May 29, 1928. 1,671,790

E. G. STAUDE

STACKING MECHANISM FOR PAPER BOX MACHINES

Filed July 15, 1926 8 Sheets-Sheet 1

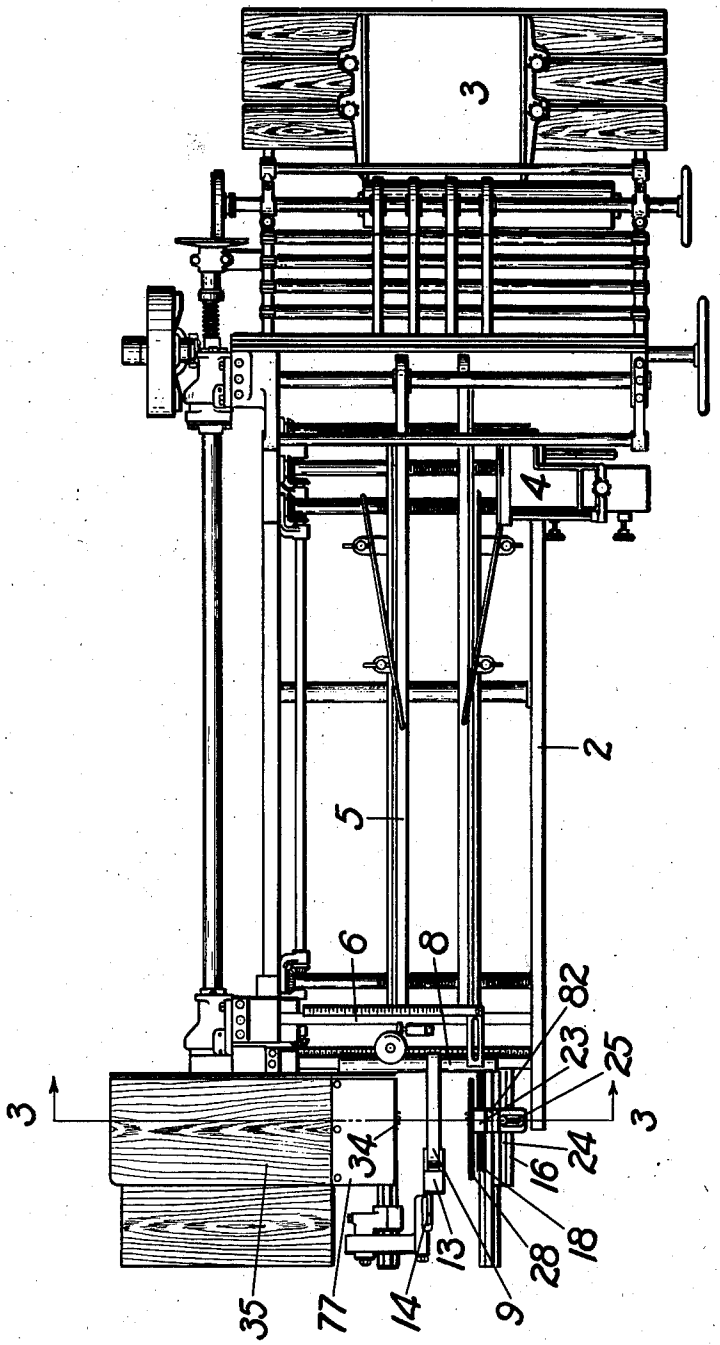


FIG. 1

INVENTOR
EDWIN G STAUDE
BY Paul, Paul & Woodman
ATTORNEYS

May 29, 1928. 1,671,790

E. G. STAUDE

STACKING MECHANISM FOR PAPER BOX MACHINES

Filed July 15, 1926 8 Sheets-Sheet 2

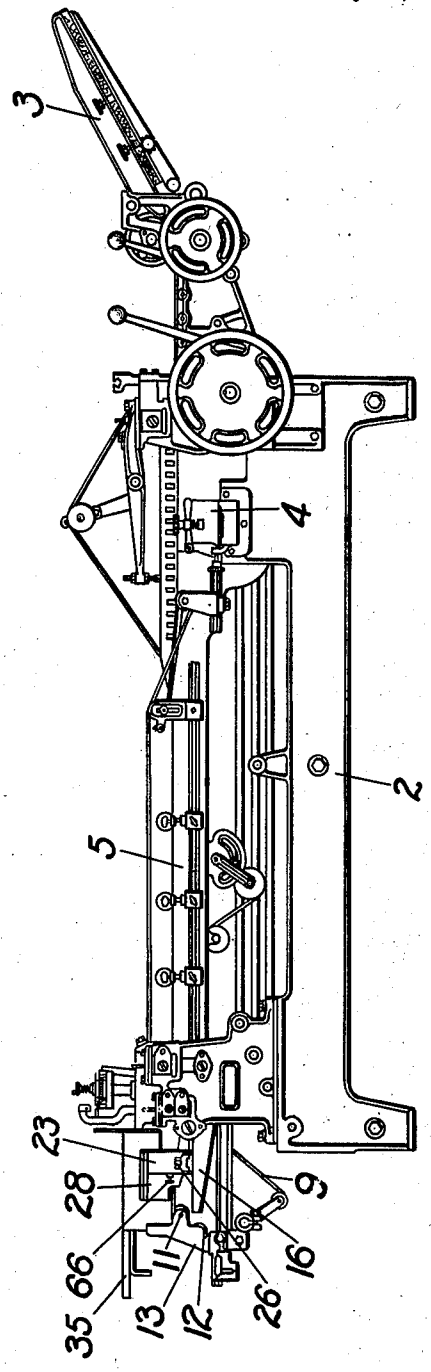


