Dec. 14, 1926. 1,610,662

G. DE PAMPHILIS

SLIP SHEETER AND DRIER

Filed Dec. 1, 1925

Fig. 1

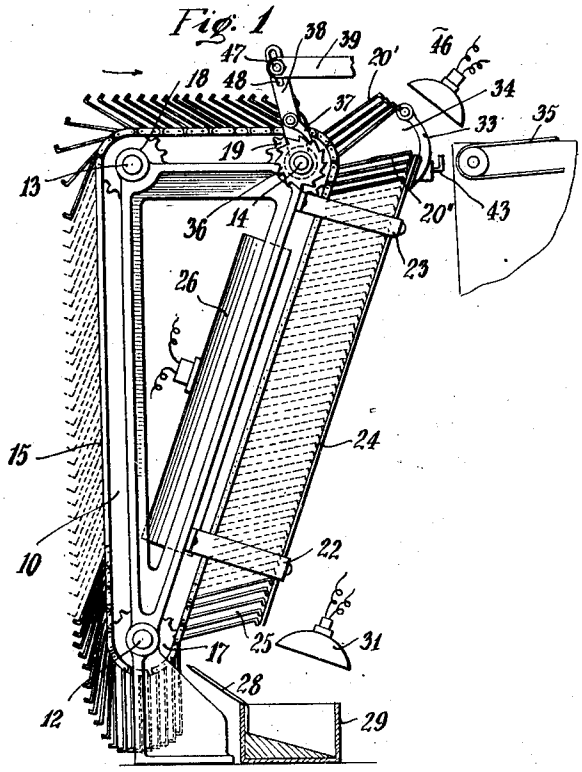


Fig. 2

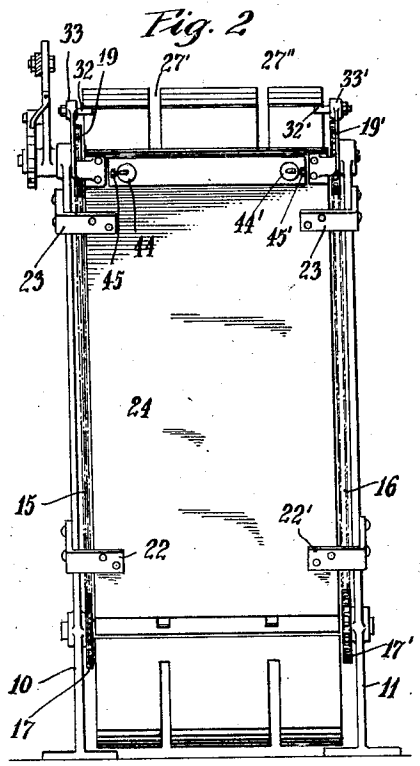


Fig. 3

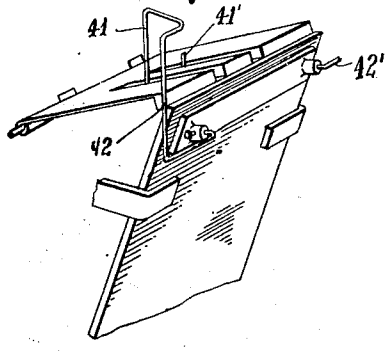
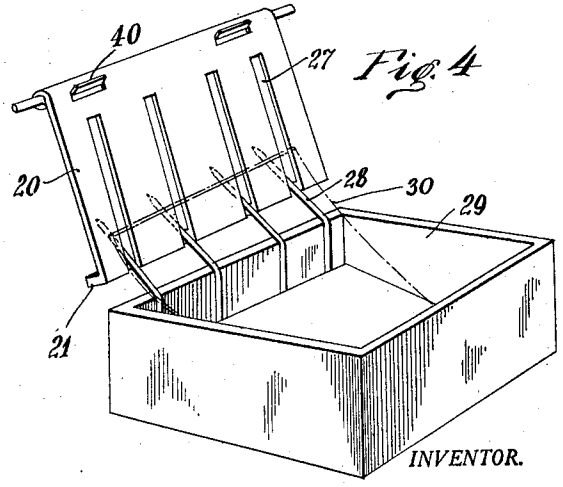


Fig. 4



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Patented Dec. 14, 1926. 1,610,662

UNITED STATES PATENT OFFICE.

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SLIP SHEETER AND DRIER.

