No. 835,002. PATENTED NOV. 6, 1906.

C. A. STURTEVANT.

DELIVERY MECHANISM FOR SHEET FOLDING AND OTHER MACHINES.

APPLICATION FILED JULY 31, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

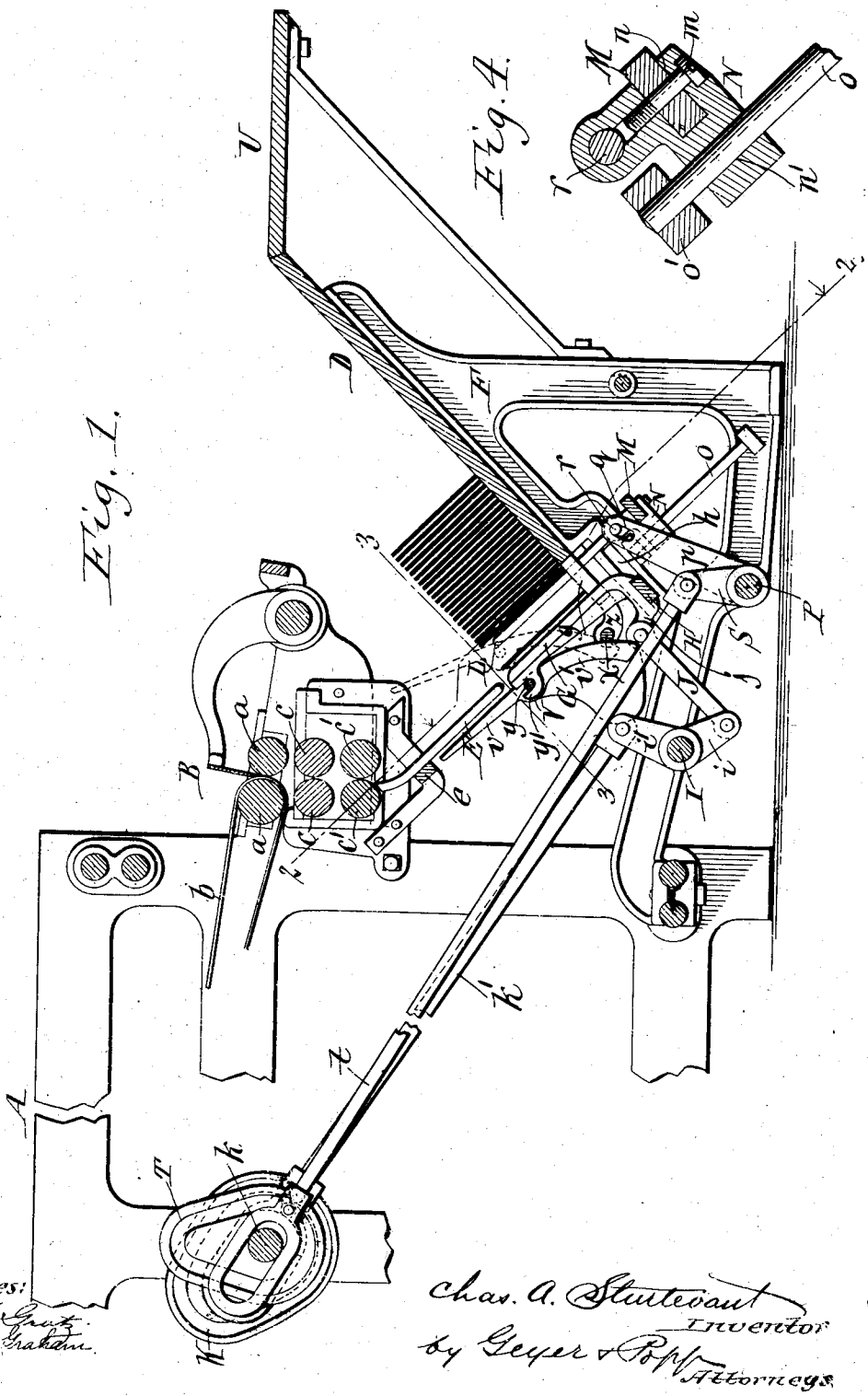


Fig. 4.

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2 SHEETS—SHEET 2.

