever being adapted to be engaged and moved about the shaft when the jaws approach the member 28 by a rigid arm 56 projecting from one of the posts 18, or from one of the bearing members 26.

The truck is limited in its movement toward the apron and cutter structure by any suitable means, such as a stop 57 on the track 35, the jaws then projecting beyond the cutter a distance sufficient to cause them to receive the cut end of the board 9 therebetween, as shown in Fig. 2. At the same time, the lever 55 will have been rotated by contact with the arm 56 a distance sufficient to cause the racks 38, and consequently the jaws, to be raised a distance equal to the thickness of a sheet of the board. When the lever disengages from the arm 56, the former is returned to its normal position by a spring 58 or other suitable means, the racks 38 being held from downward movement by reason of the pawls 50 which engage the ratchet wheels 49.

The arm 56 and lever 55 may however be omitted if desired, and the shaft 47 turned directly by hand.

When the truck 36 approaches its limit of desired movement away from the apron structure, it engages and throws an arm 59 connected to the clutch 13 by suitable connecting means indicated diagrammatically at 60, whereby the clutch is automatically disengaged by the truck as the latter reaches its limit of movement away from the apron. This automatic clutch-throw device however forms no part of the present invention, since it is fully set forth and claimed in my aforementioned copending application.

Also, any suitable means may be employed to move the truck 36 back and forth. Such features however also form no part of the present invention, and the truck may be considered to be moved by hand—a method of manipulation which has been successfully used with the present apparatus, on account of the improved features of construction, whereas it could not be so employed with the previous machine.

On the floor under the tracks 35 and in parallel alinement therewith are tracks 61 to form supports for a wheeled truck 62 of sufficient size to support a stack of the board 9, as shown in Fig. 1.

This truck is positioned so that one end extends beyond and under the apron 28 and the other end is beyond the limit of travel of the truck 36 away from said apron.

The operation of the apparatus is as follows:

The board, formed at the time it passes between the rolls 3 as previously described, and then in a very wet and "green" condition, is moved toward and onto the apron 14 by the constantly moving belt 10 on which the board rests.

As soon as the end of the board reaches the plane of the cutter 30 (assuming that this is the first board made from a fresh supply of stock), the belt is halted, the apron 28 is depressed by raising up on the handle 29, and the truck 36 is then moved toward said apron so that the jaws carried thereby may be engaged with the end of the board which then projects clear of the depressed apron. The latter is preferably not lowered until the jaws are adjacent thereto, in order to avoid a sagging down of the wet board, which might happen even though only a very short length of the same is unsupported. The upper jaw is then clamped onto the lower jaw by the raising of the handle 45 by an operator.

Previous to this, assuming the truck 62 to be empty, the platform 16 has been lowered, by manipulation of the hand wheel 27, until the apron 28 is within a few inches from the floor of the truck. The jaws 39 and 40 have also been lowered to substantially the same level as that of said apron by release of the pawls 50 while maintaining the shaft 47 under control.

The apron 14, being hinged at one end and resting on the fixed support 15 at the other end always provides a continuous supporting surface for the board from the belt 10 to the platform 16.

The jaws being engaged with the board as above stated, the power is again applied to the belt 10, and the truck 36 is then moved along and away from the belt by hand or otherwise, an operator holding the handle 45 so as to maintain the grip of the jaws on the board.

Due to the fact that a considerable length of the board is resting on the belt 10 and is being constantly moved forward at an even rate thereby, only sufficient driving pressure is applied to the truck 36 to keep it moving at the same rate as the belt and so that it rests lightly on the truck 62. In other

words, this movement is not fast enough to exert undue tensional strain on the board beyond the belt, nor yet so slow that the positively driven portion of the board has a tendency to fold over onto itself as the outer and slack portion comes to rest on the truck 62. The latter provides a supporting surface for the slack portion of the board between its raised and definitely supported ends as it is being drawn along by the truck, and as such ends are held but a few inches above the truck surface, there is but little sag or drop of the board between its ends, and hence no tendency for the board to pull apart and break of its own weight.

As the truck 36 is moved along, the apron 28 may be left in its uppermost position, or may be lowered somewhat. Also the apron unit as a whole may be vertically adjusted by the operator during this period if desired, any such movement being left to the judgment of the operator and depending on the distance it may be desired to have the board unsupported between the apron 28 and the truck 62.