Application filed December 1, 1925. Serial No. 72,472.

This invention relates to devices for handling printed sheets as they come off the printing press, and more particularly relates to a novel and improved device adapted to receive and dry sheets one by one and then deliver them into a suitable receptacle in a proper sequence after drying.

The primary object of this invention is to provide a novel and improved machine adapted to be made in the form of an attachment to a printing press or in the form of a separate portable appliance adapted to serve any one of a number of printing presses, whereby the labor now required for separating and drying sheets as they come off the printing press may be performed automatically at practically no cost.

Another object of this invention is to provide a novel and improved conveyor adapted to be used in connection with printing presses, said conveyor comprising a plurality of cardboard trays or receivers and being adapted to be associated with a printing press served thereby so as to cause the operation of said conveyor to be timed in accordance with the operation of the printing press to receive dry and deliver printed sheets as produced by the press.

With these and other objects in view as will more fully appear as the description proceeds, this invention, furthermore, comprises certain novel constructions and arrangements of parts, as will be hereinafter fully described and claimed in the appended claims.

In producing printed sheets of any description, it is customary to carefully separate the sheets from one another as they come off the printing press until the ink is dry, to prevent marring or blurring of the printing on one sheet by another. This operation calls for considerable expenditure of time and labor because the sheets must be handled very carefully and therefore, the full time of a boy is usually required to keep pace with the production of a single press.

In the case of numbered blanks the work of the boy is further complicated by the necessity of keeping the blanks in proper sequence before they are sent to the binder; and all the work entailed by these various operations naturally reflects upon the price of the ultimate product and also limits the capacity of production of a printing establishment as a whole.

The present invention has for its object to perform these various operations automatically by associating a suitable handling mechanism with the printing press, thereby decreasing the cost of production and also increasing productive capacity by handling the work more expeditiously than the present method permits. To these advantages must be added the reliable operation of the device which automatically insures the proper sequence of delivery, avoiding all possibility of mistakes in this direction. In the drawings, I illustrate an embodiment of my invention, and in the same

Fig. 1 is a side view in elevation of my device in the form of a printing press attachment;

Fig. 2 is a front view in elevation of the same;

Fig. 3, is a detail view in perspective on an enlarged scale of the loading end of the device; and

Fig. 4 is a detail view in perspective on an enlarged scale of the delivery end of the device.

In the embodiment illustrated, the device comprises a frame consisting of two uprights 10, 11, and three shafts 12, 13, 14, extending between the two uprights and rotatably mounted on said uprights. Said three shafts are preferably arranged to correspond to the apexes of an inverted elongated triangle having its front side downwardly inclined from front to rear.

Said shafts are used to support, guide and operate a continuous conveyor comprising two side flexible elements or chains 15, 16, running over sprocket wheels 17, 18, 19 and sprocket wheels 17′, another sprocket wheel corresponding to wheel 18 and another sprocket wheel 19′ mounted on said shafts. Between said chains or carriers and pivotally attached thereto, are provided a plurality of evenly spaced sheet receivers such as 20, for the entire length of the carriers. Said receivers are free to swing a certain angle around their pivots, and their direction outwardly from the carriers is controlled by gravity throughout the travel of said carriers. The carriers are arranged to travel by a step by step motion in a clockwise direction with reference to Fig. 1 as indicated by the arrow; and the receivers 20 are so mounted with respect to the chains or carriers that from the vertical hanging down

position which they assume at the point where the chains or carriers pass over lower sprocket wheels 17, 17′, they come to assume a rearwardly inclined direction from the carriers during the upward stretch of travel from the sprocket wheels 17, 17′ to sprocket wheels 18, and during the horizontal stretch of travel from sprocket wheels 18, to sprocket wheels 19, 19′.

In passing over sprocket wheels 19, 19′, however, the carriers or chains are directed downwardly, forcing the inclination of the receivers to gradually change in relation to the vertical. During this gradual change, the receivers will eventually reach a vertical position and beyond, and once the vertical position has thus been passed, each receiver is caused to fall or swing towards the front around its pivot, due to gravity.

