No. 738,778. PATENTED SEPT. 15, 1903.

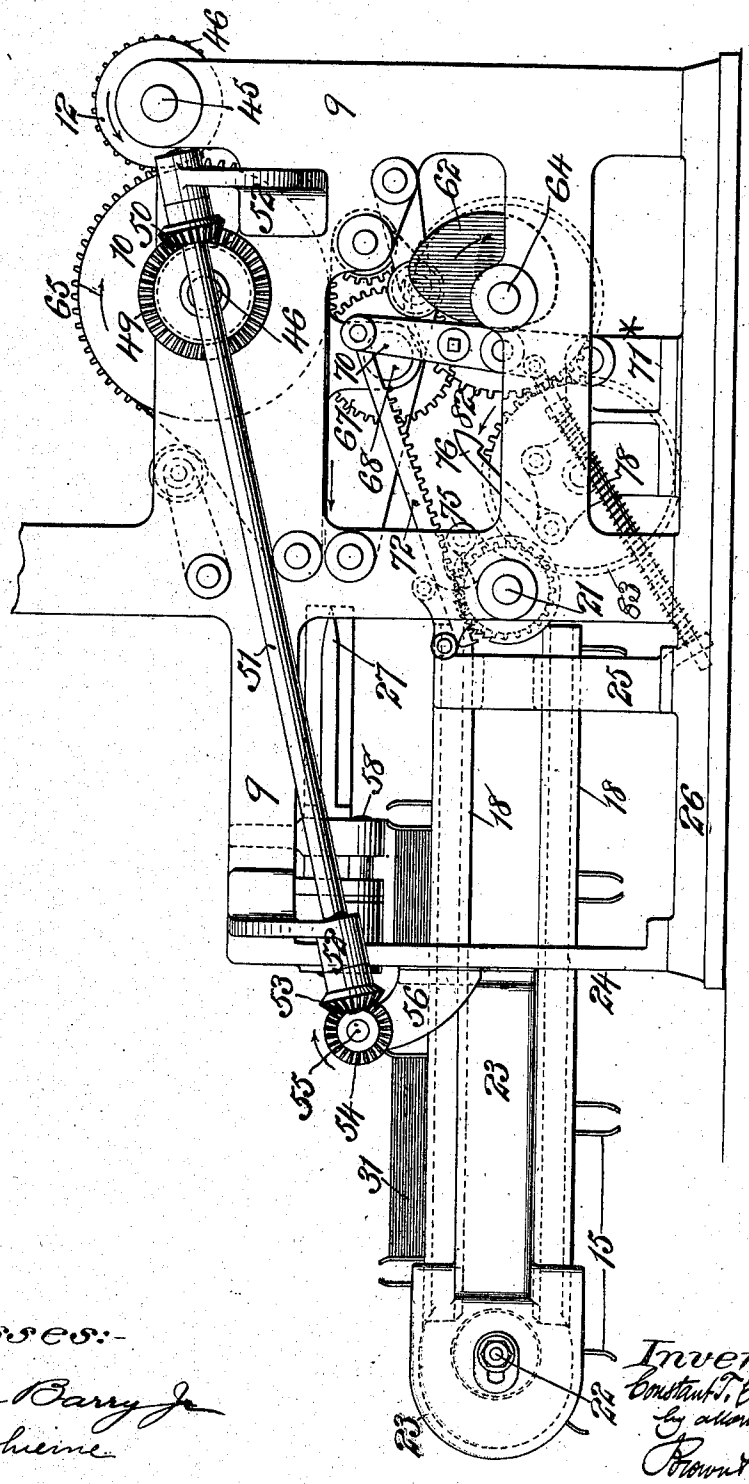
C. T. CUNDALL.

SHEET DELIVERY APPARATUS FOR PRINTING AND FOLDING MACHINERY.