When the truck 36 has advanced until the clutch-throw arm 59 is engaged thereby, the travel of the belt 10 and board 9 thereon is discontinued. The truck operator will at the same time release the handle 45, allowing the jaws to open and the adjacent end of the board to drop from therebetween onto the truck 62. No difficulty is experienced in timing the handle-releasing movement of the operator with the throwing of the clutch 13, since when said truck strikes the throw arm 59 a resistance to the continued movement of the truck is at once had, which is felt by the operator grasping the handle 45, and gives him a warning signal to let go.

The length of board just drawn along is now lying flat on the board from its outer end to a point a certain distance from the opposite end which is still attached to the remainder of the continuous stretch of formed board and is depending from the raised apron 28.

The board is then cut across by pulling the cutter 30 crosswise of the machine, the apron 28 being first raised so as to make a firm support for the board thereabove, and also a fixed cutting edge with which the movable cutter co-acts.

The cutter being drawn across the board and clear of the same, may be left where it is halted, or returned to its starting point, depending on the desire and convenience of the operator.

The cut end of the board will now drop onto the truck 62. The truck 36 is now returned toward the apron 28, with the jaws open to engage the end of the board resting on said apron. As the jaws move close to the apron 28, the latter is lowered, leaving the unsupported end of the board in the clear, so that the lower jaw 39 may pass under the same, and the upper jaw 40 thereover.

Just before the jaws move into engagement with the board, the lever 55 is engaged by the fixed arm 56, and the racks 38, and the jaws supported by the racks, are moved upwardly a distance equal to the thickness of the board just deposited on the truck 62.

About the same time the platform 16 is moved vertically by manipulation of the handwheel 27 so as to cause the projecting end of the board to about rest on the lower jaw 39 when the latter moves under the board, since it is the upper jaw only which moves to clamp the jaws together.

The parts now being back in the same positions as stated at the outset of the above description of operations, another and duplicate cycle of movement as that above outlined is about to start, and hence further description is unnecessary.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

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

1. In a plaster board forming apparatus, a delivering mechanism for the formed board, a supporting element on which the delivered board is to be piled in stacked relation, and means for raising the delivery mechanism in definitely spaced step by step order as the pile advances.

2. In plaster board forming apparatus, handling means comprising means for advancing the formed board; said means including jaw members to grip the forward edge of the formed board and sustain and draw the same away from the forming means.

3. In plaster board forming apparatus, handling means comprising means for advancing the formed board; said means including jaw members to grip the forward edge of the formed board and sustain and draw the same away from the forming means, and means for vertically adjusting the jaw members as a unit.

4. A plaster-board handling apparatus including horizontally movable means for engaging the end of the board, and reciprocatable through a certain distance, and means whereby said engaging means will be

raised vertically a certain distance each time said engaging means reaches its horizontal limit of movement in one direction.

5. A plaster-board handling apparatus including horizontally movable means for engaging the end of the board, and reciprocatable through a certain distance, and means whereby said engaging means will be raised vertically a certain distance once with each reciprocation of the same.

6. In a plaster-board handling apparatus, a board supporting means mounted in a fixed plane, a vertically movable supporting means beyond said first supporting means, and means for supporting the board between said fixed and movable means irrespective of the relative levels thereof.

7. In a plaster-board handling apparatus, a board supporting means mounted in a fixed plane, a vertically movable supporting means beyond said first supporting means, and onto which the board from said first supporting means passes, and means for engaging the end of the board when the latter is at the outer end of said movable supporting means.

8. In a plaster-board handling apparatus, a board supporting means mounted in a fixed plane, a vertically movable supporting means beyond said first supporting means, and onto which the board from said first supporting means passes, means for engaging the end of the board when the latter is on said movable supporting means, and means for enabling the level of said engaging means to be maintained substantially the same as that of the movable supporting means.

9. In a plaster-board handling apparatus, a board supporting means mounted in a fixed plane, a vertically movable supporting means beyond said first supporting means, and onto which the board from said first supporting means passes, and a vertically movable means for engaging the end of the board when the latter is on said movable supporting means.