FIG. 2

INVENTOR
EDWIN G STAUDE
BY Paul, Paul & Woodruff
ATTORNEYS

May 29, 1928. 1,671,790

E. G. STAUDE

STACKING MECHANISM FOR PAPER BOX MACHINES

Filed July 15, 1926 8 Sheets-Sheet 3

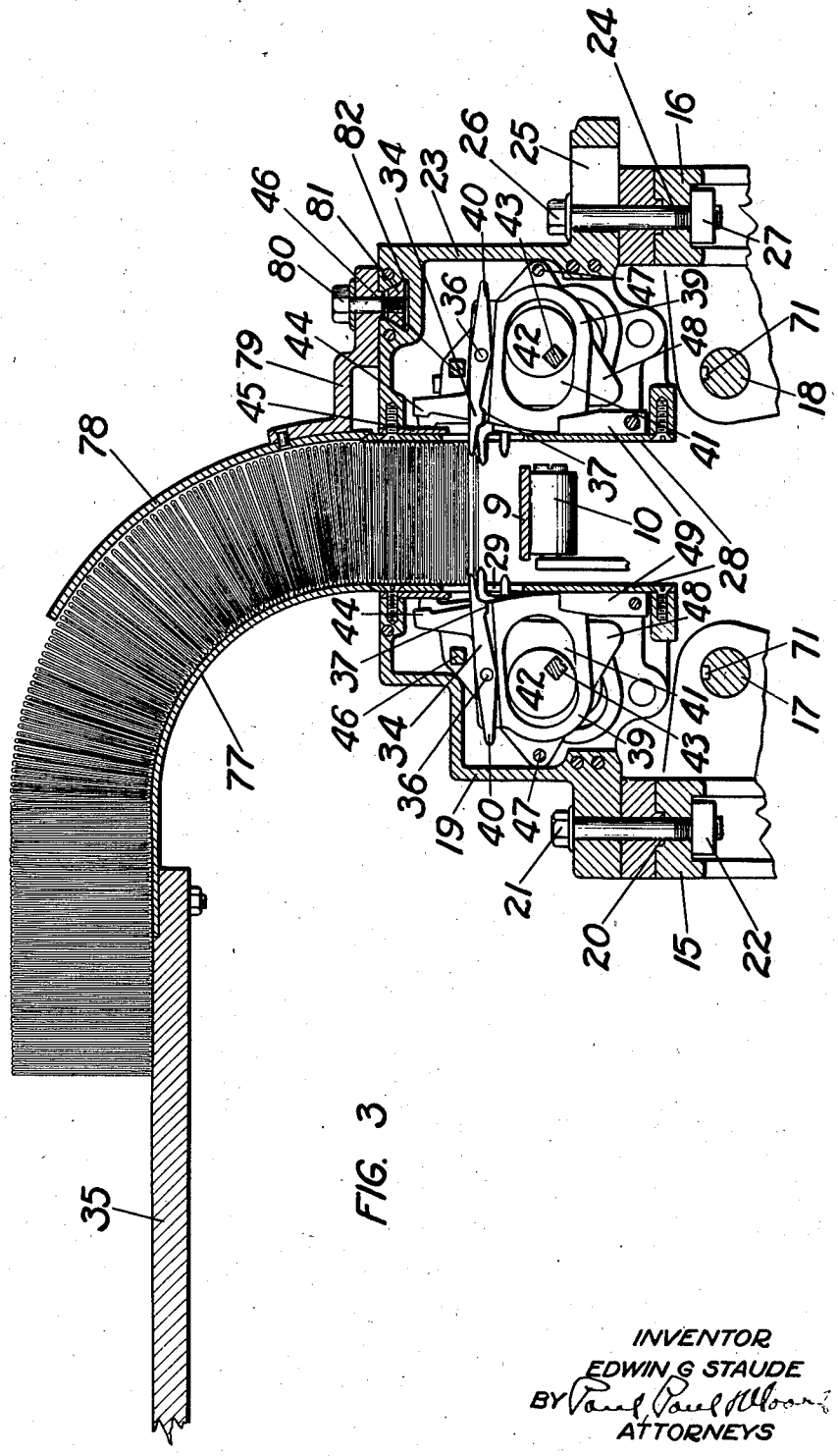


FIG. 3

INVENTOR
EDWIN G STAUDE
BY Paul, Paul & Woodruff
ATTORNEYS

May 29, 1928. 1,671,790

E. G. STAUDE

STACKING MECHANISM FOR PAPER BOX MACHINES