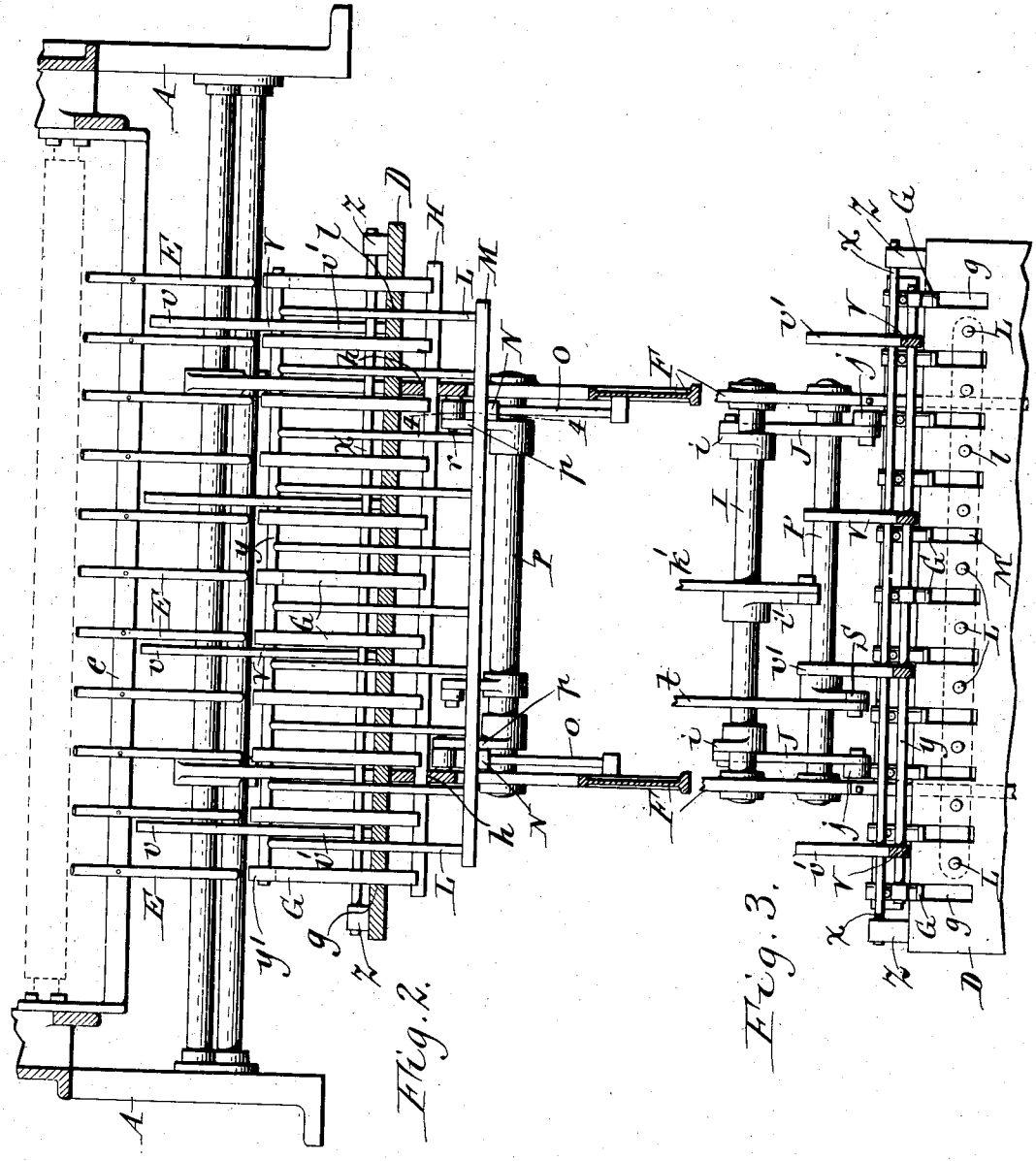


Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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DELIVERY MECHANISM FOR SHEET-FOLDING AND OTHER MACHINES.

No. 835,002. Specification of Letters Patent. Patented Nov. 6, 1906.

Application filed July 31, 1905. Serial No. 271,901.

To all whom it may concern:

Be it known that I, CHARLES A. STURTEVANT, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented new and useful Improvements in Delivery Mechanism for Sheet-Folding and other Machines, of which the following is a specification.

This invention relates to a delivery mechanism for sheet-folding and other machines, and has the object to produce a delivery mechanism for this purpose of improved construction and one which avoids the necessity of employing followers on the stacking-table, thereby permitting of handling the stack of folded sheets with greater facility.

