J. WHITE.

SHEET DELIVERY MECHANISM.

APPLICATION FILED OCT. 19, 1912.

1,211,512.

Patented Jan. 9, 1917.

7 SHEETS—SHEET 1.

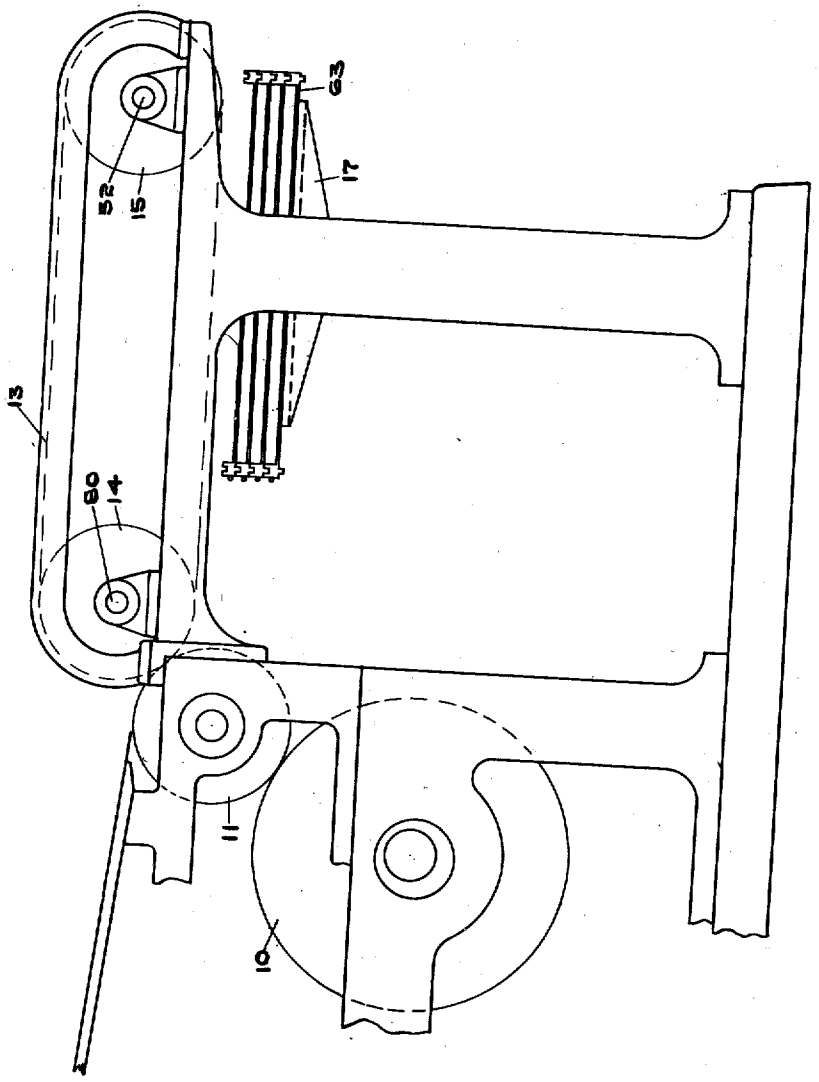


Fig. 1.

WITNESSES

Francis M. Hague.

Charles F. Bryan

INVENTOR

Joseph White,

by George P. Sculll,

his ATTORNEY

J. WHITE.

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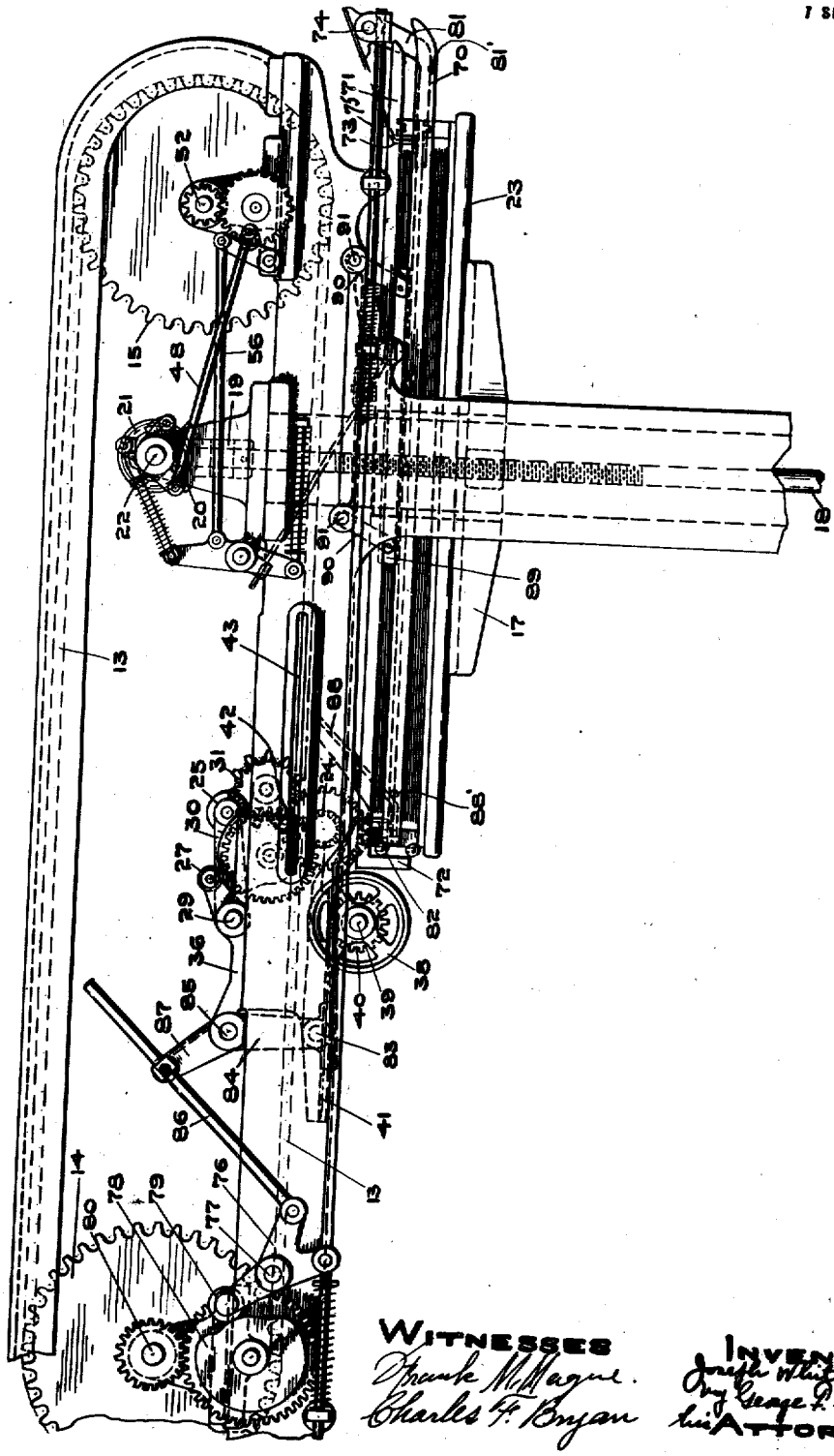