APPLICATION FILED MAY 22, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:-
George Barry Jr
Henry T. Heine

Inventor:
Constant T. Cundall
by attorneys
Brown & Seward

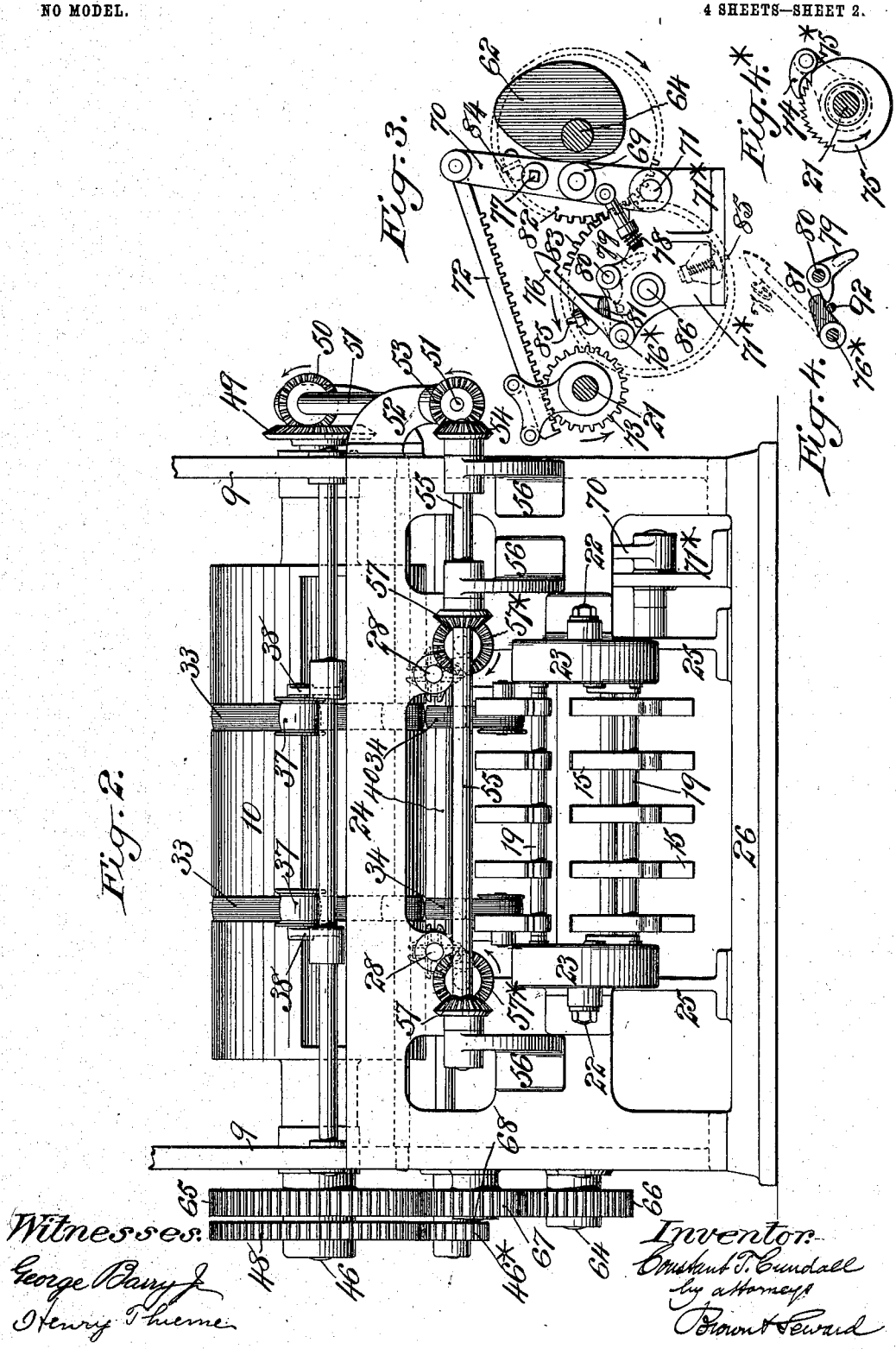
No. 738,778. PATENTED SEPT. 15, 1903.

C. T. CUNDALL.

SHEET DELIVERY APPARATUS FOR PRINTING AND FOLDING MACHINERY.

APPLICATION FILED MAY 22, 1903.

NO MODEL. 4 SHEETS—SHEET 2.