In the accompanying drawings, consisting of two sheets, Figure 1 is a vertical longitudinal section of my improved delivery mechanism applied to a sheet-folding machine. Figs. 2 and 3 are cross-sections thereof at right angles to each other in lines 2 2 and 3 3, Fig. 1, respectively. Fig. 4 is a vertical section, on an enlarged scale, of one of the packer-rod guides, taken in line 4 4, Fig. 2.

Similar letters of reference indicate corresponding parts throughout the several views.

So much of the folding-machine shown in the drawings for illustrating the application of my improved delivery mechanism consists, essentially, of a frame A, a pair of folding-rollers *a a*, journaled horizontally on the rear part of the frame, a folding blade B cooperating with said rollers, tapes *b* for carrying the sheets to said rollers, and two pairs of smashing-rollers *c c'*, arranged below the folding-rollers and receiving the folded sheets therefrom.

As the folded sheets issue downwardly from the smashing-rollers the same are received by my improved delivery mechanism, which stacks or piles the folded sheets and which is constructed as follows:

D represents the stacking or receiving table, upon which the folded sheets are piled or stacked. This table is inclined, preferably, at an angle of forty-five degrees and rises from its rear or receiving end rearwardly toward its front or delivery end. The receiving end of the table is arranged below and in front of the smashing-rollers of the folding-machine. The sheets are directed from these rollers to the receiving end of the table by inclined guide-bars E, which extend from said rollers downwardly and forwardly at right angles to the receiving-table. These guide-bars are supported by means of a cross-bar *e*, which is connected at its ends to the main frame of the folding-machine and to which the guide bars are secured near their upper ends. The receiving-table is supported by means of two standards F, arranged lengthwise underneath the same near opposite ends thereof.

G represents a plurality of packing-fingers which reciprocate lengthwise of the table, and whereby the folded sheets are moved forwardly over the same. Each of these fingers is arranged at right angles to the plane of the table and extends through a longitudinal slot *g* in the same, the greater part of its length projecting above the table, while a short part thereof projects below the table. The several packing-fingers are arranged in a row transversely of the table and are connected at their lower ends below the table by a transverse guide-bar H. The latter is guided in inclined guideways or slots *h*, formed on the standards F.

Various means may be employed for effecting the reciprocating movement of the packing-fingers lengthwise of the table, that shown in the drawings consisting of a transverse rock-shaft I, journaled on the standards, links J each pivotally connected at one end with an ear *j*, formed on one of the packing-fingers, and at its opposite end with a depending rock-arm *i* on the rock-shaft I, a rotary cam K, arranged on a transverse driving-shaft *k*, and a cam-rod *k'*, connected at one end with an upright arm *i'* on the rock-shaft I and engaging operatively at its opposite end with the cam K.

In their rearmost position the packing-fingers are arranged in line with the guide-rods E and form, together with the same, practically a continuous surface, whereby the folded sheets are directed edgewise from the smashing-rollers of the folding-machine to the receiving-table. After the folded sheet has been deposited on the table in front of the packing-fingers the latter move forwardly and carry the sheet against the pile on the same and then move rearwardly in position for receiving the next sheet.

L represents a plurality of detent-rods, whereby the pile on the table is supported

when not engaged by the packing-fingers. The detent-rods are arranged parallel with the packing-fingers and in a transverse row in front of the same. The several detent-rods are reciprocated at right angles to the plane of the table, so that the upper ends thereof project alternately above and below the top of the table. At their lower ends the rods are connected with a cross-bar M, and at their upper ends the same pass through guide-openings *l* in the table. The cross-bar is guided in its reciprocating movement with the detent-rods by means of brackets N N, arranged near opposite ends of the bar M and guided on inclined guide-rods O, which are arranged parallel with the packing-fingers and detent-rods. Each of the brackets N is provided on its front side with a recess *n*, in which the cross-bar M is secured by a screw *m*, and on its rear side with an eye *n'*, which receives the adjacent guide-rod O. The latter are mounted on the standards F by means of lugs *o'*, secured to or formed on the inner sides of the standards and supporting the rods O at their ends. The detent-rods and the parts connected therewith may be raised and lowered by various means. The means for this purpose shown in the drawings consist of a horizontal rock-shaft P, journaled transversely on the standards F; upright rock-arms *p*, secured to the rock-shaft P near the ends thereof and each provided at its upper end with a slot *q*, which receives a transverse pin *r* on the upper part of one of the brackets N; an intermediate upright rock-arm S, secured to the central part of the rock-shaft P; a rotary cam T, secured to the main driving-shaft *k*, and a cam-rod *t*, connected at one end to the rock-arm S and engaging operatively at its opposite end with the cam T.