Fig. 2.

WITNESSES

Frank M. Magee.

Charles F. Bryan

INVENTOR

Joseph White.

by George P. Sewall,

his ATTORNEY

J. WHITE.

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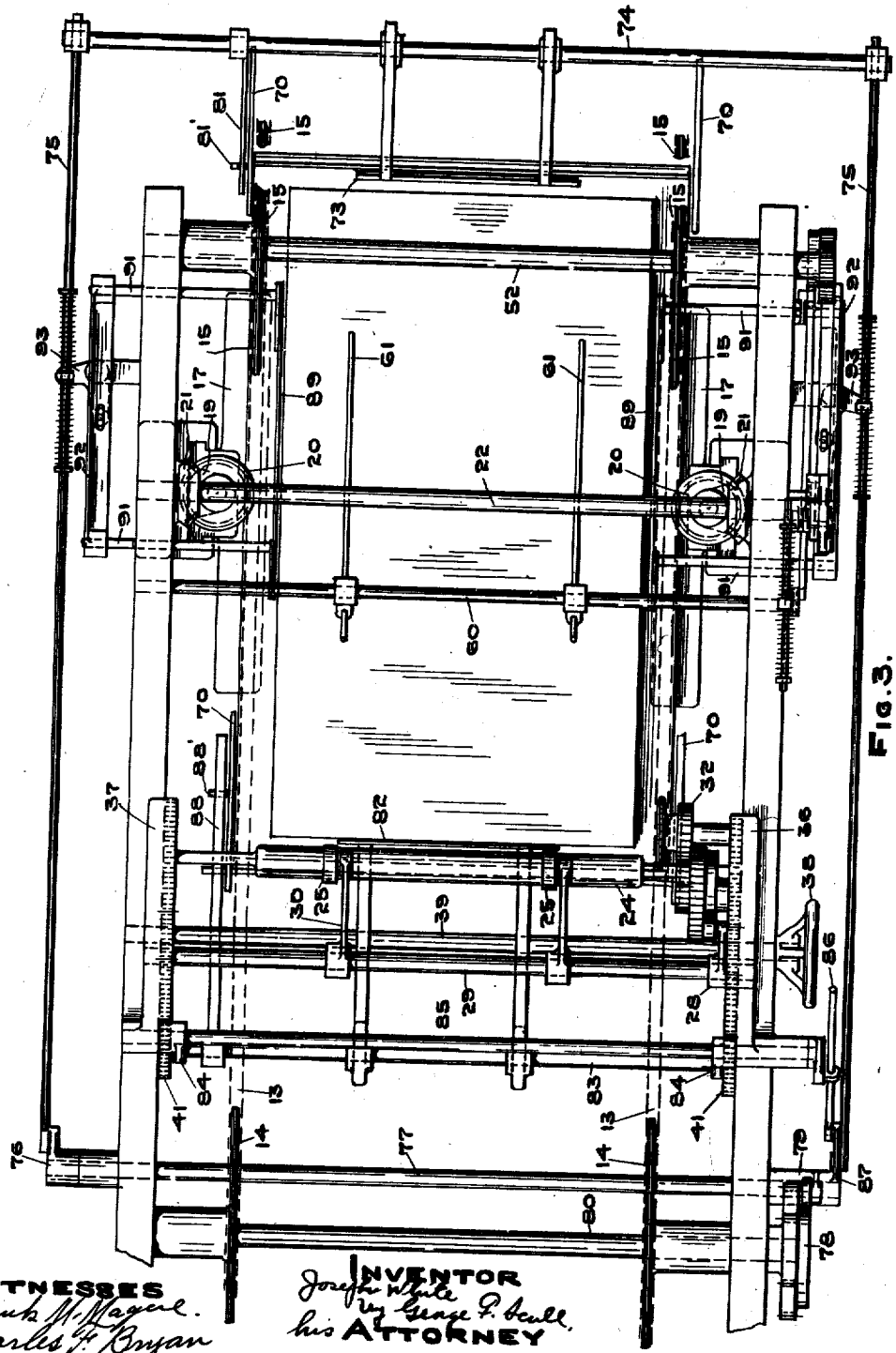


FIG. 3.

WITNESSES

Frank M. Magee.

Charles F. Bryan

INVENTOR

Joseph White

by George P. Scull.