Witnesses:
George Barry Jr.
Henry Thieme

Inventor:
Constant T. Cundall
by attorneys
Brown & Seward

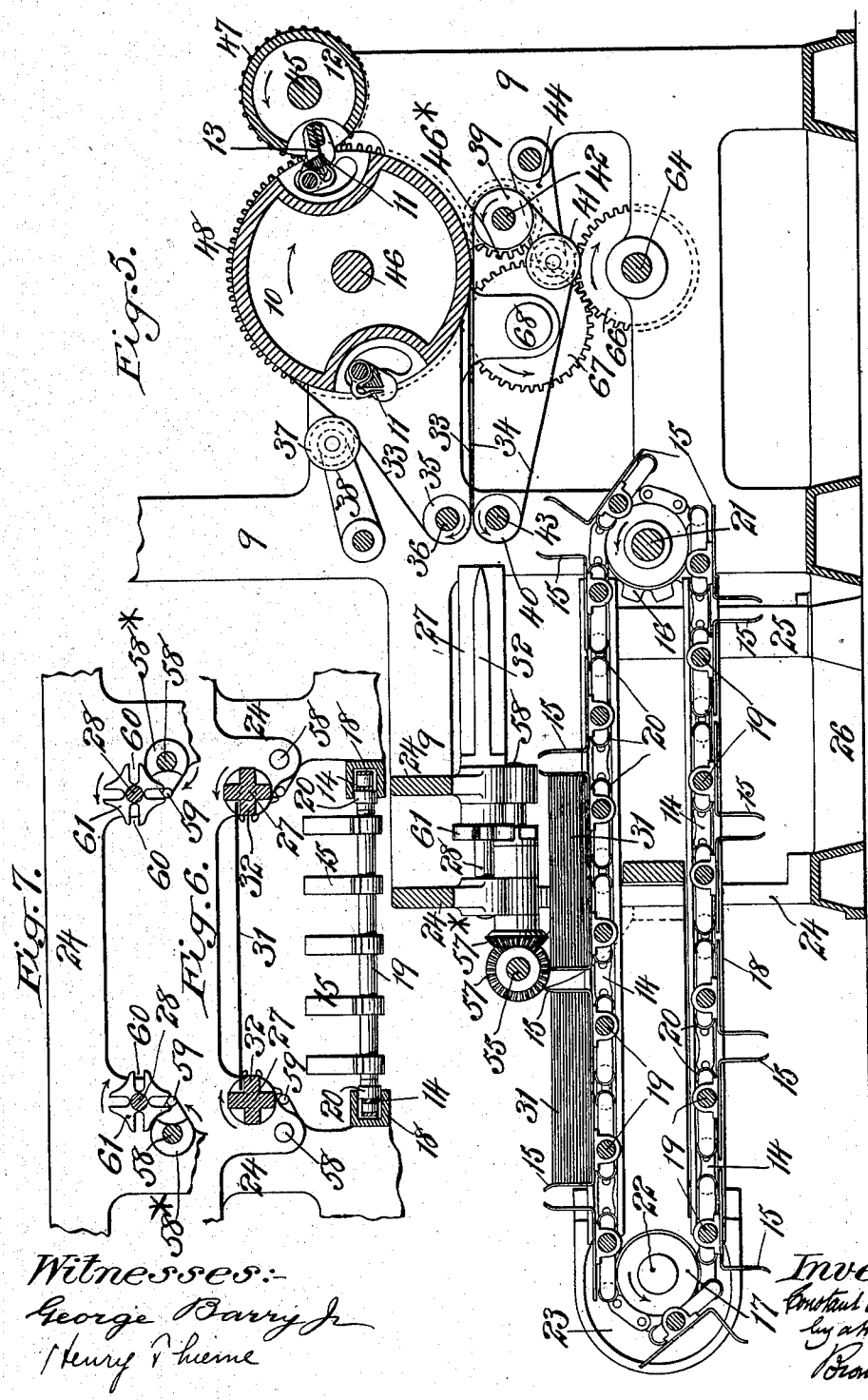
No. 738,778. PATENTED SEPT. 15, 1903.

C. T. CUNDALL.

SHEET DELIVERY APPARATUS FOR PRINTING AND FOLDING MACHINERY.

APPLICATION FILED MAY 22, 1903.

NO MODEL. 4 SHEETS—SHEET 3.



Witnesses:-
George Barry Jr
Henry F. Keene

Inventor:-
Constant T. Cundall
by Attorneys
Brown & Seward

No. 738,778. PATENTED SEPT. 15, 1903.

C. T. CUNDALL.

SHEET DELIVERY APPARATUS FOR PRINTING AND FOLDING MACHINERY.

APPLICATION FILED MAY 22, 1903.

NO MODEL. 4 SHEETS—SHEET 4.