10. In a plaster-board handling apparatus, a board supporting means mounted in a fixed plane, a vertically movable supporting means beyond said first supporting means, and onto which the board from said first supporting means passes, and means for causing the board to travel from the first onto the second named supporting means.

11. In plaster board forming apparatus, handling means comprising means for advancing the formed board; said means including jaw members to grip the forward edge of the formed board and sustain and draw the same away from the forming means, and means for vertically adjusting the jaw members as a unit in step by step order.

12. A plaster board handling apparatus including horizontally driven means on which a certain length of the board is supported, and horizontally movable means operable independently of the supporting means for gripping the end of the board on the supporting means and moving the board away from said means.

13. In a plaster-board handling apparatus, a board supporting means mounted in a fixed plane, a vertically movable supporting means beyond said first supporting means, and an apron lying between said supporting means and arranged to form a continuous board supporting surface therewith irrespective of the relative levels of the latter.

14. In a plaster-board handling apparatus, a board supporting means mounted in a fixed plane, a vertically movable supporting means beyond said first supporting means, an apron hinged to the vertically movable supporting means, and a member fixed adjacent said first named supporting means and on which the adjacent end of the apron slidably rests.

15. A plaster-board handling apparatus including horizontally movable means for engaging the end of the board, means for supporting said end of the board prior to its engagement, and means for moving both the supporting and board engaging means vertically.

16. In a plaster-board handling apparatus, vertically adjustable means for engaging one end of the board, and a horizontally movable member, mounted in a fixed plane, supporting said adjustable means.

17. In plaster board forming apparatus, handling means comprising means for advancing the formed board; said means including horizontally reciprocable jaw members to grip the forward edge of the formed board and sustain and draw the same away from the forming means, and means for vertically adjusting the jaw members as a unit with each reciprocatory movement thereof.

18. In a plaster-board handling apparatus, opposed jaw members adjustable vertically relative to each other, a vertically movable supporting member for said jaws, and means actuated by the movement of said supporting member for moving said jaw members vertically as a unit.

19. In a plaster-board handling apparatus, a horizontally movable member, vertical and transversely spaced members supported thereby, a jaw member fixed on and extending between said members, and a movable jaw member slidably mounted on said vertical members.

20. In a plaster-board handling apparatus, a horizontally movable member, vertical and transversely spaced members supported thereby, a jaw member fixed on and extending between said members, a movable jaw member slidably mounted on said vertical members, and means for moving the

movable jaw to and from the fixed jaw at will.

21. In a plaster-board handling apparatus, a horizontally movable member, vertical and transversely spaced members supported thereby, a jaw member fixed on and extending between said members, a movable jaw member slidably mounted on said vertical members, and means mounted in connection with the fixed jaw for moving the other jaw relative thereto.

22. In a plaster-board handling apparatus, a horizontally movable member, vertical and transversely spaced members supported thereby, a jaw member fixed on and extending between said members, a movable jaw member slidably mounted on said vertical members, means mounted in connection with the fixed jaw for moving the other jaw relative thereto, and independent means for raising the vertical members.

23. In a plaster-board handling apparatus, a horizontally movable member, vertical and transversely spaced members supported thereby, a jaw member fixed on and extending between said members, a movable jaw member slidably mounted on said vertical members, means mounted in connection with the fixed jaw for moving the other jaw relative thereto, and independent means for raising the vertical members, without altering the level of the supporting means.

24. In a plaster-board handling apparatus, opposed jaw members adjustable vertically relative to each other, a supporting member for said jaws, reciprocatable through a certain horizontal distance, jaw means supported by said member, a lever, means between said lever and the jaw means for causing the latter to be moved vertically with a movement of said lever, and means for engaging and moving the lever as the supporting means approaches the end of its travel in one direction.

25. In a plaster-board handling apparatus, opposed jaw members adjustable vertically relative to each other, a supporting member for said jaws, reciprocatable through a certain horizontal distance, jaw means supported by said member, a lever, means between said lever and the jaw means for causing the latter to be moved vertically with a movement of said lever, and a fixed arm with which said lever contacts at a predetermined point in the travel of the supporting member.

In testimony whereof I affix my signature.

JOHN F. MAKOWSKI.