his ATTORNEY

J. WHITE.

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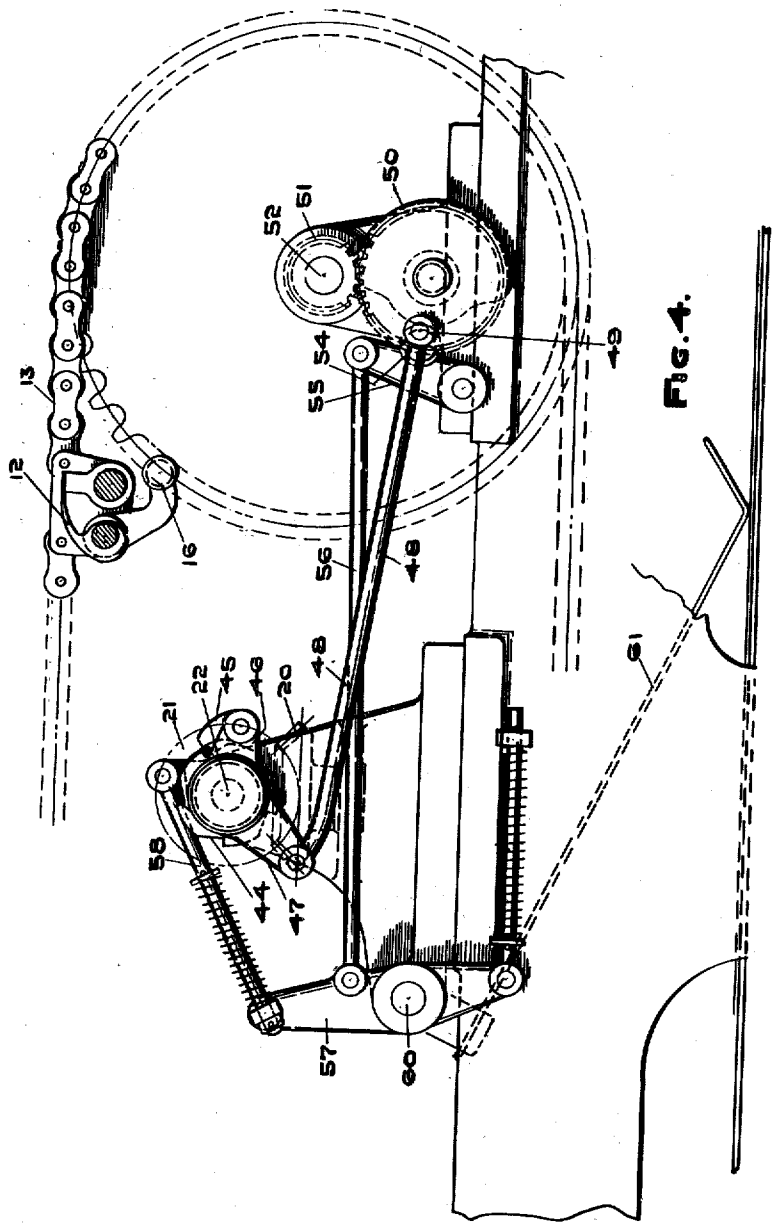


Fig. 4.

WITNESSES

Frank M. Magee.

Charles F. Bryan

INVENTOR

Joseph White.

By George P. Scull,

His ATTORNEY

J. WHITE.

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7 SHEETS—SHEET 5.

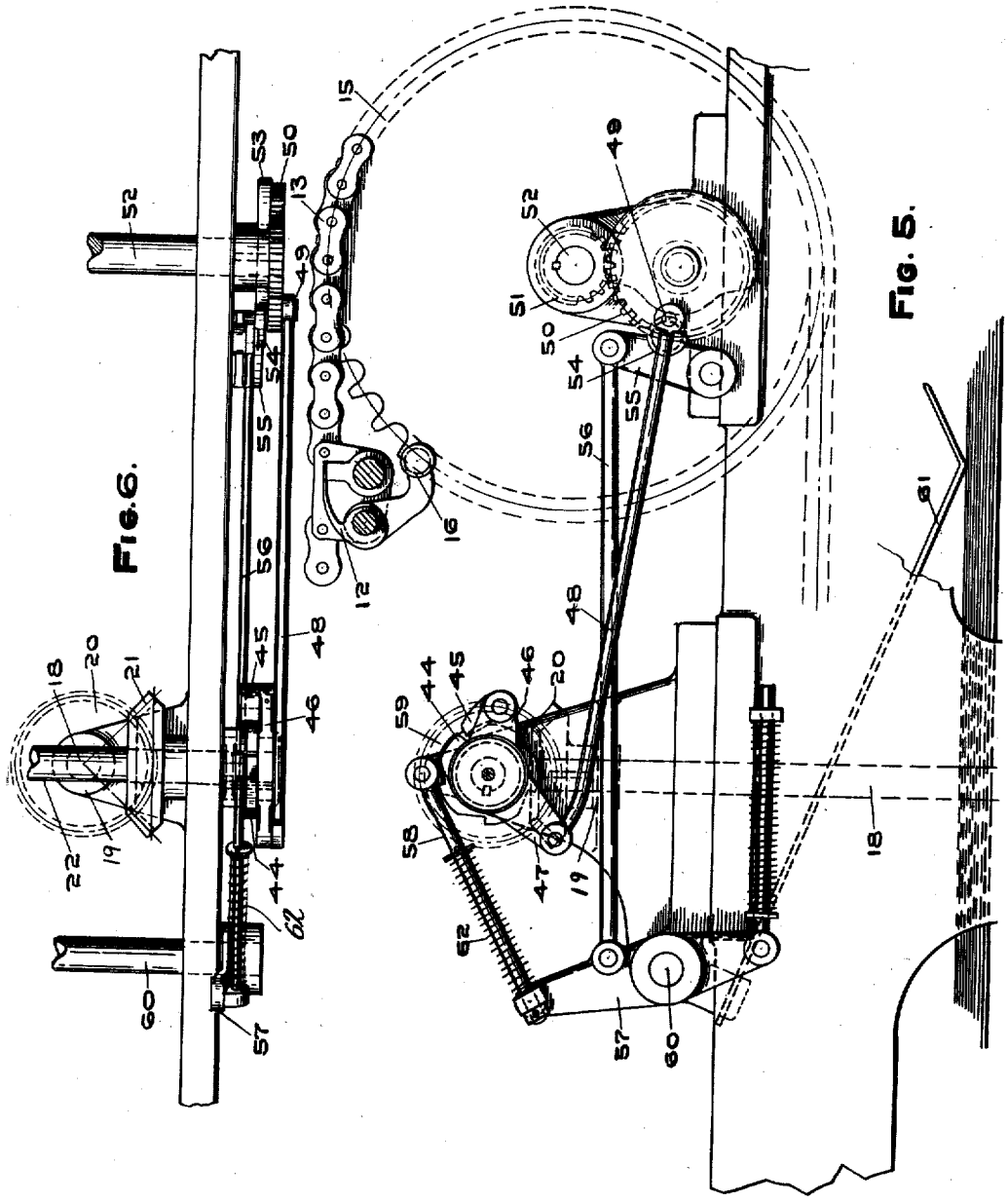


FIG. 6.