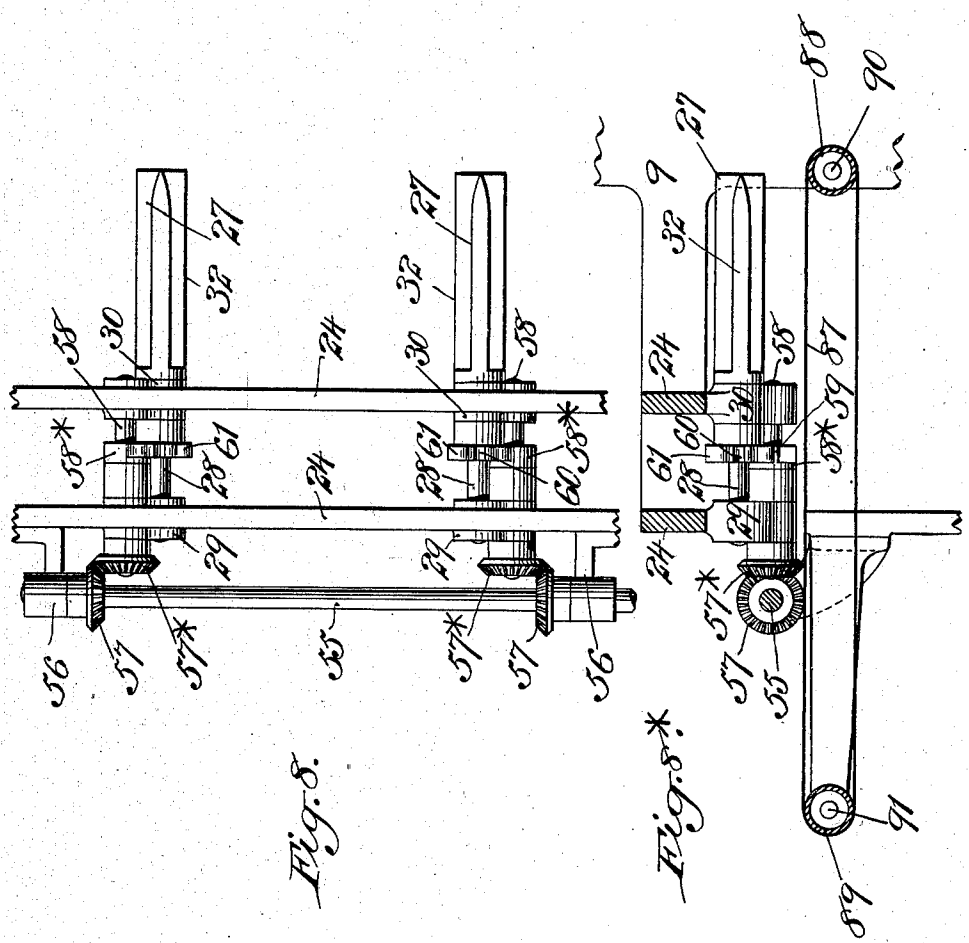


Fig. 8.

Fig. 8*.

Witnesses:-

George Barry Jr.

Henry P. Thieme.

Inventor:-

Constant T. Cundall

by attorneys

Brown & Seward

No. 738,778. Patented September 15, 1903.

UNITED STATES PATENT OFFICE.

CONSTANT T. CUNDALL, OF ASHAWAY, RHODE ISLAND, ASSIGNOR TO C. B. COTTRELL & SONS COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

SHEET-DELIVERY APPARATUS FOR PRINTING AND FOLDING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 738,778, dated September 15, 1903.

Application filed May 22, 1903. Serial No. 158,313. (No model.)

To all whom it may concern:

Be it known that I, CONSTANT T. CUNDALL, a citizen of the United States, and a resident of Ashaway, in the county of Washington and State of Rhode Island, have invented a new and useful Improvement in Sheet-Delivery Apparatus for Printing and Folding Machinery, of which the following is a specification.

The principal object of this invention is to facilitate the transfer of folded sheets from a folding mechanism, which may be an adjunct to a printing-machine, to a carrier, by which the sheets are delivered in piles or in a train; and to this end the improvement consists in part of a sheet-dropper of the novel construction hereinafter described and in certain combinations hereinafter described and claimed, in which the said dropper constitutes an element.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation of a signature-delivery apparatus embodying my invention in a form which comprises a pocketed carrier in which the signatures are collected from the dropper for delivery in piles; Fig. 2, an elevation viewed from the left of Fig. 1; Fig. 3, a side view of the mechanism, partly shown in Fig. 1, for moving the carrier; Figs. 4 and 4*, front views of some of the details imperfectly shown in Fig. 3; Fig. 5, a vertical section parallel with Fig. 1; Fig. 6, a transverse vertical section of the dropper and the carrier; Fig. 7, a transverse section of some of the dropper-operating mechanism; Fig. 8, a plan of the dropper; Fig. 8*, a sectional view corresponding with parts of Fig. 5, but illustrating a carrier on which the sheets are collected from the dropper in a train.