While the packing-fingers are in their rearmost position the detent-rods are elevated above the table and support the pile of sheets at the back thereof, so as to form a space or gap behind the same and the packing-fingers into which the next incoming sheet is fed from the folding-machine. After the sheet has been thus deposited on the table in front of the packing-fingers the latter advance, and at the same time the detent-fingers are withdrawn downwardly below the surface of the table, thereby permitting the packing-fingers to lay the rear sheet or signature against the back of the pile. When the packing-fingers reach the end of their forward movement, the same stand slightly in front of the detent-fingers. While the packing-fingers are in this position the detent-rods are raised so as to stand behind the last sheet, and then the packing-fingers are withdrawn into their rearmost position, leaving the pile resting against the detent-rods preparatory to receiving the next sheet or signature.

By stacking or piling the signatures from the lower end toward the upper end of an inclined table the weight of the pile of signatures tends to keep them packed against the packing-fingers and detent-rods. The movable followers which are commonly employed on horizontal piling or stacking tables and against which the signatures are usually packed are thus dispensed with, thereby permitting the attendant to remove the signatures from the front of the pile from time to time without the inconvenience or loss of time attending the use of such followers.

For the purpose of furnishing a convenient support on which the attendant may straighten out and bundle the signatures after removing them from the inclined stacking-table a horizontal auxiliary table or extension U is provided at the upper front or delivery end of the main stacking-table D, as shown in Fig. 1.

It has been found in practice that when very long or high signatures or sheets are being delivered from the folding mechanism to the stacking-table that the upper ends of the signatures, in the absence of any provision to prevent it, would lag behind, while the lower parts thereof are engaged by the packing-fingers during their forward movement, thereby interfering with the next-incoming sheet.

The means for avoiding this objection are constructed as follows: V represents a plurality of auxiliary clearing-levers or packing-fingers, which are arranged vertically and each provided with an upper push-arm *v* and a lower actuating-arm *v'*. The several clearing-levers are mounted so that they have a bodily movement with the packing-fingers and also a vertically-swinging movement independent of the packing-fingers. For this purpose the clearing-levers are pivotally supported between their arms on the upper ends of the packing-fingers, while their lower ends engage with a stationary abutment *x* in rear of the lower part of the packing-fingers. As shown in Figs. 1, 2, and 3, the pivotal connection between the clearing-levers and the packing-fingers consist of a transverse rod *y*, to which said levers are secured, and which are journaled in upwardly-opening bearings or sockets *y'*, formed on the upper rear part of some of the packing-fingers. The abutment consists of a transverse rod supported by means of brackets *z* on the rear end of the stacking-table.

While the main packer-fingers are in their rearmost position the clearing-levers stand with their upper arms in rear of the path of the sheets, as shown by full lines in Fig. 1, these levers being yieldingly held in this position by any suitable means, but preferably by making the lower arms of the clearing-levers heavier than the upper arms, so that they bear constantly against the abutment-rod *x*. As the main packing-fingers move forward in engagement with the lower part

of the signature the pivot of the clearing-levers also moves forward. Inasmuch as the lower arms of the clearing-levers are prevented from moving forward with the packing-fingers, these levers during this movement are caused to tilt or turn in a vertical plane, whereby the upper arms thereof are advanced beyond the packing-fingers, as shown by dotted lines in Fig. 1, and caused to push the upper ends of the signature forwardly, so that they do not interfere with the next incoming sheet. As the packing-fingers return to their rearmost position the clearing-levers are also automatically restored to their rearmost position, ready for receiving the next sheet. It will thus be observed that the upper or operative ends of the auxiliary packing-fingers *v* move forward with the main packing-fingers G; but the movement of the auxiliary fingers is faster than the main fingers, which acceleration of movement is due to the actuating-arm *v'* of the auxiliary fingers engaging with the abutment or stationary rod *x*. The return movement of the auxiliary fingers is in like manner accelerated, so that the same clear the guide-rods E by the time they reach the end of their backward movement.