FIG. 5.

WITNESSES

Frank Mazur.

Charles F. Bryan

INVENTOR

Joseph White,

by George P. Beall,

his ATTORNEY

J. WHITE.

SHEET DELIVERY MECHANISM.

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1,211,512.

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7 SHEETS—SHEET 6.

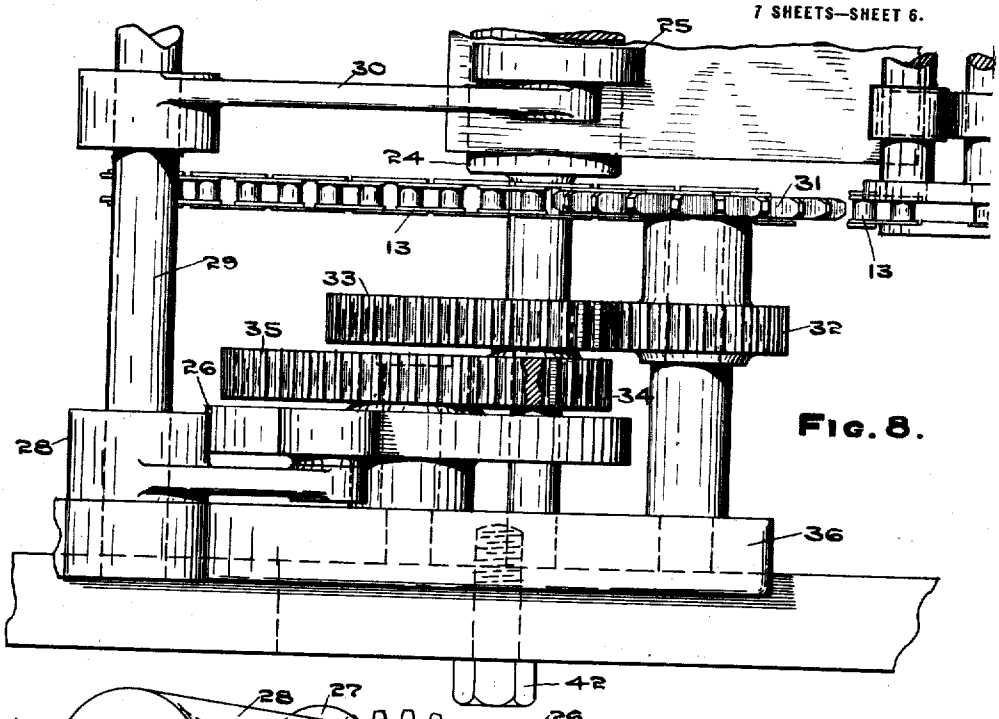


FIG. 8.

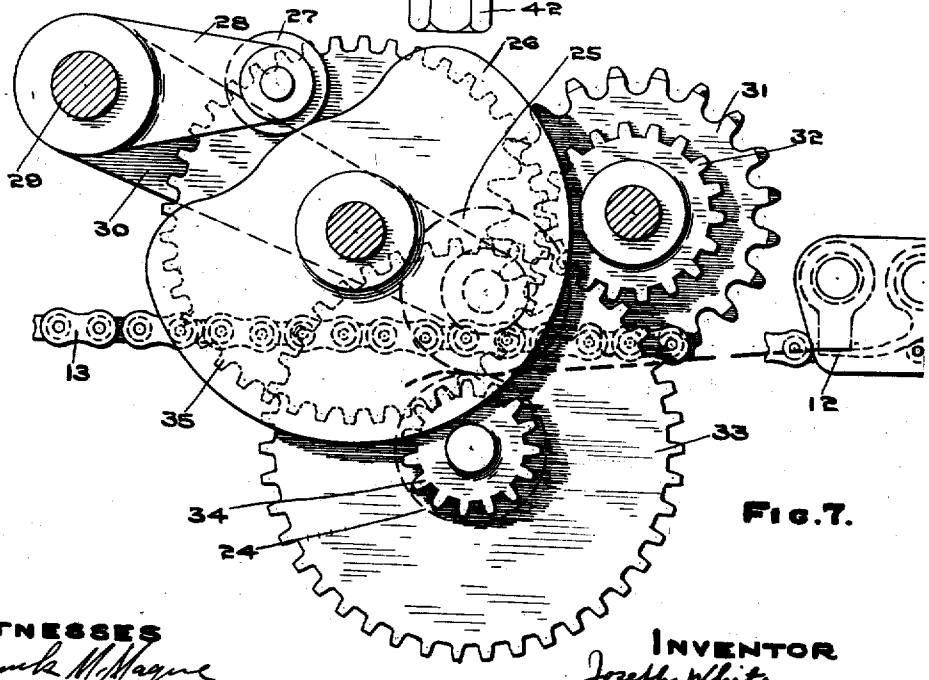


FIG. 7.

WITNESSES

Frank M. Magee

Charles F. Bryan

INVENTOR

Joseph White,

by George P. Sell,

his ATTORNEY

J. WHITE.

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APPLICATION FILED OCT. 19, 1912.

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7 SHEETS—SHEET 7.

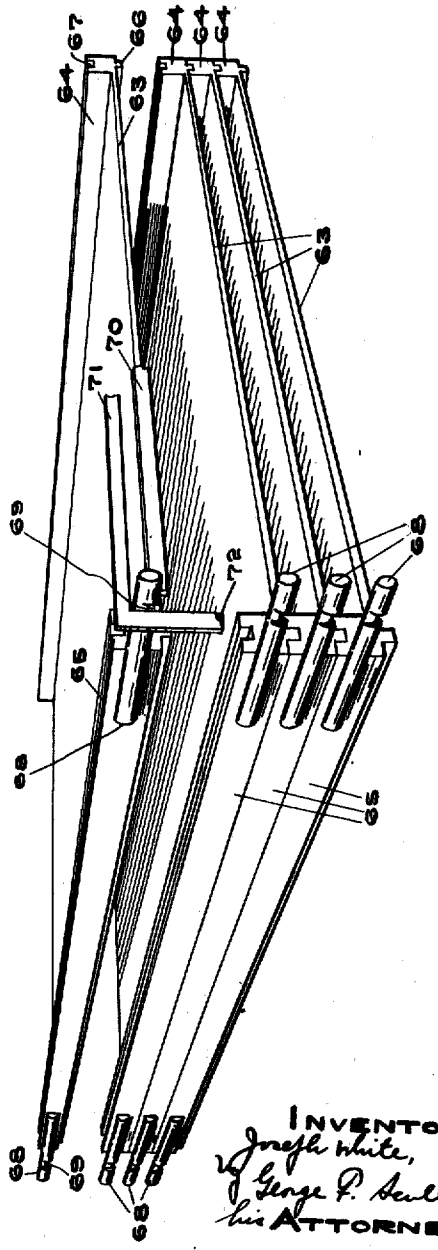


Fig.9.