Filed July 15, 1926 8 Sheets-Sheet 4

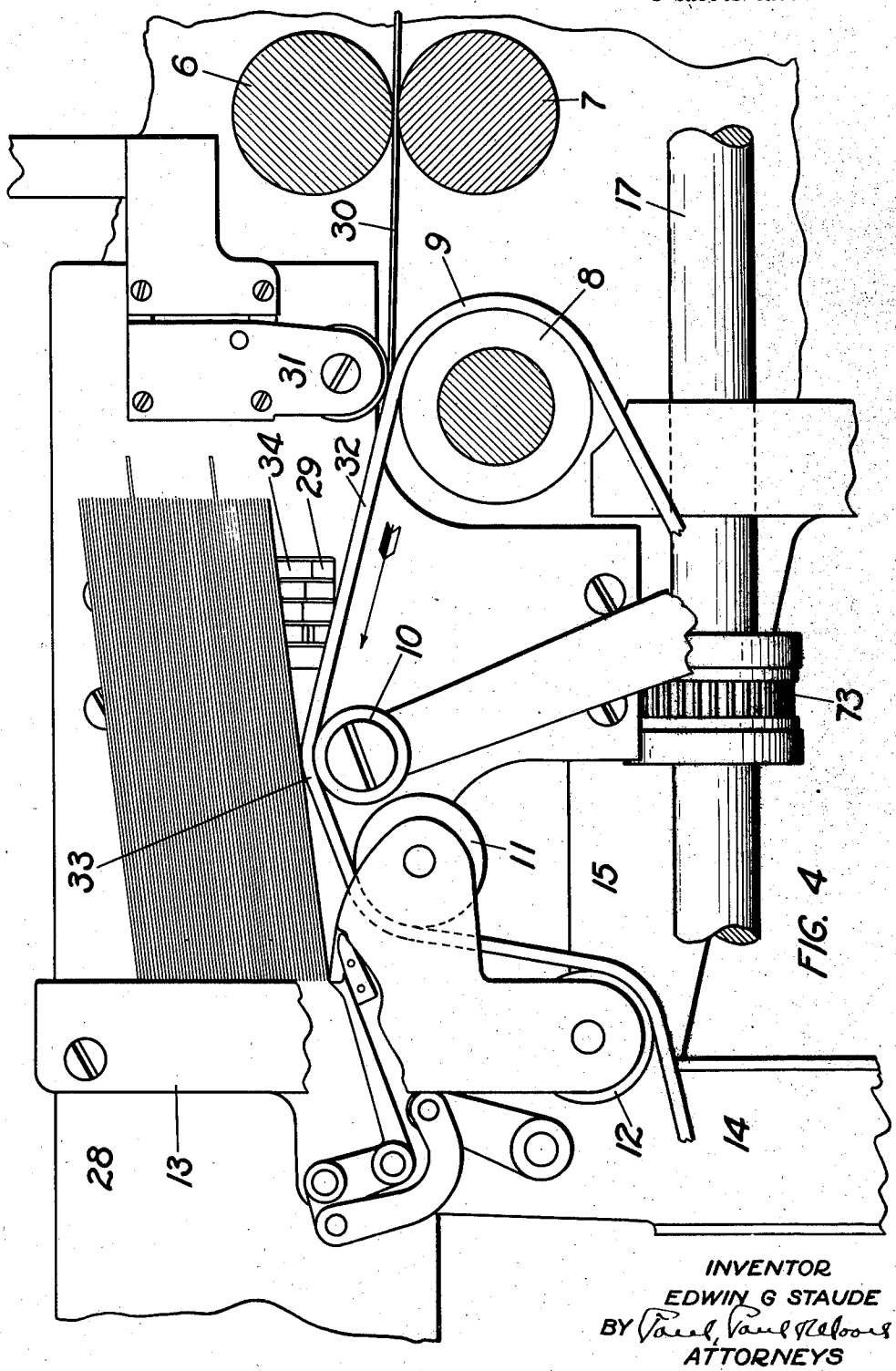


FIG. 4

INVENTOR
EDWIN G STAUDE
BY Parker, Paul & Parker
ATTORNEYS

May 29, 1928. 1,671,790

E. G. STAUDE

STACKING MECHANISM FOR PAPER BOX MACHINES

Filed July 15, 1926 8 Sheets-Sheet 5

FIG. 6

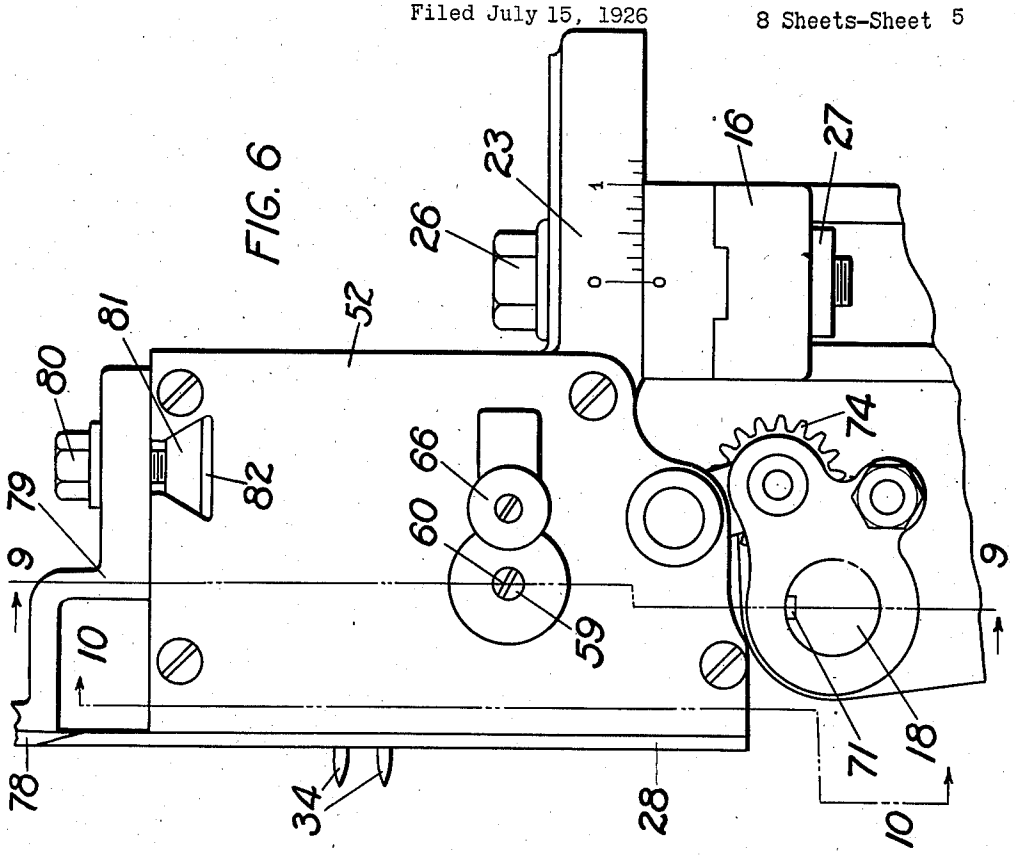
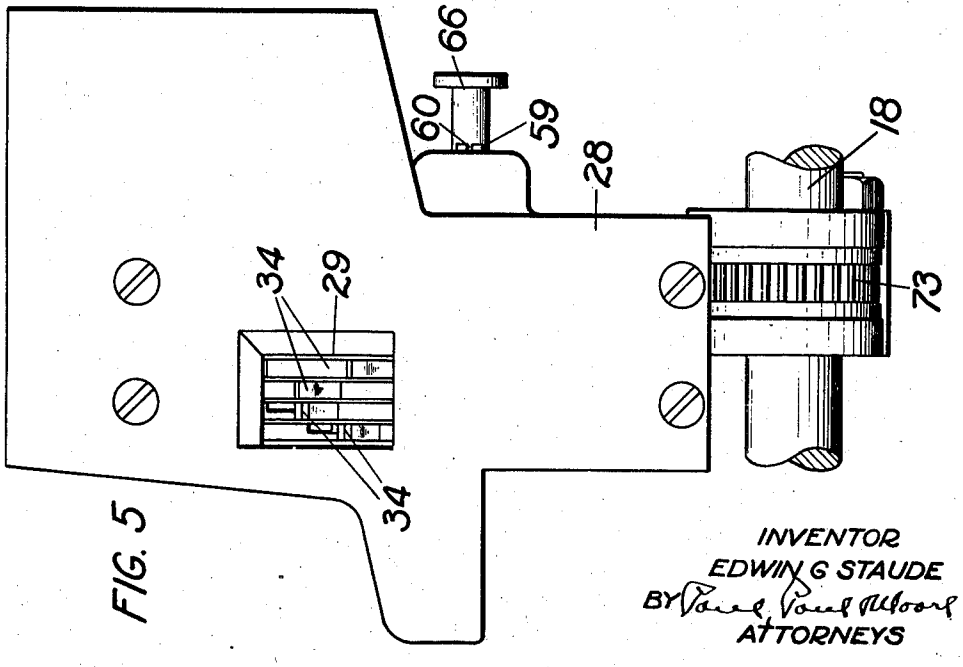