Referring first to Figs. 1, 2, and 5, the folding mechanism, which is therein represented and which serves as well as any other for the illustration of my invention, consists of a folding-cylinder 10, furnished with two sets of gripping-jaws 11 and a tucking-cylinder 12, furnished with a tucking-blade 13, coöperating alternately with one and the other set of gripping-jaws to fold sheets presented to said cylinders in any suitable manner. The shafts 45 46 of said cylinders run in fixed bearings on the side framing 9 and are geared together by gears 47 48, so that the tucking-cylinder 12 makes two revolutions for one of the folding-cylinder 10. Such folding mechanism being well known needs no further description. The delivery-carrier, which is represented in the same figures arranged some distance below and forward of said cylinders, is also of a well-known kind, consisting principally of endless chains 14 and attached skeleton pockets 15 15, said chains being carried by wheels 16 17 and running in horizontal guides 18. The skeleton pockets are each composed of two sets of angle-pieces 15 15, carried by one of a series of pairs of shafts 19, which are firmly secured in the chains 14 and the ends of which are furnished, as shown in Fig. 6, with rollers 20, running in the horizontal guides 18. The wheels 16, which are sprocket-wheels engaging with the chains 14, are carried by the shaft 21, which is the driving-shaft of the carrier and which runs in fixed bearings in or on the side framing 9. The wheels 17, which are merely supporting-wheels, run loosely on fixed studs 22 in the horizontal frames 23, of which the guides 18 form part and which are supported in part by the transverse framing 24 and in part by standards 25, erected on the bed-plate 26.

The dropper 27 28, which constitutes the principal feature of the present invention and which is for receiving the folded sheets or signatures from the folding-cylinder and depositing them in the carrier-pockets 15, is shown in Figs. 1, 5, 6, and 8 arranged some distance forward and below the level of the folding mechanism and over the pocketed carrier. The said dropper is composed of two similar members 27, each consisting of a longitudinal projection of cruciform or winged transverse section from one end of one of two horizontal shafts 28, which are arranged parallel with each other and with the length of the pocketed carrier and transversely to the axes of the cylinders 10 12 in bearings 29

30 in the transverse framing. The space between said members 27 and the relative arrangement of said shafts 28 and the pocketed carrier and cylinders is such that two opposite margins of a folded sheet or signature 31 may, as shown in Fig. 6, be supported upon two of the wings 32—that is to say, upon one wing 32 of each member—which are presented horizontally with the corresponding edges of the sheet or signature between two others of said wings, which are at the same time presented upward. The dropper-shafts 28 are geared together in such manner, as will be hereinafter described, that they rotate together in opposite directions, each in such direction (indicated by arrows in Fig. 6) that the wings of each, which are presented toward the wings of the other, have downward movements. Their rotation is intermittent, so that the members 27 are stationary while receiving a sheet on their oppositely-presented wings 32, and the next movement carrying the said members downward and outward removes the support from the sheet, which then drops into one of the pockets 15, which is at the time stationary under the dropper. To provide for the transfer of the sheets or signatures from the folding-cylinder 10 to the dropper, there is represented a carrier consisting of two sets of tapes 33 34. (See Fig. 5.) The tapes 33 run in grooves in the cylinder and around wheels 35, running loosely on a shaft 36 and being kept at proper tension by idler-wheels 37 in swinging arms 38. The tapes 34 run on wheels 39 40 41, the wheels 39 being fast on a shaft 42, running in bearings in the side framing 9, the wheels 40 being loose on a fixed shaft 43 and the wheels 41, which are tightening-wheels, being hung in swinging arms 44. The tapes 33 are driven by the cylinder 10 and those 34 through the gearing of their shaft 42 by a gear 46* with the gear 48 on the cylinder 10.