WITNESSES

Frank W. Hague.

Charles F. Bryan

INVENTOR

Joseph White,

by George P. Sell,

his ATTORNEY

UNITED STATES PATENT OFFICE.

JOSEPH WHITE, OF PISCATAWAY TOWNSHIP, NEW JERSEY, ASSIGNOR TO HALL PRINTING PRESS COMPANY, OF DUNELLEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SHEET-DELIVERY MECHANISM.

1,211,512. Specification of Letters Patent. Patented Jan. 9, 1917.

Application filed October 19, 1912. Serial No. 726,593.

To all whom it may concern:

Be it known that I, JOSEPH WHITE, a citizen of the United States, residing in Piscataway township, (post-office address Bound Brook, New Jersey,) State of New Jersey, have invented certain new and useful Improvements in Sheet-Delivery Mechanism; and I do declare the following to be a full, true, and exact description of the said invention, such as will enable others skilled in the art to which it appertains to make use of the same.

This invention relates to improvements in means for delivering sheets from printing presses and other similar machines, and particularly from such machines which are delivering sheets at a high rate of speed and in rapid succession.

It also relates to improvements in sheet piling mechanism to be used in connection with such delivery mechanisms.

One of the objects of my invention is to provide a simple, efficient and continuously acting delivery mechanism by which sheets may be carried from a printing press or other like machine to a delivery pile, and to arrange such mechanism so that it may be readily adjusted for various sized sheets.

Another object of my invention is to provide a device by which the distance between the top of the pile and the delivery mechanism is maintained substantially constant, this being accomplished, preferably, by mechanism which contacts with the top of the pile.

Another object of my invention is to provide a plurality of sheet delivering trays and supports therefor of such construction that an empty tray may be inserted above a filled tray without undue exertion on the part of the operator, and without interfering in any way with the operation of the delivery mechanism.

Another object of my invention is to provide sheet joggers which will operate to jog sheets as delivered, either to a delivery support or to trays placed on such support, and which will be arranged so that they will not interfere with the insertion of any empty tray, as above described.

With these and other objects in view, my invention consists of certain novel features of construction and arrangement of parts as will be more fully described and pointed out in the appended claims.

In the drawings, Figure 1 is a more or less diagrammatic view of my delivery mechanism as applied to a form of printing press, it being understood that the delivery mechanism and the trays shown are preferred forms only. Fig. 2 is an enlarged side elevation of a portion of Fig. 1, showing the details of the delivery mechanism in my preferred forms. Fig. 3 is a plan view of Fig. 2. Fig. 4 is an enlarged side elevation of a portion of my preferred form of delivery mechanism, showing particularly the device to control the lowering of the delivery pile support, the parts being shown in the position they would occupy immediately after the pile has been lowered. Fig. 5 is the same as Fig. 4, except that the parts are shown in the position which they would occupy just before the pile is lowered. Fig. 6 is a partial plan view of the mechanism shown in Figs. 4 and 5. Fig. 7 is a side elevation of a portion of my delivery mechanism, showing particularly the retarding rollers and the means for operating them. Fig. 8 is a plan view of Fig. 7. Fig. 9 is a perspective view showing my preferred form of delivery tray and a portion of the support therefor.

The corresponding parts are numbered both in the drawings and the following description by similar reference characters.

Referring now to Fig. 1, 10 is the plate cylinder and 11 the impression cylinder of a printing press which I have chosen for purposes of illustration. Adjacent to the impression cylinder 11 and traveling in a path to receive a sheet therefrom after it has been printed, is arranged a set of sheet grippers 12, these grippers being mounted on bars suspended on a pair of parallel traveling chains 13 mounted on sprockets 14—15. The closing and opening of the grippers 12 is controlled by a cam roller 16 operating on suitable fixed cams in a well-known manner to close the grippers as a sheet passes from the cylinder 11 to the grippers 12 and to open them as the grippers 12 are about to move around the sprocket wheel 15, to allow the sheet to drop on the sheet support. This sheet support, in my preferred form, consists of platforms 17, each mounted as a nut on vertical screw rods 18, which are rotatably mounted in brackets 19 on either side of the delivery device. Each of the rods 18 is provided at its upper end with a gear

wheel 20, with which meshes a gear wheel 21 attached to a cross shaft 22, so that, when the shaft 22 is turned, the screws 18 are also turned, thus raising or lowering the platforms 17. The platforms 17 are provided with a delivery board 23 mounted thereon upon which the sheets may drop directly, or as will be explained more fully hereafter, on which the trays, into which the sheets may be dropped may be placed.