As previously stated, said receivers are evenly spaced and distributed along the entire length of the chains or carriers; their length extends from one side of the frame to the other and their width or depth is such as may be necessary to receive the largest sheet produced by the printing press to which the device is attached. Said receivers are preferably made of pieces of sheet metal or cardboard, having their outer edge bent in the sense of the direction of travel to reach the back of the adjoining receiver; the outer edge of the receivers is preferably bent at right angle to form an outer short leg 21, the width of which is substantially equivalent to the distance between pivotal attachments of adjoining receivers.

To the front part of the frame is attached, by means of brackets 22, 22′, 23, 23′, a plate 24, running almost from front to bottom parallel to the stretch of chains or carriers extending between sprockets 19, 19′ and sprockets 17, 17′, but at a distance from said chains or carriers, somewhat smaller than the width of the receivers attached to said chains or carriers. The result of this arrangement, as shown in Fig. 1, is that during the downward stretch of travel of the chains or carriers from sprockets 19, 19′ to sprockets 17, 17′, and for the entire length of plate 24, the receivers are prevented from falling to their natural hanging down vertical position which they assume due to gravity when free to do so. On the other hand, the inner surface of plate 24 serves as a guiding and supporting surface for the outer edge of the receivers during their downward travel, causing said receivers to remain slightly inclined downwardly from front to rear during this portion of their travel. Therefore, during their downward travel the receivers are forced to form what is equivalent to a rack comprising a plurality of trays downwardly inclined towards the chains, said trays being spaced from each other due to the bent over edges 21, and forming shallow intermediate chambers or receptacles 25 within which printed sheets may be inserted and retained.

The printed sheets thus supported by each tray are protected from contact with the surface of adjoining trays, due to the spacing arrangement thus obtained and are safely conveyed from the upper to the lower part of the device up to the point when they are delivered to a suitable receptacle; during the interval the sheets can be dried by directing against them the heat obtained by some suitable source, for instance, by means of an electric heating unit 26, extending behind the trays or receivers and close to said trays or receivers between shaft 14 and shaft 12. When each tray reaches the end of its travel delimited by plate 24, the sheet carried thereby has thus become thoroughly dry and may safely be deposited on top of other sheets previously delivered by the device. The delivery or discharge of the sheets is obtained by gravity due to the fact that as each tray or receiver reaches beyond the lower edge of plate 24, it becomes free to swing downwardly as shown in Fig. 1. The trays are formed with a plurality of transversal slots 27 extending from their outer edge towards their attaching side, said slots being spaced to correspond with fingers or strippers 28 which are upwardly inclined towards the chains or carriers in the path of the trays or receivers at a certain distance underneath the lower edge, of plate 24. These fingers or strippers are, in fact, placed at a point intermediate between the inclined position of the lower tray as it reaches the lower edge of plate 24 and the vertical hang down position assumed by said tray as soon as said point is passed; therefore, in the downward swinging movement of each tray taking place as said tray passes beyond the lower edge of plate 24, the sheet carried by said tray is intercepted by fingers or strippers 28, which compel said sheet to slide forward into a suitable receptacle 29 from which said fingers or strippers project.

This discharge of the sheets within receptacle 29 is clearly illustrated in Fig. 4, where 30 designates a sheet in the act of being laid into the receptacle by the inclined support formed by fingers or strippers 28. As each sheet is delivered into receptacle 29, the drying action may be continued by providing some suitable heating means such as for instance, an electric heater, as shown at 31 directing heat within the receptacle.

The action of gravity in the forward swinging movement of each tray or receiver as it passes the forward position when carried around sprocket wheels 19, 19′, is not thoroughly reliable; that is, it is not absolutely certain that each tray will swing forwardly at exactly the time when a certain

angle has been reached, because the swinging motion of the trays may be governed to a certain extent by frictional resistance in their respective pivots, etc.; therefore, while I rely on gravity to produce the forward swinging movement of the trays, I prefer to rely on some more positive means for successively presenting the trays or receivers to the delivery end of the printing press, so that proper sequence of delivery may be assured at all times.

To this end, at a point below that at which the forward swinging motion of each tray takes place, I provide a suitable obstacle in the path of said trays preventing said trays to reach the full inclination permitted by plate 24 until said obstacle has been passed.