FIG. 5



INVENTOR
EDWIN G STAUDE
BY Paul, Paul & Moore
ATTORNEYS

May 29, 1928. 1,671,790

E. G. STAUDE

STACKING MECHANISM FOR PAPER BOX MACHINES

Filed July 15, 1926 8 Sheets-Sheet 6

FIG. 8

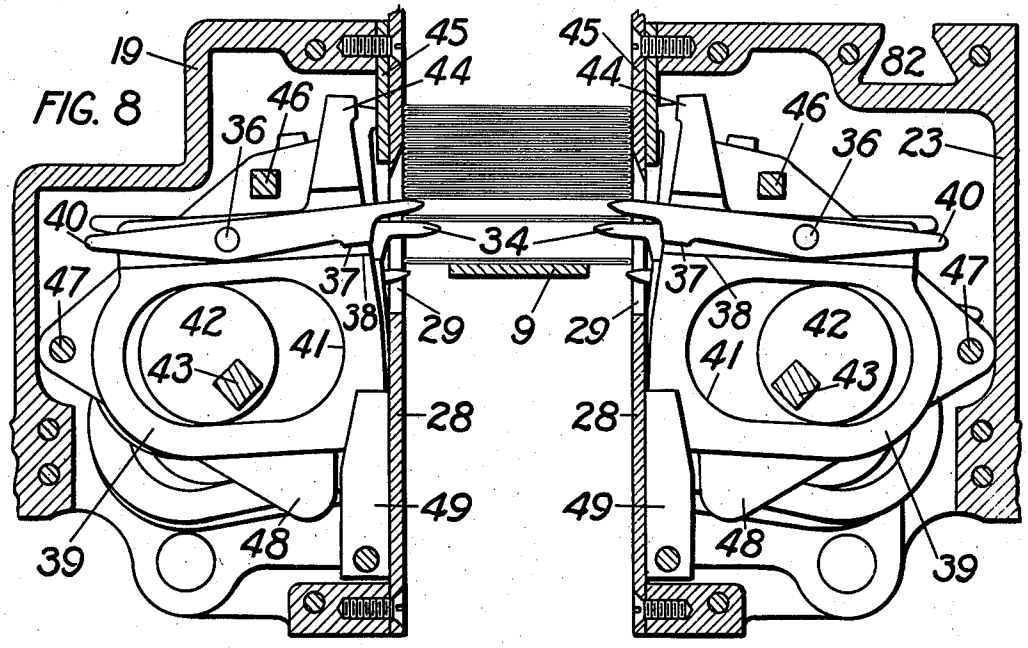
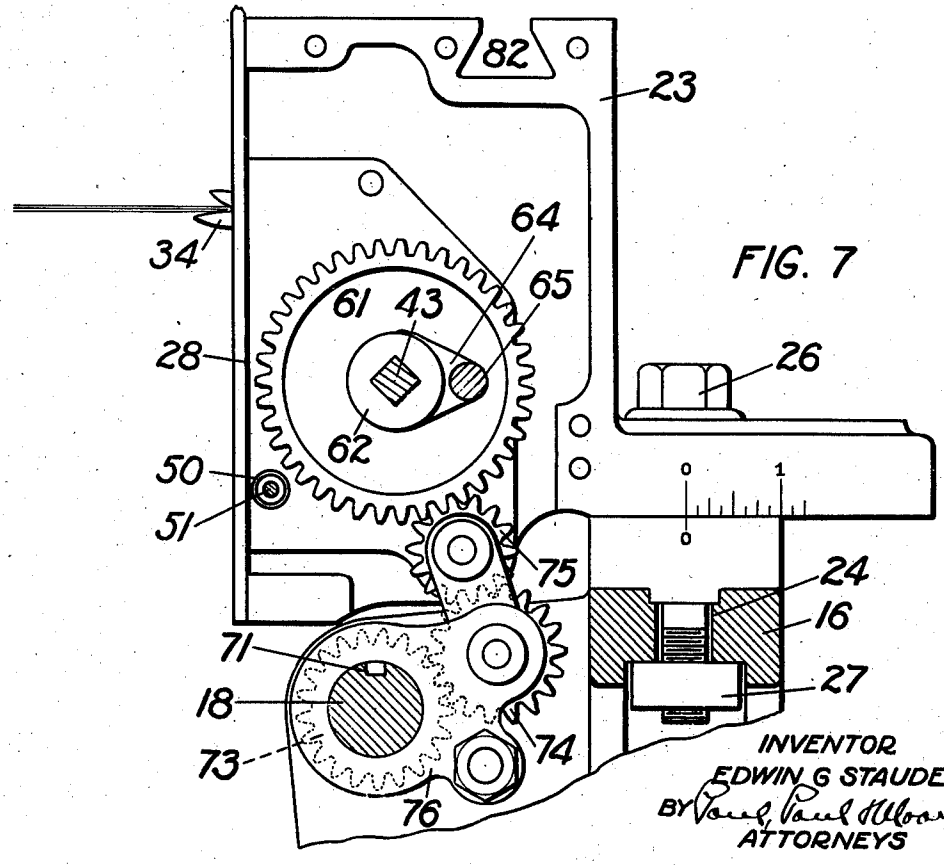