Referring now to Figs. 2 and 7, 24 is a roller extending between the frames of the machine in such a position that the sheet in the grippers 12 will be carried across the top thereof as the sheet is being drawn away from the cylinder 11. Above the roller 24 is provided one or more rollers 25 which may be moved into and out of contact with the roller 24 by a cam 26 acting on a roller 27 mounted on a lever 28 which, in turn, is connected to a shaft 29, to which the arm 30 carrying the roller 25, is also attached. In Fig. 2, the roller 27 is shown in its raised position, and in this position the grippers 12 and their accompanying mechanism, may be passed between the rollers 24 and 25. As the chains 13 are in motion, at a constant speed, it will be understood that when the grippers 12 open to allow the sheet to drop to the delivery board, the sheet will have a certain inertia which will make its point of stoppage very uncertain. Moreover, if permitted to drop in this manner, the sheet will be full of wrinkles extending across the machine, thus preventing the even piling up of the sheets. To overcome these difficulties, I provide the mechanism shown in Fig. 7 and arrange it so that, after the grippers 12 have passed between the rollers 24 and 25 and before the tail of the sheet has passed between these rollers, the roller 25 is dropped into contact with the roller 24, thus holding the sheet yieldingly between these rollers. The roller 24 is driven at a very much slower speed than the surface speed of the chains 13 of the grippers 12 and the contact of the tail of the sheet with the rollers 24 and 25 tends to retard it to draw the sheet taut between these rollers and the grippers 12. The rollers 24 and 25 are positioned so that they still retain control of the sheet when the grippers 12 open and their continued motion serves to feed out the sheet at a very slow rate, and to deliver it flat to the delivery board. The roller 24 is driven from the chain 13 through a sprocket 31 engaging therewith, this sprocket having fastened to it a gear 32 meshing with a gear 33 fastened to the roller 24. The cam 26 is driven by a gear 34, fastened to the roller 24, and meshing with a gear 35 on the stub shaft upon which is mounted the cam 26. These various shafts, gears and rollers are all mounted in a pair of brackets 36—37, on opposite sides of the delivery mechanism, these brackets being slidably mounted on the frame of such mechanism so that they may be moved horizontally thereon. Such motion is given by the hand wheel 38 mounted on a shaft 39 mounted in bearings on the side frames of the delivery mechanism, and carrying a gear 40 on either end thereof, meshing with portions 41 of the brackets 36—37, which have gear teeth cut on them. It will be seen that by turning wheel 38, the brackets 36—37 are moved horizontally, being limited in such motion by bolts 42 attached to the brackets 36—37, and projecting through slots 43 in the side frames of the delivery mechanism. After the brackets 36—37 are adjusted, the tightening of the bolts 42 serves to hold the brackets in position. By this arrangement, the rollers 24—25 may be shifted to bring them in correct relation with the tail of the sheet at the time the grippers 12 open, regardless of the length of the sheet. It will be understood that in devices of this character, provision must be made to operate on sheets of different lengths and widths at different times. In order to insure the delivery of sheets to the pile, it is preferable that each sheet, in falling, will have the same conditions surrounding it as every other sheet. It will also be understood that this would not be the case if the pile was allowed to increase so that the distance which a sheet would fall at the beginning of the operation would be considerably greater than that of a sheet delivered at a later time. To make this condition as nearly uniform as may be desired, I provide mechanism by which the top of the delivery pile may be maintained automatically at a substantially constant level at all times, regardless of the number of sheets which have been delivered to such pile or the relative thickness of such sheets. For this purpose, I provide the mechanism shown particularly in Figs. 4 and 5, in which 44 is a ratchet wheel attached to the shaft 22 and arranged to be engaged by a pawl 45 mounted on an arm 46 to which is fastened the arm 47, connected through the rod 48 with a crank pin 49 on a gear 50. This gear receives its motion from a gear 51 attached to a shaft 52, receiving its motion from the sprocket wheel 15. The gear 50 has attached to it a cam 53 engaging a roller 54 on a lever 55, one end of which is connected through the connection 56 with a lever 57. The lever 57, through a spring connection 58, is connected to an arm of a ratchet guard 59, arranged alongside of the ratchet 44. The lever 57 is attached to a shaft 60 extending across the machine and to this shaft are attached one or more detector arms 61.

The operation of the mechanism shown in Figs. 4 and 5 is as follows: The cam 53 is so shaped that the detector arms 61 are held above the plane of the gripper fingers 12 to allow the latter to pass and are allowed to

drop on the top of the delivery pile after the grippers have passed and the sheet deposited. As will be seen by an inspection of Figs. 4 and 5, as the height of the pile increases as successive sheets are dropped thereon, the detector arms 61 drop a less and less distance, thus gradually shifting the position of the guard 59 when the detectors 61 are resting on top of the pile. The cam 53 is shaped and arranged so that the arms 61 are always raised to the same height, while leaving the detectors 61 free to fall as far as they are permitted by the pile. It will be understood that the pawl 45 is being carried back and forth above the tops of the teeth of the ratchet 44, but normally is prevented from engaging therewith by the guard 59. When, however, the pile is so increased in height that the arms 61 cannot fall far enough to cause the guard 59 to keep the pawl from one of the ratchet teeth, the pawl drops into the ratchet tooth and turns the ratchet, together with the guard, as it is shown as beginning to do in Fig. 5. This turning of the ratchet turns the shaft 22 to which it is connected, and, through the gearing shown, the lowering screws 18, thus dropping the delivery board 23 to bring the height of the pile to the position shown in Fig. 4. After this, the sheets accumulate again until the condition shown in Fig. 5 is again reached, when the operation is repeated. It will be understood that the cam 53 is so shaped that after the pawl 45 engages with the ratchet 44, the guard 59 will be thrust under the pawl on the return stroke of the latter to prevent its engagement with the next tooth of the ratchet. The spring 62 is mounted on the connection 58 to provide for any inequalities of motion between the pawl 45 and the levers 57, because of the different motions transmitted thereto by the crank pin 49 and the cam 53, respectively.

Instead of piling the sheets directly on the delivery board 23, it is sometimes preferable, in order to relieve the pressure on the sheets and to permit them to dry more readily, to provide a series of trays to receive a small quantity of the sheets and to support such small quantity free from the pressure of the sheets subsequently delivered. If the sheets are being delivered very slowly, and not in close succession, it might be possible for an operator to place an empty tray over a filled one without stopping the operation of the machine. In machines of certain kinds, however, particularly of the kind which I have illustrated, the sheets are passing to the delivery board in rapid succession, and the operator has not sufficient time, unless special means are provided, to enable him to insert the empty tray, without interfering with the operation of the delivery mechanism. Moreover, these trays are frequently of very large size, and are positioned so that the operator does not have ready control of them. In the mechanism which I have provided, an operator may, with a minimum amount of effort and time, insert an empty tray after the previous one has been filled.