In the drawings, said obstacle is represented by pins 32, 32′, inwardly projecting in the path of the trays as they fall from brackets 33, 33′ attached to the upper part of plate 24. During the movement of the conveyor, one of the trays 20′, has its edge resting against pins 32, 32′, while other succeeding trays which have already passed their forward position have swung forwardly as far as said tray 20′ has permitted. During the next step in the motion of the conveyor, said tray 20′ clears pins 32, 32′ and is then free to fall to the position shown at 20″ in which it becomes the upper tray of the rack formed by plate 24, while the next tray will now abut against pins 32, 32′, in the position formerly occupied by tray 20, 20′. There is therefore, an open space between the tray 20″ which has just fallen and the tray 20′ which is about to fall, said space being designated by a numeral 34; and at this point it is possible to freely insert a printed sheet on top of tray 20″, for instance, by delivery by means of a belt conveyor 35, which is attached to or operated by the printing press.

The operation of the device is timed so as to synchronize with that of the printing press, so that each time a tray falls to the position 20″, a sheet is delivered to said tray by belt conveyor 35; and the means for operating the device are therefore preferably associated with the press itself. This can be obtained in any suitable manner, for instance, by providing shaft 14 with a ratchet wheel 36 and rotating the same step by step by means of a pawl 37, carried by an arm 38 which is caused to oscillate around its pivot by the reciprocating motion imparted to a connection 39 by some rotating element of the press making one revolution for each sheet delivered. This driving mechanism is merely shown as an example, since it is possible to drive the device in a number of ways so that it will be properly timed with the operation of the press, merely by using ordinary mechanical skill, not entailing invention.

The trays or receivers are also provided with lugs such as 40 outwardly projecting from the surface upon which the sheets are placed to limit the travel of said sheets in order to prevent their falling through and retain them on the trays. Said lugs are quite close to the point of pivotal attachment of the trays or receivers so as to permit sheets of the maximum width to be used. However, sometimes the sheets to be handled are very small and it is desirable to keep them fairly close to the outer edge of the press, to insure their proper discharge upon fingers, or strippers 28; therefore, I prefer to fit the device with some suitable depth gauge, permitting adjustment of the stop point in relation to the outer edge of the tray. A device suitable for this purpose is shown in the drawings and comprises vertical fingers such as 41, 41′, registering with the slots 27′, 27″, of the trays, and placed so that they project below the charging surface of the first tray 22, without interfering with the free swinging of the trays when falling from the position 20′ to the position 20″. Said fingers are adjustable to and from the outer edge of the upper tray, and to this end, they are made to reach at a point well above the swinging range of the trays, then they are bent outwardly and then forwardly and then downwardly to form an outer vertical tract 42, 42′, bent inwardly at 43 and inserted in bushings 44, 44′. The inwardly directed tract of said fingers inserted in said bushings permits adjustment of said fingers from front to rear and set screws such as 45, 45′, may be used to secure the fingers at any desired distance from the outer edge of upper tray.

By means of this arrangement, sheets the length of which is not more than the distance between the vertical tracts 42, 42′ and not less than the distance between vertical fingers 41, 41′, may be fed upon the trays; and if said sheets are very narrow, fingers 41, 41′ may be moved close to the edge of tray 20″ to insure the sheets being caught by fingers or strippers 29 at the lower end. It is true that the trays are somewhat inclined and that the sheets might move inwardly to a certain extent, but once a sheet has been placed in position upon its tray, the downward movement of the conveyor, which is smooth, is not likely to cause said sheet to move inwardly to any noticeable extent, in view of the frictional resistance between the sheet and the underlying surface.

Fingers 41, 41′, are, of course, only used occasionally in connection with small work and are removable, the machine being normally used for the general run of work. If desired, an additional heating unit 46 may be provided to initiate the drying of the upper sheet, and while I show electrical heating units all through, it is obvious that steam pipes or some other source of heat may be

used if preferable. Whenever electrical current is available however, I prefer to use electrical units on account of their compactness and convenience, and in view of the possibility that they offer of directing the heat wherever wanted by means of reflecting surfaces of a suitable type.

It is obvious that the device may be built as an internal part of the printing press or else as an attachment as shown, or else again it may be mounted upon a portable frame, provided with wheels and adapted to be moved from one place to another; in this case, the means of connecting the printing press to the operating mechanism of the device shall be detachable, and if a mechanism of the type shown is used, it will be advisable to make the pivotal attachment 47 between connection 39 and arm 38 adjustable along radial slot 48 provided in arm 38, so that the proper angular motion of arm 38, may be obtained for different lengths of the reciprocating stroke of connection 39.