FIG. 7



INVENTOR
EDWIN G STAUDE
BY Paul, Paul & Woodard
ATTORNEYS

May 29, 1928. 1,671,790

E. G. STAUDE

STACKING MECHANISM FOR PAPER BOX MACHINES

Filed July 15, 1926 8 Sheets-Sheet 7

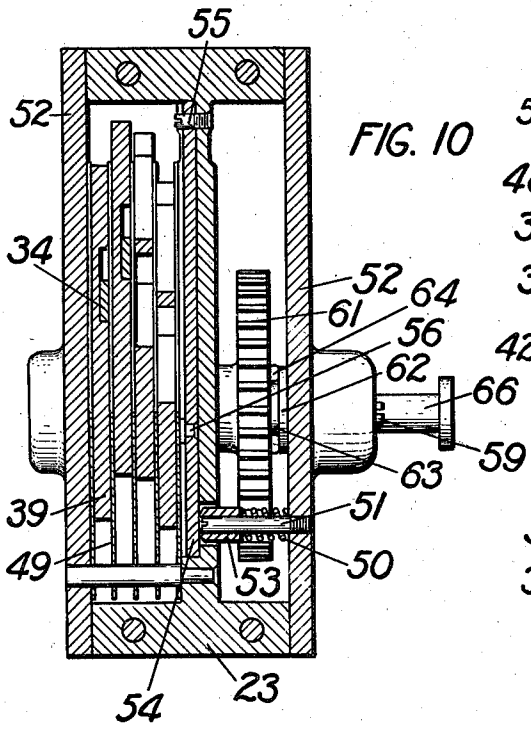


FIG. 10

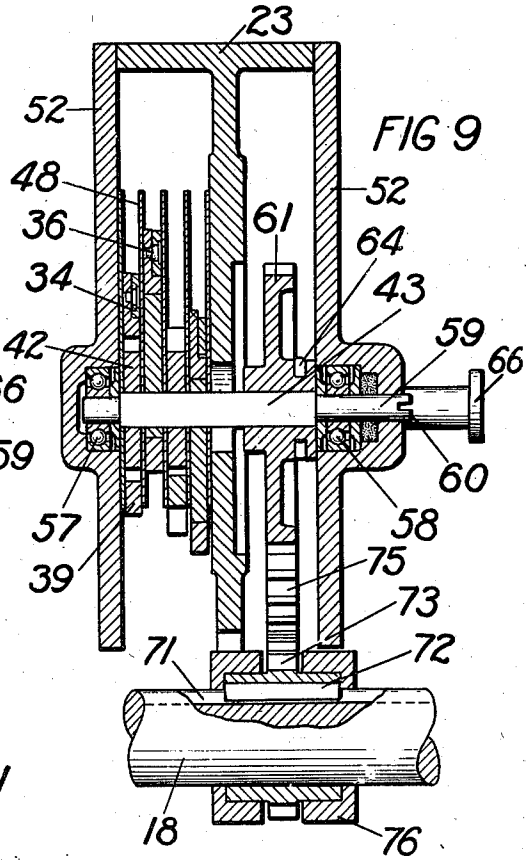


FIG 9

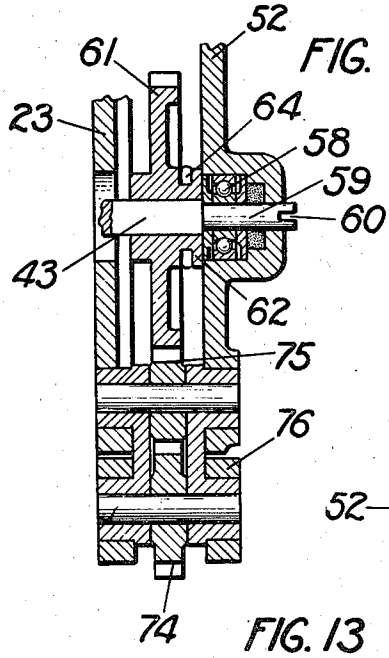


FIG. 11

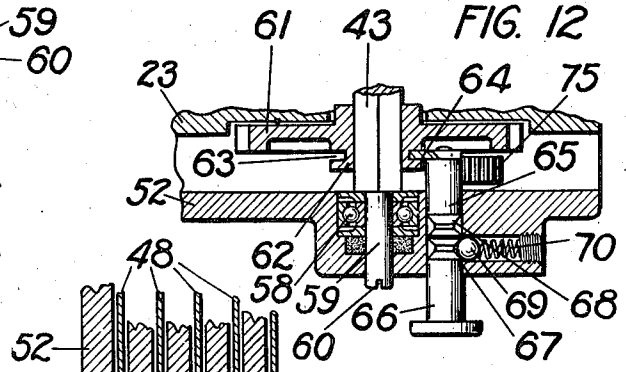


FIG. 12

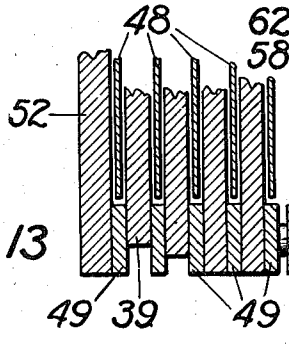


FIG. 13

INVENTOR
EDWIN G STAUDE
BY Paul Paul & Woof
ATTORNEYS

May 29, 1928. 1,671,790

E. G. STAUDE

STACKING MECHANISM FOR PAPER BOX MACHINES

Filed July 15, 1926 8 Sheets-Sheet 8

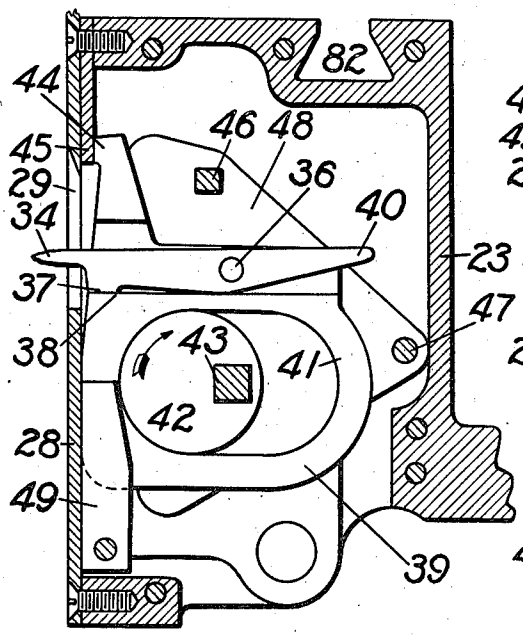


FIG. 14

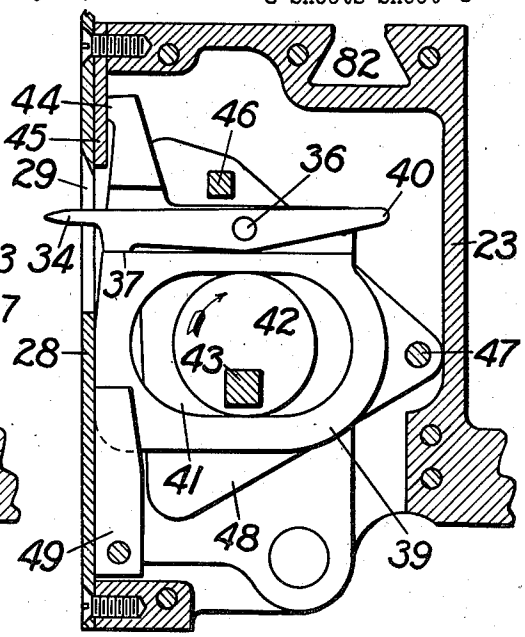


FIG. 15

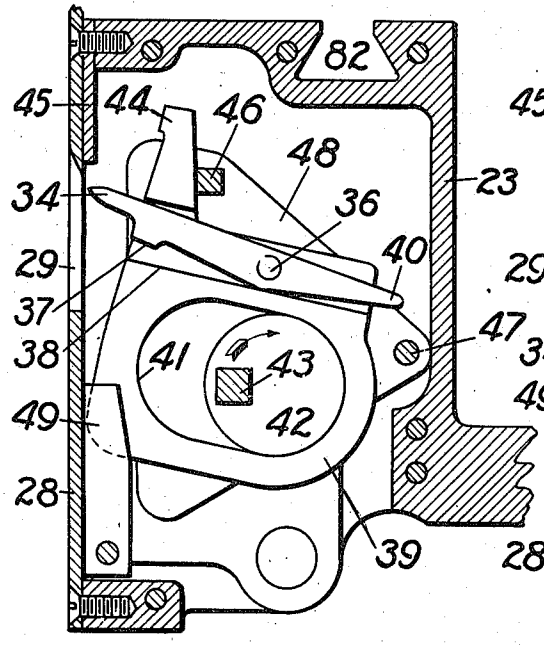


FIG. 16

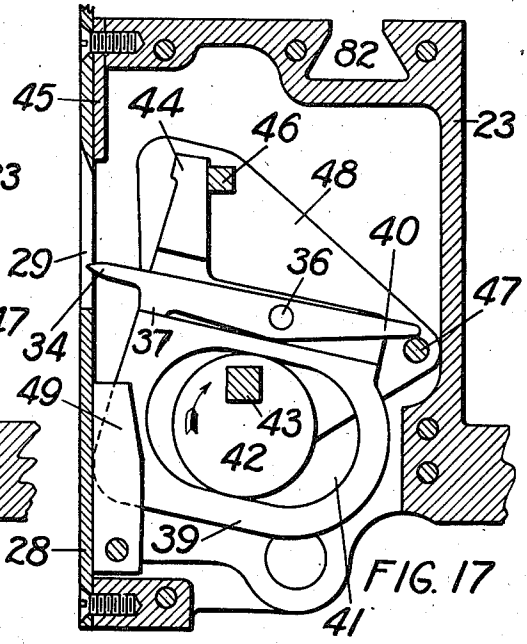


FIG. 17

INVENTOR
EDWIN G STAUDE
BY Pennie Davis Marvin & Edmonds
ATTORNEYS

Patented May 29, 1928. 1,671,790

UNITED STATES PATENT OFFICE.

EDWIN G. STAUDE, OF MINNEAPOLIS, MINNESOTA.

STACKING MECHANISM FOR PAPER-BOX MACHINES.

Application filed July 15, 1926. Serial No. 122,603.

This invention is an improvement upon my application Serial #698,098, filed March 10, 1924, and also on Patent #961,263, dated June 14, 1910, and Patent #1,018,087, dated February 20, 1912.

The object of my invention is to provide an improved delivery for paper box machines which will require a minimum adjustment for boxes of different sizes and occupy a minimum amount of floor space.

A further object is to provide a delivery for paper box machines which will deliver the flat folded boxes or cartons vertically without marring the printed surface or otherwise injuring the carton.

A further object is to provide a delivery for paper box machines, the mechanism of which will have a reasonably slow speed and be capable of receiving and stacking the box as it passes into the delivery section at the rate of 100 per minute or 2000 per minute, if desired, without readjusting the speed of the stacking mechanism.

A further object is to provide a construction which will be strong and rigid and still be light and simple in construction.

Other objects of the invention will appear from the following detailed description.

The invention consists generally in various constructions and combinations, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings, forming a part of this specification,

Figure 1 is a plan view of a machine embodying my invention;

Figure 2 is a side elevation thereof;

Figure 3 is a transverse section on the line 3—3 of Figure 1;

Figure 4 is a sectional view of the carton receptacle showing the means for feeding the cartons into the receptacle, the inclined belt for conveying the carton to the rear of the receptacle, the back-stop arrangement, and the relative position of the lifters with respect to the rear of the cartons, also showing the manner in which the lifters keep the cartons in the receptacle clear of the path of the following incoming carton;

Figure 5 is a side view of one of the lifter cases, looking from the inside of the stacker receptacle;

Figure 6 is an end view of the same;

Figure 7 is a similar view to Figure 6 with the cover plate removed showing the driving connection;