The relative movements of the several parts of the machine illustrated by Figs. 1 to 8, inclusive are as follows: The tucking and folding cylinders 12 10 have continuous rotary motion, and the carrier 33 34 has a continuous movement. The intermittent rotary movements of the dropper are so timed that they take place quickly once for every folding operation. The movement of the pocketed carrier takes place only after every such number of sheets or signatures 31 as are desired in a pile have been deposited in a pocket 15, which has been stationary under the dropper. The means for imparting these movements to the several parts, which all derive their movements from the shaft 46 of the folding-cylinder 10, will now be described.

For driving the dropper there is provided on one end of said shaft 46 a bevel-gear 49. This bevel-gear gears with a bevel-gear 50 on a shaft 51, Figs. 1 and 2, which runs in bearings in brackets 52 on the outside of the framing 9 and which carries another bevel-gear 53, which gears with a bevel-gear 54 on a shaft 55, Figs. 1, 2, 5, 8, and 8*, which is arranged crosswise of the pocketed carrier and of the dropper-shafts 28 in bearings in brackets 56 on the cross-framing 24. The said shaft 55 carries two miter-gears 57, which gear with two miter-gears 57* on short shafts 58, arranged parallel with the dropper-shafts 27 in bearings in the cross-framing 24. The said shafts 58, which receive a constant rotary motion at the rate of one revolution for every half-revolution of the folding-cylinder 10 and every delivery of a folded sheet, are each furnished with a disk 58*, (see Fig. 7,) which carries an eccentric-pin 59, which engages with radial slots 60 in disks 61 on the dropper-shafts 28, the said slots in each disk corresponding in number with the wings of the droppers, so that a quarter-revolution of the dropper-shafts and one operation of the dropper is produced by each revolution of the shafts 58.

The means represented in Figs. 1, 3, 4, 4*, 5 for giving motion to the pocketed carrier are such as are now well known, having been described in United States Letters Patent No. 604,004, dated May 10, 1898, and therefore need here only to be briefly described. They derive their movements from a cam 62, Figs. 1 and 3, on a shaft 64, which is arranged parallel with the folding and tucking cylinders in bearings in the side frames 9 and which is geared with the folding-cylinder 10 to make two revolutions for every one of the said cylinder by means of a spur-gear 65 on the shaft of said cylinder, a spur-gear 66 on said shaft 64, and an intermediate spur-gear 67, running on a fixed stud 68, carried by the side framing 9. This cam 62 acts at the proper time against a roller 69 on a lever 70, which works on a fixed fulcrum 71 in a stand 71*, the upper end of said lever having connected with it a toothed rack 72, which engages with and turns a pinion 73, which is loose on the driving-shaft 21 of the carrier, but which is engaged with said shaft by means of a pawl 74 and ratchet-wheel 75, (see Fig. 4*,) the said-ratchet-wheel being fast on the shaft and said pawl being carried by an arm 75*, attached to the said pinion. This engagement only takes place when turning in the direction of the arrow shown near it in Figs. 1 and 3, this direction being the proper one for moving the carrier. The stroke of the rack 72 thus produced by the cam 62 is just sufficient to move the carrier a distance to take one of its pockets away from and present another one under the dropper. Until the determined number of sheets or signatures has been deposited in a pocket the lever is held out of the operative range of the continuously-rotating cam 62 by means of a detent 76, which is pivoted by a pivot 76* to the stand 71* and which is engaged by a stud 77 on the said lever; but at the proper time for moving the carrier the said detent is lifted from the stud, and the lever is brought within the operative range of the cam by means of a spring 78, which always

presses it toward the cam. The lifting of the detent is effected at the proper time through the agency of a small trip-lever 79, Figs 3 and 4, which is pivoted by a pin 80 to the stand 71* and which acts against a toe 81, attached to the detent. The operation of this trip-lever 79 is produced and controlled by intermeshing gears 82 83 and tappets 84 85, thereto attached. The gear 82, which is carried by the cam-shaft 64, has a less number of teeth than that 83, which turns on a fixed stud 86 on the stand 71* and is driven by that 82. The tappet 84 on the gear 82 is fixed upon said gear; but the tappets 85 on the gear 83 are attached to slide radially on said gear under the control of springs which tend to press them outward. Once during a given number of revolutions of the two gears and at a time when the inner end of one of the sliding tappets 85 is opposite the lower end of the trip-lever 79 the tappet 84 comes against the outer end of said sliding tappet and presses the said tappet inward against the trip-lever, which then presses upward the toe 81 of the detent, and so raises the latter from the stud 79 of the lever 70 and allows the said lever to be brought by the spring 78 within range of the cam 62, which then during a portion of its next revolution produces the necessary movement of said lever and its rack 72 to produce the operation of the carrier. While the detent is inoperative it is supported by a fixed stop 92 on the side of the stand 71*, as shown in Fig. 4. The number of sheets or signatures deposited in a pile in the pockets between the movements of the carrier will depend on the relative numbers of teeth in the gears 82 83 and the number of tappets on said gears. If, for example, there are forty-seven teeth in gear 82 and forty-eight teeth in gear 83 and there are two tappets on the gear 83 and one on that 82, the carrier will be moved once for every twenty-four sheets or signatures deposited.