In my preferred form, I provide trays of the form shown particularly in Fig. 9, in which 63 is the bottom board. This may be made up, as shown, of a single piece, or of a plurality of strips, as preferred. 64 and 65 are end members projecting above the surface of the bottom 63. Each of the members 64—65 is provided with a tongue member 66 and a groove 67, so that a number of these trays may be nested together as shown in Fig. 9. Each of the trays is provided on either side at its front end with a projecting member 68 having a groove 69 formed therein. On either side of the delivery mechanism is mounted a horizontal support 70, which is positioned so as to engage with the members 68 of the trays, the grooves 69 in contact with the member 70 forming guiding means for the trays. Above the support 70 is mounted a guard member 71 which terminates at 72 in a downwardly extending stop portion.

Assuming that the parts are in the position shown in Fig. 2, the delivery board 23 will gradually be lowered as the sheets accumulate in the topmost tray on the support until such tray is filled, when it will have been lowered sufficiently to permit the insertion of a new tray. The operator will then place the members 68—68 of an empty tray on the supports 70—70, and push it into place, the operator supporting the rear end of the tray and the free end being carried above the topmost tray on the board 23, as the members 68 move along the supports 70, until they contact with the stop member 72. The empty tray is now in a position to be dropped so that its tongue member 66 will engage with the grooves 67 of the tray below it, and the stop 72 is positioned so that this will result. As will be seen, the insertion of such a tray is a very simple matter and one which may be done very quickly by the operator, but without any great care on his part, the empty tray being guided accurately to its proper place. After the empty tray is in place, the sheets will drop into it, the pile being gradually lowered through the contact of the detector arms 61 with the top of the pile. Instead of having the arms 61 operate directly on the sheet pile, it may be desirable to position them so that they will contact with the bottom of the tray 63, at the sides of the pile. When so arranged, the insertion of an empty tray will cause the screws 18 to be turned very rapidly until the bottom 63 of the empty tray is in the same position that the bottom of the preceding tray was when the empty tray was inserted. The screws 18 will then

remain motionless until another tray is inserted. In order to jog the sheets on the delivery board 23, or on the trays, if the latter are in use, I provide a front jogger 73 supported on a shaft 74 mounted in turn on a pair of parallel rods 75, each attached at one end to a lever 76 attached to a shaft 77 extending across the delivery mechanism, and oscillated by a cam 78 through a cam roller 79, the cam 78 being rotated through gearing connected to the shaft 80 on which are mounted the sprockets 14. The shaft 74 is provided with an arm 81 which is shaped in such a manner that when a tray is inserted, a portion of the tray, preferably one of the projecting members 68, will contact therewith to lift the jogger 73 high enough to permit the member 65 of the tray to pass the blade 73. I also provide a rear or back jogger 82 mounted on a shaft 83. This shaft 83 is rotatably mounted in arms 84 attached to a shaft 85 extending across the delivery mechanism and mounted in the brackets 36—37. The shaft 85 is connected through a connecting rod 86 and an arm 87 with the lever 76, so as to partake of the motion thereof. To the shaft 83 is attached an arm 88 arranged to engage with a portion of the tray, preferably one of the projections 68, when the tray is being inserted. This contact acts on the cam-like portion of the member 88 to rotate the lever 83, and thus raise the back jogger 82 to permit the member 65 of the tray being inserted, to pass it. As soon as the member 68 is out of contact with the arm 88, the jogger falls by gravity until it rests on the bottom of the tray. A stop pin 88′ may be provided to limit the downward motion of the arm 88, and similarly, a pin 81′ may be used to limit the motion of the arm 81 of the front jogger. In order to jog the sheet laterally, I provide the blades 89 which are mounted on parallel links 90 attached to rods 91 projecting through the side frames of the delivery mechanism, so as to be guided thereby. At the opposite ends and outside of the delivery mechanism frames, I connect the rods 91 by a yoke 92 which, through a pin and slot arrangement, is connected to a lever 93 having a spring connection with the rod 75. A reciprocation of the rod 75 by the cam 78 will cause the levers 93 to turn to move the yoke 92 and with it the pins 91 back and forth laterally of the delivery pile, to cause the blades 89 to jog the sheets as they fall thereon. By mounting the blades 89 on the parallel links 90 in the manner shown, particularly in Fig. 2, it will be seen that the insertion of a new tray will cause the blades to be swung upward until the member 65 of the incoming tray is past the blades when they will drop by gravity until they contact with the bottom of the tray. The spring connections between the rod 78 and the levers 93 permit the front jogger to be moved after the side jogger has been pushed against the delivery pile. It is obvious that these side joggers could be arranged to be moved out of the way of the incoming tray by mechanism contacting with the projections 68 or other part of the tray in a manner similar to that in which the front and back joggers are moved out of the way. I find, however, that the arrangement shown is sufficient for the purpose.

While I have described the joggers particularly in their operation in connection with trays, it will be seen that the arrangements which I have provided will be useful when no trays are used, the joggers being mounted so as to compensate for varying heights of the board 23 without any disturbance of their operating mechanism.

While I have shown a simple, efficient, and preferred form of my invention, it will be understood, that there may be many modifications in the device illustrated all of which fall within the scope of my invention. Many other forms of support for the delivery board other than the screws 18 may be provided, and the mechanism for lowering it may be widely varied.

Many of the features of my device may be used with or without other features, as will be readily understood by those skilled in the art. A delivery mechanism of any of the well-known types in which the sheets are delivered by a reciprocating carriage may be used, instead of the continuous delivery which I have illustrated. It will also be understood that while I have described the members 61 as sheet detectors, they also will assist in delivering the sheets by pressing the sheet down on the pile when the delivery grippers let go of it. Only one of these detectors may be used. It will also be understood that the form of my trays and the means by which they interlock with one another to form a pile may be widely varied.

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

1. A delivery pile support, a sheet carrier constructed and arranged to pass across said support to deposit sheets thereon and automatic means, including a member contacting with the top of the pile, to maintain the top of the pile at a predetermined level as sheets are deposited thereon, and means to move said member to permit sheets to be deposited on the pile.

2. A delivery pile support, a sheet carrier constructed and arranged to pass across said support to deposit sheets thereon and automatic means, including a member contacting with the top of the pile, to maintain the top of the pile at a predetermined level as sheets are deposited thereon, and means to

move said member to permit said carrier to pass.