Figure 8 is a section through the lifter cases, showing the position of the various lifter fingers as they function in the stacker receptacle; also showing a section of the stacker belt and incoming cartons;

Figure 9 is a section on the line 9—9 of Figure 6;

Figure 10 is a section on the line 10—10 of Figure 6;

Figure 11 is a detail of the driving connection of the lifter;

Figure 12 is a detail of the manner of shifting one of the gears out of mesh with the train of gears that drive the lifters for the purpose of timing one set of lifters with the co-acting lifters on the opposite side of the stacker receptacle;

Figure 13 is a detail section of the friction members which clamp the forward lower end of the individual lifters to give the in and out movement;

Figures 14, 15, 16 and 17 are sections through the lifter case and show the consecutive position of the lifting finger, the action of the actuating member, and the clamping mechanism.

In the drawing, 2 represents a folding paper box machine to which my invenion is attached, having the usual feed table 3, the glue pot 4, the folding mechanism 5, and the usual feed rolls 6 and 7 at the delivery end of the machine for delivering the cartons into a collecting receptacle. (See Figure 4.)

The collecting receptacle is also provided with the usual stacker belt pulley or drum 8 (see Figure 4) which drives the adjustable inclined belt 9, the position of said belt 9 being determined for the particular carton by an adjustable roller 10, the belt passing over the pulley 11 and around the idler 12 to suitable tightening mechanism for taking up the slack of the belt when adjustment is made for small cartons.

The back-stop 13 is adjustable vertically and horizontally by the slide 14 which functions in a suitable clamp, not shown.

Forming a continuation of the folder frame structure on the right hand side is a bracket 15 and a similar bracket 16 forms a continuation of the left hand folder frame mechanism. (See Figure 3.)

Each side of the machine has the usual

drive shaft 17 and 18 adapted to be adjusted simultaneously with the folder frame for guiding blanks of different widths. The shafts 17 and 18 are driven in the conventional manner.

Mounted on the bracket 15 is a lifter case 19. The bracket 15 has a slot 20 for the adjustment of the lifter case 19 in different positions from the front to the rear of the stacking receptacle, and is secured by a cap screw 21, having a nut 22.

On the bracket 16 is a similar lifter case 23, having a similar adjusting slot 24, and also a cross adjustment slot 25, said case being clamped by a cap screw 26 and a nut 27, after the correct position has been ascertained with respect to the line-up of the folder frames, so that the incoming carton will have a free travel along a straight line as it passes from the machine into the carton collecting receptacle.

The lifter cases are provided with guide plates 28 which cover the faces of the lifter cases except for small openings 29 through which the lifters project into the path of the cartons between the plates in the receptacles for the purpose to be later described.