By the use of the clearing-levers the necessity for employing very long packing-fingers and detent-rods and a quick operating mechanism therefore is avoided and instead allows more time for moving these fingers and rods into position, thereby reducing the wear and rendering the operation less noisy.

I claim as my invention—

1. A delivery mechanism for sheet-folding and other machines comprising a stacking-table, main packing-fingers operating to engage the lower parts of the sheets, separate detent-rods operating to engage the lower parts of the sheets, and auxiliary packing or clearing fingers operating on the sheets above the main packing-fingers and detent-rods, substantially as set forth.

2. A delivery mechanism for sheet-folding and other machines comprising a stacking-table, main packing-fingers movable lengthwise of said table and operating to engage the lower part of said sheets, detent-rods movable transversely of said table and operating to engage the lower parts of said sheets, and auxiliary packing-fingers movable lengthwise of the table in advance of the main packing-fingers and operating to engage with the sheets above the main packing-fingers and detent-rods, substantially as set forth.

3. A delivery mechanism for sheet-folding and other machines comprising a stacking-table, main packing-fingers movable lengthwise of the table and operating to engage the lower parts of the sheets, detent-rods movable transversely of the table and operating to engage the lower parts of the sheets, and auxiliary packing-fingers pivoted on said main packing-fingers so as to move in the same direction therewith lengthwise of the table and arranged to engage the sheets above the main packing-fingers and detent-rods, and means for accelerating the movement of the auxiliary packing-fingers relatively to the main packing-fingers, substantially as set forth.

4. A delivery mechanism for sheet-folding and other machines comprising a stacking-table, main packing-fingers movable relatively to said table and arranged to engage the lower part of the sheets, upright clearing-levers or fingers pivoted on said main packing-fingers and each having an upper arm arranged to engage the upper part of said sheets and a lower arm, and an abutment which is engaged by the lower arms of said clearing-levers, substantially as set forth.

5. A delivery mechanism for sheet-folding and other machines comprising a stacking-table, a plurality of main packing-fingers movable forward and backward relatively to said table and having at their upper ends sockets or bearings, a transverse pivot-rod journaled in said bearings, upright clearing-levers or auxiliary packing-fingers each having an upper push-arm and a lower actuating-arm which is heavier than the push-arm and mounted between its arms on said pivot-rod, and a transverse abutment-rod mounted on the stacking-table and engaged by the lower arms of said clearing-levers or auxiliary fingers, substantially as set forth.

6. A delivery mechanism for sheet-folding and other machines comprising a stacking-table, a plurality of packing-fingers arranged at right angles to the plane of the table and movable parallel thereto in longitudinal slots formed in the table, a cross-bar connecting said fingers below the table, a plurality of detent-rods arranged parallel to the packing-fingers and movable at right angles to the plane of the table through openings in the same, a cross-bar connecting the lower ends of said rods below the table, and means for moving the fingers forward while depressing the rods and elevating the rods while retracting the fingers, comprising a rock-shaft having rock-arms connected with the cross-bar of the fingers, and a rock-shaft having rock-arms connected with the cross-bar of said rods, substantially as set forth.

7. A delivery mechanism for sheet-folding and other machines comprising a stacking-table, standards supporting said table at opposite sides and provided with longitudinal guideways, a plurality of packing-fingers movable through slots in said table, a cross-bar connecting said fingers below said table and movable in said guideways lengthwise of the table, a rock-shaft provided with rock-arms, links connecting said arms with said

finger cross-bar, and detent-rods arranged in front of said packing-fingers, substantially as set forth.

8. A delivery mechanism for sheet-folding and other machines comprising a stacking-table, standards supporting said table at opposite sides, packing-fingers movable lengthwise of the table, detent-rods movable through openings in the table, a cross-bar connecting the lower ends of said detent-rods, guide-rods mounted on said standards, brackets for slidingly mounting said cross-bar on said guide-rods each bracket having a recess in its front side in which said cross-bar is secured, a guide-eye on its rear side which receives one of said guide-rods and a coupling-pin arranged on its upper side, a rock-shaft, and rock-arms secured to said shaft and each provided at its free end with a slot which receives the coupling-pin of one of said brackets, substantially as set forth.

Witness my hand this 14th day of July, 1905.

CHARLES A. STURTEVANT.

Witnesses:
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E. E. BUSH.