3. A delivery pile support, trays adapted to be placed one by one on said support, a member adapted to contact with the topmost of said trays on said support, means to move said member into and out of contact with said topmost tray, and automatic means, controlled by said member, and arranged to be thrown into operation when an additional tray is placed on said support, to lower said support the thickness of the tray.

4. A delivery pile support, trays adapted to be placed one by one on said support, means to deliver sheets to the topmost of said trays, a member adapted to contact with the topmost of said trays on said support, means to move said member into and out of contact with said topmost tray after each sheet is delivered thereto, and lowering means for said support, arranged to be thrown into operation when an additional tray is placed on said support.

5. A delivery pile support, means to deliver sheets thereto from one side thereof, and a plurality of trays adapted to be placed one by one on said support, means to support and guide a tray into place on said support, and means constructed and arranged to permit said trays to be inserted from a side other than that from which the sheets are delivered to said support, and made operative by the placing of a tray on said support to lower said support.

6. A delivery pile support, a plurality of trays adapted to be placed one by one on said support, means to support and guide a tray into place on said support and adapted to hold the tray being moved into place, out of contact with said support or tray thereon, and means made operative by the placing of a tray on said support to lower said support.

7. A delivery pile support, a plurality of trays adapted to be placed one by one on said support, means to support and guide a tray into place on said support, a member adapted to contact with the topmost tray on said support, automatic means to lift said member away from said support, and means, controlled by said member, to lower said support when an additional tray is placed thereon.

8. A delivery pile support, a plurality of trays adapted to be placed one by one on said support, means to support and guide a tray into place on said support, adapted to hold the tray being moved into place, out of contact with said support or tray thereon, a member adapted to contact with the topmost tray on said support, and means controlled by said member, to lower said support when an additional tray is placed thereon.

9. A delivery pile support, a tray adapted to be placed thereon, a sheet jogger arranged to jog sheets on said support or on said tray when on said support, said jogger being constructed and arranged to be moved automatically to adjust its position so as to be brought into contact with the sheet supporting portion of said tray when the tray is placed on said support.

10. A delivery pile table, a sheet jogger arranged to jog sheets on said table, means to move said jogger, means to raise and lower said table, said jogger being constructed and arranged to maintain contact between it and said table as the latter is raised or lowered, and to maintain connection with said moving means.

11. A sheet jogger blade freely movable vertically, means immovable vertically, constructed and arranged to support and move said blade horizontally, and connections between said blade and said supporting means, constructed and arranged to permit said blade to be moved vertically while connected to said means.

12. A sheet jogger blade, a horizontally movable member and a link pivotally connecting said member and said blade and arranged to permit said blade to swing freely through a considerable arc in a plane at right angles to the direction of motion of said horizontally movable member.

13. A sheet jogger blade, horizontally movable mechanism, and a pair of parallel links pivotally connecting said blade and said mechanism and arranged to permit said blade to swing freely through a considerable arc in a plane at right angles to the direction of motion of said horizontally movable mechanism.

14. A delivery pile support, a tray adapted to be placed thereon, a sheet jogger adapted to jog sheets on said support and constructed and arranged to be moved by the placing of said tray on said support and to move into coöperative relation with said tray after the latter is in place.

15. A delivery pile support, a tray having an end member higher than its bottom member and adapted to be placed on said support, a sheet jogger blade above said support and independent thereof and means to support and move said blade, constructed and arranged to permit said blade to be moved out of the path of said end member when said tray is placed on said support and to permit said blade to move into contact with said bottom member after said end member has passed.

16. A delivery pile support, a tray adapted to be moved horizontally across said support into place thereon, means to support said tray out of contact with said pile support as said tray is being moved into place, a sheet jogger above said pile support, constructed and arranged to be moved out of the

path of said tray as it is being moved into position and to jog sheets thereon after said tray is in place.

17. A delivery pile support, a tray adapted to be moved horizontally across said support into place thereon, means to support said tray out of contact with said pile support as said tray is being moved into place, an end sheet jogger above said pile support and means arranged to be moved by said tray as it is being moved into place, to move said jogger out of the path of said tray, said jogger being constructed and arranged so as to permit it to move into position to jog sheets on said tray after the latter is in place.

18. A delivery pile support, a tray adapted to be moved horizontally across said support into place thereon, means to support said tray out of contact with said pile support as said tray is being moved into place, a sheet side jogger and a sheet end jogger each above said pile support and each constructed and arranged to be moved out of the path of said tray as it is being moved into place and to move into position to jog sheets thereon after said tray is in place.

19. A delivery pile table, a jogger adapted to jog sheets thereon, sheet retarding means and a carriage movable horizontally above said table and carrying said jogger and said sheet retarding means.

20. A continuously moving sheet carrier, sheet retarding means, mechanism engaged with and driven by said carrier for operating said retarding means and a movable support for said retarding means, adapted and arranged to be movable along the path of said carrier while engaged with said carrier.

21. A carrier, including a continuously moving member, sheet retarding means and mechanism engaged with and driven by said member for operating said retarding means.

22. A plurality of delivery trays adapted to be placed one upon another and supporting and guiding means arranged to permit one of said trays to be moved horizontally above another of said trays and out of contact therewith and to be dropped into contact with the other tray only when in proper vertical relation thereto.

23. A plurality of delivery trays, each composed of a bottom member and a member at each end projecting above said bottom member and means to guide and support one end of one of said trays as it is being moved horizontally above another of said trays, and out of contact therewith, said support being constructed and arranged to permit the tray being moved to drop when its end members are over the end members of the other tray.

24. A plurality of delivery trays adapted to be placed one upon another and each having engaging members adapted to engage with another of said trays and means to support and guide one of said trays as it is being moved horizontally into its place on top of another, said means being arranged to prevent said engaging means contacting with the other tray until the moving tray is in correct position above the other tray.

25. A plurality of delivery trays adapted to be placed one upon another and each having engaging members adapted to engage with another of said trays and guiding and supporting means arranged to permit one of said trays to be moved horizontally above another of said trays with said engaging member out of contact with the other tray and to be dropped into contact with the other tray and said engaging member brought into operative position therewith, only when the tray is in proper vertical relation with the other tray.

JOSEPH WHITE.

Witnesses:
FRANK M. MAGUE,
CHARLES F. BRYAN.