Referring to Figure 4, I have indicated a carton 30 passing between the feed rolls 6 and 7 and between the belt 9 and the tension pressure roll 31, which roll revolves by frictional contact with the surface of the carton 30, that is moved by the belt 9 up the incline 32 of the belt over the high point 33 and against the back-stop 13, which arrests the horizontal movement of the carton at the forward end, but because of the position of the roller 10 which forms an elevated point near the center of the stack of cartons, it follows that when the carton has passed out from under the tension roller 31, the rear of it will fly up into a position in alinement with the center of the carton at the point 33 and the point where the carton rests against the back-stop 13.

This snapping up of the rear of the carton, for the reasons above stated, is sufficient to cause a space for the succeeding carton to pass under the preceding one.

I find, however, that as the load increases, the pressure of the cartons at the point 33 will be so great that the incoming carton 30 cannot pass beyond this point, with the result that the receptacle will not receive any more cartons and the machine will become clogged.

To relieve the load of the cartons at the point 33 and a part of the load from the back-stop 13, I provide lifter fingers 34, which operate through the openings 29 in the guide plates 28 and are adapted to function within the lifter cases 19 and 23. (See Figure 3.)

I have found these lifters are capable of supporting a larger number of cartons than my previous construction without marring or mutilating the surface of the carton. The action of the lifters is vertical, and their withdrawal is in a horizontal plane and there is no point in the mechanical functioning of the lifters where there is a sliding contact with the carton surface frequently highly lithographed, as would be the case where a revolving spiral is used for performing this operation.

These lifters will permit a stack of cartons to be guided on a radius of sufficient size so that the delivery can be made in a horizontal direction before the eyes of the operator, who can inspect the cartons and readily remove them from the delivery table 35. (See Figures 1, 2 and 3).

The lifter fingers 34 are pivoted at the point 36 and have a stop 37 adapted to bear against a surface 38 of the actuating member 39.

The extensions 40 limit the upward movement of the lifter fingers 34.

The purpose of this flexible mounting of the fingers is to permit the withdrawal of a finger 34 without tearing or mutilating the carton when the succeeding finger carries the load which may be one, two or more cartons between the two adjacent fingers, and the space therefore must be adapted for the required thickness without friction.

The actuating member 39 has an oval shaped opening 41 adapted to receive an eccentric 42, driven by a shaft 43.

The actuating member has a stop 44 which limits its outward movement and is adapted to bear against a plate 45.

By referring to the Figure 14, the position of the lifter finger 34 is shown just as it has passed into the path of the cartons in the receptacle, but above the incoming carton.

Figure 15 shows the eccentric 42 advanced in the direction of the arrow for a quarter turn and indicates the vertical movement of the finger 34.

Figure 16 shows the receding movement during the quarter of a revolution between the position shown in Figure 15 and Figure 16; and Figure 17 shows the eccentric in its downward position to bring the lifter finger downward, so that the next quarter of a revolution will again cause it to assume the position shown in Figure 14.

In order that the movement may be continuous, a stop 46 is provided to bear against the rear of the stop 44 on the actuating member 39, which will cause the forward lower end of the actuating member 39 to bear against the guide plate 28.

To bring the lifter finger down into its proper position, the extension 40 bears against a pin or stop 47. (See Figure 17).

To separate the lifters one from another, I provide a plate 48 held in position by the stops 46 and 47 and the shaft 43.

To secure the proper functioning of the actuating member 39, I provide a plate 49 between each pair of fingers (see Figure 13) and a spring tension device 50 (see Figure 10) is seated against the outer plate 49 and consists of a pin 51 screwed into the side plate 52 of the lifter case and having a sleeve 53 sliding freely on the pin 51 and bearing against a flexible plate 54, pivoted at 55 and bearing against the adjacent plate 49 at 56 by means of a small rivet-head projection.

From the construction just described it is clear that each lifter finger 34 during revolutions of shaft 43 has first a vertical movement, then a horizontal movement out of contact with the cartons and into the lifter case, then a downward movement in the lifter case, and finally a horizontal movement out into the path of the cartons.

By referring to Figure 9, it will be seen that the shaft 43 is mounted in ball bearings 57 and 58. The shaft 43 has an extension 59 through one of the ball bearings. This extension is provided with a screw driver slot 60, so that the shaft may be turned into the proper timing position before the driving mechanism is moved into driving mesh.

To drive the shaft 43, I provide a spur gear 61 slidable on the shaft 43 (see Figures 7, 9, 11 and 12). This spur gear has a hub 62 provided with a groove 63 and adapted to receive a fork or yoke 64 secured to a sliding pin 65, having a knob 66, annular grooves 67 and 68, and a ball 69 held in its adjusted positions by a spring 70 for holding the yoke in either in or out position.

In Figure 9, the spur gear 61 is shown in the mesh position, similar to the view in Figure 11.

Figure 12 shows the position of the spur gear 61 out of mesh with the driving train and therefore permits the free adjustment of the shaft 43, so that the position of the eccentrics thereon will correspond to the position of the opposite lifter case, and the corresponding fingers or lifters of both lifter cases will have the same movement.

This adjustment is made upon assembling the machine and also whenever the lifter cases are adjusted or moved into a different position.

Referring to Figures 3, 7 and 9, the shafts 17 and 18 are provided with keyways 71 each adapted to receive key 72 (see Figure 9) in the gear 73.

The purpose of this is that the gear may have adjustable movement along the shaft 18, but adapted to rotate with the shaft.

The gear 73 meshes with the gear 74, and the gear 74 meshes with the gear 75, which in turn meshes with the gear 61. (See Figure 7).

The gear 75 has a fixed position in the lifter case, but the gear 74 is connected with the gear 73 and the gear 75 by a link mechanism 76.

The purpose of this link mechanism is to permit adjustment in and out without disturbing the pitch line of the gears.

Both lifter cases have a corresponding drive construction.

By referring to Figure 3, it will be seen how the stack of cartons is carried vertically and then horizontally over the table 35.

The action of these cartons is guided by the radius plate 77 and the guide 78.

The guide 78 is secured to a bracket 79 and clamped to the top of the lifter case 23 by a cap screw 80 and a bevel nut 81, which may be adjusted in the bevel slot 82 of the lifter case 23.

I have found that as the machine is adjusted for different widths, the difference in the radius of the plate 77 and the guide 78 is so slight that it will not prevent the perfect functioning of the delivery of the cartons on the table 35.