The device may be used in connection with printing presses of all kinds, producing flat work, whether on paper or cloth or silk or tinplate, and with suitable modifications its use may also be extended to the handling of printed items of different nature.

It is obvious that the details of construction of my device may vary to a considerable extent from those shown and described, still remaining within the scope of my invention; for instance, continuous travel of the conveyor at a suitable speed, timed to synchronize with the speed of operation of the printing press would do just as well as a step by step motion, since the intermittent dropping of the trays at the loading point would still be controlled by the obstacle such as pins 32, 32′ inserted in their path; therefore, the drawings, are to be considered as being intended for illustrative purposes only and not in a limiting sense. I accordingly, reserve myself the right to carry my invention into practice in any way or manner which may enter, fairly, into the scope of the appended claims.

I claim:

1. In a device of the class described, a conveyor having a plurality of pivoted tray members, each adapted to receive a freshly printed form while in an inclined position, means for operating said conveyor, causing movement of said tray members from an inclined loading, an inclined traveling to a reversely inclined discharging position, and means causing the successive discharge of said forms from said tray members.

2. In a device of the class described, a conveyor having a plurality of pivoted tray members, each adapted to receive a freshly printed form, means for operating said conveyor, causing movement of said tray members, supporting said forms, from one oblique loading and inclined traveling to a reversely inclined discharging position, means maintaining said tray members in an inclined position relative to their pivotal point so as to prevent falling off of the forms supported thereby, and means causing the successive discharge of said forms from said tray members.

3. In a device of the class described, having a plurality of pivoted tray members each adapted to receive a freshly printed form, means for operating said conveyor causing travel of said tray members and forms from one inclined loading to another reversely inclined discharging position, and means interposed in the path of said tray members while in said reversely inclined position, permitting their passage but intercepting forms carried thereby causing the discharge of said forms from said tray members.

4. In a device of the class described, a conveyor having a plurality of pivoted tray members, each adapted to receive a freshly printed form, means for operating said conveyor, causing travel of said tray members successively in vertically upward, horizontal and obliquely downward directions, each of said members adapted to support a form while traveling obliquely downwards from one inclined loading to a reversely inclined discharging position, oblique guide means maintaining said tray members in an inclined position to prevent falling off of forms supported thereby, and means interposed in the path of said tray members while in their reversely inclined discharging position and permitting their passage but intercepting forms carried thereby causing the discharge of said forms from said tray members.

5. In a device of the class described, the combination with a flexible carrier, of a plurality of spaced tray members pivotally attached thereto, said tray members being each adapted to receive a freshly printed form and inclined means supporting and guiding the outer edge of said tray members during their downward travel from a loading to a discharging point, maintaining said tray members in an upwardly inclined position relative to their pivots so as to prevent falling off of forms supported thereby.

6. In a device of the class described, the combination with a flexible carrier, of a plurality of spaced tray members pivotally attached thereto, said tray members being each adapted to receive a freshly printed form, and an inclined surface supporting the outer edge of said tray members during their travel from an upper loading to a lower discharging point, said surface maintaining said tray members in an oblique position adapted to prevent falling off of forms supported thereby.

7. In a device of the class described, the

combination with a flexible carrier, a plurality of spaced tray members pivotally attached thereto, and means causing said carriers to change from a transversely to a downwardly directed course, of means arranged at both side edges and interposed in the path of said tray members preventing full swinging movement of the same from one upwardly inclined position to another upwardly inclined, but reversed, position due to said change in the direction of travel of said carriers, said means permitting dropping of said tray members one by one to their operative position as the travel of the carriers continues causing the distance between the pivotal attachment of each tray member and said interposed means to gradually increase.

8. In a device of the class described, the combination with a flexible carrier, of a plurality of spaced tray members pivotally attached thereto, said tray members being each adapted to receive a freshly printed form, means maintaining said tray members in a position adapted to prevent falling off of the form supported thereby, during the travel from a loading to a discharging point, means causing the travel of said carrier to change from a transverse to a downward direction, previous to reaching said loading point, causing swinging of said tray members about their pivots due to gravity, and means arranged to engage the side edges of said tray members and interposed in the path of said swinging movement of said tray members, preventing full displacement thereof, to their operative position, said means permitting dropping of said tray members one by one to the receiving position as the travel of the conveyor continues, causing the distance between the pivotal attachment of each tray member and said interposed means to gradually increase.