In the modification of my invention illustrated in Fig. 8* the continuously-moving carrier, on which the sheets or signatures are deposited by the dropper, consists of an endless apron or series of tapes 87, carried by wheels or rollers 88 89, carried by shafts 90 91, to which continuous rotary motion may be given by any suitable means. The sheets or signatures deposited on the so-moving carrier lie thereon in a train in which each sheet or signature 31 partly overlaps its predecessor, as shown in said figure.

Though I consider it preferable that the dropper members 28 should be cruciform or four-winged, as represented, I do not consider my invention limited to that form, as they might possibly have only three or more than four wings.

What I claim as my invention is—

1. A sheet-dropper comprising two parallel rotary shafts having upon them longitudinal wings for the support of sheets.

2. A sheet-dropper comprising two rotary members of cruciform transverse section having their axes parallel with each other.

3. A sheet-dropper consisting of two rotary members of winged transverse section having their axes parallel with each other, and means for giving said members intermittent rotary movements between which they are stationary with one wing of each presented toward a wing of the other and one wing of each presented upward.

4. A sheet-dropper consisting of two rotary members of winged transverse section having their axes parallel with each other and geared together to rotate in such opposite directions that the wings of each which are presented toward the wings of the other have downward movements, and means for giving said members an intermittent rotary motion during the intermissions of which a wing of each is presented opposite a wing of the other.

5. The combination of a sheet-dropper consisting of two intermittently-rotating members of winged transverse section having their axes parallel with each other, and a carrier running parallel with said axes for depositing sheets on the wings of said members during the intermissions of their rotation.

6. The combination of a sheet-dropper consisting of two intermittently-rotating members of winged transverse section having their axes parallel with each other, and a carrier arranged below said dropper for the reception and delivery of sheets deposited thereon by the rotary movements of said members.

7. The combination of a sheet-dropper consisting of two intermittently-rotating members of winged transverse section having their axes parallel with each other, and a carrier arranged below said dropper and running parallel with said axes for the reception and delivery of sheets deposited thereon by the rotary movements of said members.

8. The combination of a sheet-folding device, a carrier for the reception and delivery of the sheets folded by said device, a dropper consisting of two rotary members arranged above said carrier with their axes parallel with the direction of the movement of said carrier, and means for giving said members intermittent rotary motion for the reception of folded sheets from said folding device and the deposit of the so-received sheets upon said carrier.

9. The combination of a sheet-folding device, a dropper consisting of two rotary members arranged parallel with each other, a carrier between the said device and dropper running parallel with the axes of the dropper members for depositing folded sheets on the dropper, and a carrier below the dropper for the reception of sheets from the dropper.

10. The combination of a sheet-folding device, a dropper consisting of two rotary members arranged parallel with each other, a carrier between the said device and dropper running parallel with the axes of the dropper members for depositing folded sheets on the

dropper, and a carrier below the dropper running parallel with said axes for the reception of sheets from the dropper.

11. The combination of a sheet-dropper consisting of two intermittently-rotating winged members having their axes parallel with each other, a carrier arranged below said dropper for the reception of sheets deposited by the latter, and means for moving said carrier during an intermission of the movements of the dropper after a certain predetermined number of such deposits of sheets.

12. The combination of a sheet-dropper consisting of two intermittently-rotating members of winged transverse section having their axes parallel with each other, a carrier arranged below said dropper to run in a direction parallel with said axes for the reception of sheets deposited by said dropper and means for moving said carrier during an intermission of the movements of the dropper after a certain predetermined number of such deposits.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 11th day of May, A. D. 1903.

CONSTANT T. CUNDALL.

Witnesses:
A. R. STILLMAN,
ALLEN C. WHITFORD.