I claim as my invention:

1. A stacking mechanism for cartons, envelopes, paper blanks or other articles to be stacked or collected one at a time, comprising a receptacle having a moving conveyor therein for carrying the blanks into the receptacle, and a series of lifting fingers having a vertical movement above and in the path of the incoming articles, laterally of the conveyor.

2. A stacking mechanism for cartons, envelopes, paper blanks or other articles to be stacked or collected one at a time, comprising a receptacle having a moving conveyor for carrying the articles into the receptacle one underneath the other, and a series of lifting fingers having a vertical movement above and within the path of the incoming articles, said lifting fingers having a yielding movement upon entering the path of the article to be lifted.

3. A stacking device for cartons, envelopes, paper blanks or other articles for receiving and stacking or collecting same, one at a time, comprising a receptacle, a moving conveyor in the bottom of said receptacle for feeding the articles therein, means having a vertical lifting movement directly above and within the path of the incoming cartons, adapted to engage the underside of the previous carton and lift it and the stack above to permit the free entry of the following carton into the receptacle.

4. A stacking device for cartons, envelopes, paper blanks or other articles for receiving and stacking or collecting same one at a time, comprising a receptacle having a moving conveyor therein for feeding the articles into said receptacle, a stop against which said articles are fed, means for lifting the rear end of said articles ver-

tically, and means for delivering the vertically collected stack of articles on its side.

5. A receptacle for receiving and stacking cartons, envelopes, paper blanks or other articles, comprising a moving conveyor for feeding said articles into said receptacle, a stop against which said articles are fed, means for lifting the stack of collected articles away from said feeding means, and means for delivering said collected articles in a horizontal direction.

6. A receptacle for receiving and stacking cartons, envelopes, paper blanks or other articles, one at a time, comprising means for feeding the article into said receptacle, means for stopping the article in said receptacle against horizontal movement, means for lifting the stack of collected articles vertically, means for delivering them into a horizontal direction, and a table for receiving the collected articles on edge.

7. A receptacle for receiving and stacking cartons, envelopes, paper blanks, or other articles, one at a time, comprising means for feeding the articles into said receptacle against horizontal movement, means provided on the sides of the receptacle for lifting the stack of collected articles vertically, said means consisting of a mechanism having a vertical movement above the incoming article, and having a yielding action as to movement into the path of the article and when movement of the rising stack is faster than the vertical movement of said lifting means.

8. A device for stacking cartons, envelopes, paper blanks, or other articles one at a time, comprising a receptacle, adjustable feeding means for feeding the articles into said receptacle, adjustable means for varying the angle of said feeding means, adjustable means for stopping the article in said receptacle, means provided on the sides of the receptacle for lifting the stack of collected articles vertically, and means for guiding the top of the vertical stack in a horizontal direction.

9. A device for stacking cartons, envelopes, paper blanks, or other articles to be stacked or collected one at a time, comprising means for feeding the article into the receptacle, means for checking horizontal movement of the article in said receptacle, lifting fingers provided on the side of the receptacle and having a vertical movement, said lifting fingers being adapted to engage the side of the stack and lift same in a vertical direction, said fingers having a yielding movement both as to movement into the path of the incoming article and also as to the movement of the rising stack when the movement of the rising stack is faster than the movement of the lifting finger drive mechanism.

10. A device for stacking cartons, envelopes, paper blanks, or other articles to be stacked or collected one at a time, comprising means for feeding the article into the receptacle, means for stopping the article in said receptacle against horizontal movement, means adapted to engage the stack and lift same away from said feeding means, and means for guiding the stack of articles at an angle to its initial stacking movement.

11. The combination with a receptacle for cartons, envelopes, paper blanks, or other articles, of means adapted to lift the stack of articles away from the incoming article, comprising a series of lifting fingers, a yoke or actuating member on which said fingers are mounted, and an eccentric for driving said yoke and imparting a yielding in and out motion to said lifting fingers.

12. The combination with a receptacle for cartons, envelopes, paper blanks, or other articles, of means comprising a series of lifting fingers adapted to lift the stack of collected articles away from the path of the incoming article, an eccentrically actuated yoke for imparting a gyrating movement to said fingers, a driving shaft geared to said eccentric, and shifting means for rendering said shaft gearing operative or inoperative.

13. A stacking device for cartons, envelopes, and the like, comprising a receptacle, means for delivering the articles to be stacked into the lower portion of said receptacle, and means operating forward and backward in the walls of said receptacle for engaging and lifting the pile of articles, as they accumulate in the receptacle, to relieve the pressure of the upper articles upon those beneath.

14. A stacking device for cartons, envelopes, and the like, comprising a receptacle having means for delivering the cartons into the lower portion thereof, and means having a gyrating movement in the walls of said receptacle for engaging and raising the pile of articles therein, and relieving the pressure upon those beneath.

15. A stacking device for cartons, envelopes, and the like, comprising a receptacle having means for delivering the articles to be stacked into the lower portion thereof, and a series of lifting devices having a forward and backward and vertical movement in said receptacle to engage the articles therein and raise them to relieve the pressure on the articles in the bottom of the receptacle.

16. A stacking device for cartons, envelopes, and the like, comprising a receptacle, means for delivering the articles to be stacked into the lower portion of said receptacle, means in the opposite walls of the said receptacle having a forward and backward and vertical movement for engaging and raising the articles in said receptacle,

and means for rendering said article lifting means effective or ineffective.

17. A stacking device for cartons, envelopes and the like comprising a receptacle, means for feeding articles into the receptacle, a lifting mechanism including mountings separately movable, each mounting having a rockable finger, means for moving the mountings to cause the fingers to successively enter into travel in and be withdrawn from the path of the fed articles, each at varying speeds during its cycle of movement within the path of the fed article, and at slower speed during withdrawal, the arrangement being such that when a forward finger is being withdrawn a following finger moving at a greater speed may, by means of a carton interposed between the fingers, cause the forward finger to rock and therefore yield in a forward direction and thus prevent marring of the article.

18. A stacking device for cartons, envelopes and the like comprising a receptacle, means for feeding articles into the receptacle, a lifting mechanism including mountings separately movable, each mounting having a finger rockably mounted, means for moving the mountings to cause the fingers to successively enter into travel in and be withdrawn from the path of the fed articles, each at a slower speed during withdrawal, the arrangement being such that when a forward finger is being withdrawn, a following finger moving at a greater speed may, by means of a carton interposed between the fingers, cause the speed of the forward finger to be accelerated, and thus prevent marring of the article.

In witness whereof, I have hereunto set my hand this 12th day of July, 1926.

EDWIN G. STAUDE.