9. In a device of the class described, the combination with a flexible carrier, of a plurality of spaced tray members pivotally attached thereto, said tray members being each adapted to receive a freshly printed form, means supporting the outer edge of said tray members during their travel from a loading to a discharging point, maintaining said tray members in a position adapted to prevent falling off of forms supported thereby, means causing the travel of said carrier to change from a transverse to a downward direction previous to reaching said loading point, causing swinging of said tray members about their pivots due to gravity, and means interposed in the path of said swinging movement and adapted to temporarily engage the side edges of said tray members, preventing full displacement thereof, to their operative position, said means permitting dropping of said tray members one by one to the receiving position as the travel of the conveyor continues, causing the distance between the pivotal attachment of each tray member and said interposed means to gradually increase.

10. In a device of the class described, the combination with a flexible carrier, of a plurality of spaced tray members pivotally attached thereto, said tray members being each adapted to receive a freshly printed form, means maintaining said tray members in an inclined position towards their pivotal attachment so as to prevent falling off of the form supported thereby, during their travel from a loading to a discharging point, means causing the successive discharge of said forms from said tray members, means causing the travel of said carrier to change from a transverse to a downward direction, previous to reaching said loading point, causing swinging of said tray members about their pivots due to gravity, and means interposed in the path of said swinging movement and adapted to engage the side edges of said tray members, preventing full displacement thereof, to their operative position, said means permitting dropping of said tray members one by one to the receiving position as the travel of the conveyor continues, causing the distance between the pivotal attachment of each tray member and said interposed means to gradually increase.

11. In a device of the class described, the combination with a flexible carrier, of a plurality of spaced tray members pivotally attached thereto, said tray members being each adapted to receive a freshly printed form, inclined tray guide means maintaining said tray members in an upwardly inclined position relative to their pivotal points so as to prevent falling off of the form supported by the tray members during their travel from a loading to a discharging point, means causing the travel of said carrier to change from a transverse to a downward direction previous to reaching said loading point, causing swinging of said tray members about their pivots due to gravity, means arranged to engage both side edges of said tray members and interposed in the path of said swinging movement of said tray members, preventing full displacement thereof, to their operative position, said means permitting dropping of said tray members one by one to the receiving position as the travel of the conveyor continues, causing the distance between the pivotal attachment of each tray member and said interposed means to gradually increase, and means causing the operation of said carrier.

12. In a device of the class described, adapted to be operatively associated with a printing press, the combination with a flexible carrier, of a plurality of spaced tray members pivotally attached thereto, said tray members being each adapted to receive a freshly printed form and support same over

substantially its full surface, inclined tray guide means maintaining said tray members in an upwardly inclined position to their pivotal points so as to prevent falling off of the form supported thereby, during their travel from a loading to a discharging point, means causing the successive discharge of said forms from said tray members, means causing the travel of said carrier to change from a transverse to a downward direction, previous to reaching said loading point, causing swinging of said tray members about their pivots due to gravity, means interposed in the path of said swinging movement of said tray members and adapted to temporarily engage the latter at both of their outer edges, preventing full displacement thereof, to their operative position, said means permitting dropping of said tray members, one by one to the receiving position as the travel of the conveyor continues, causing the distance between the pivotal attachment of each tray member and said interposed means to gradually increase and means adapted to be controlled by the printing press served by the device causing the operation of said carrier.

13. In a device of the class described, adapted to be operatively associated with a printing press, the combination with a flexible carrier, of a plurality of tray members pivotally attached thereto and provided with spacing means, said tray members being each adapted to receive a freshly printed form, inclined guide means supporting the outer edges of and maintaining said tray members in an upwardly inclined position relative to their pivots so as to prevent falling off of the form supported thereby, during their travel from a loading to a discharging point, means causing the successive discharge of said forms from said tray members, means causing the travel of said carrier to change from a transverse to a downward direction, previous to reaching said loading point, causing swinging of said tray members about their pivots due to gravity, means interposed in the path of said swinging movement and adapted to temporarily engage both of the outer edges of said tray members, preventing full displacement of said members to their operative position, said means permitting dropping of said tray members one by one to the receiving position as the travel of the conveyor continues, causing the distance between the pivotal attachment of each tray member and said interposed means to gradually increase and means adapted to be controlled by the printing press served by the device, causing a step by step motion of said carrier.

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