5 Sheets—Sheet 1.

S. D. TUCKER.

Sheet-Delivering Apparatus for Printing-Machines.

No. 197,700. **Patented Nov. 27, 1877.**

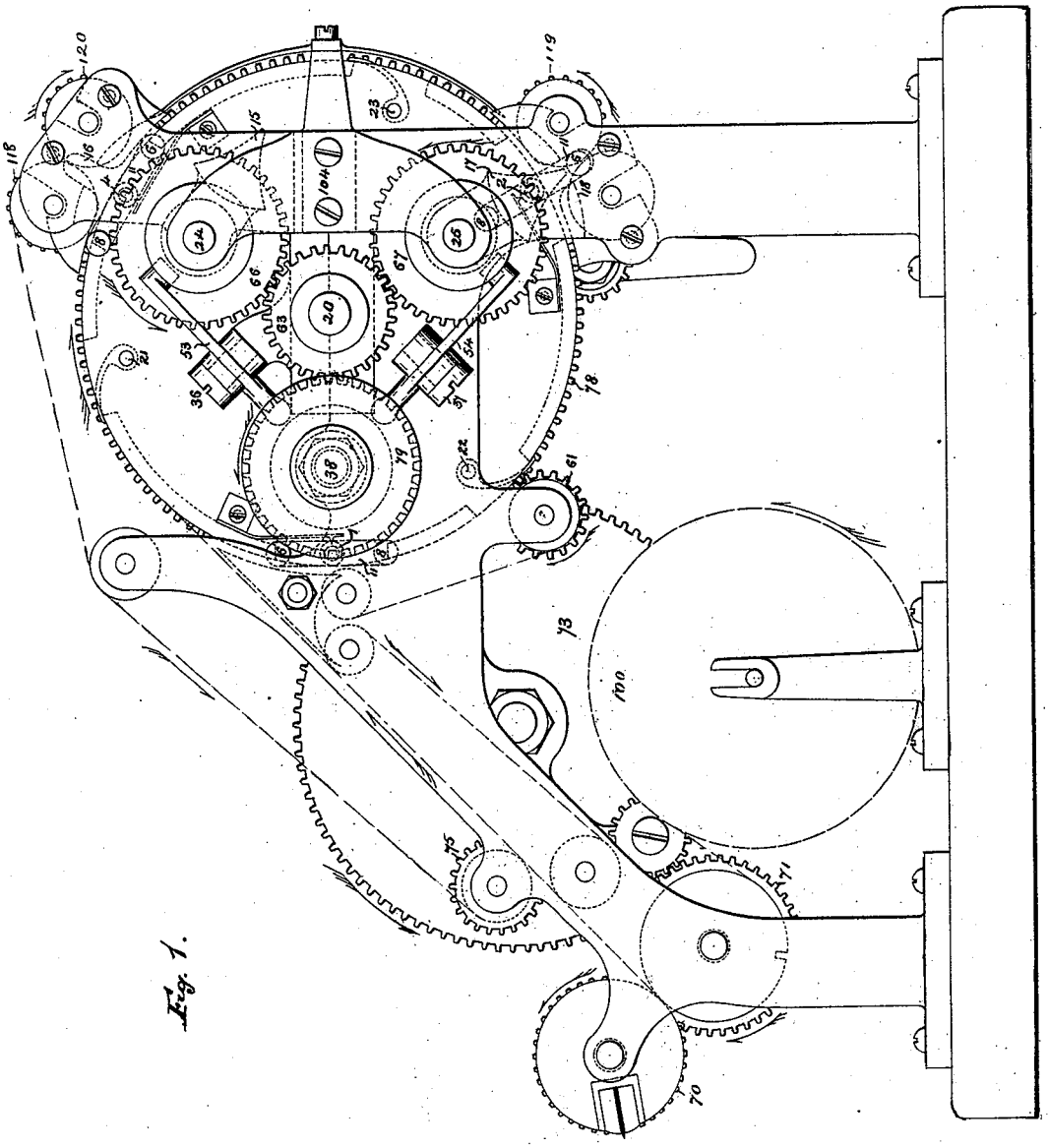

Fig. 1.

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5 Sheets—Sheet 2.

S. D. TUCKER.

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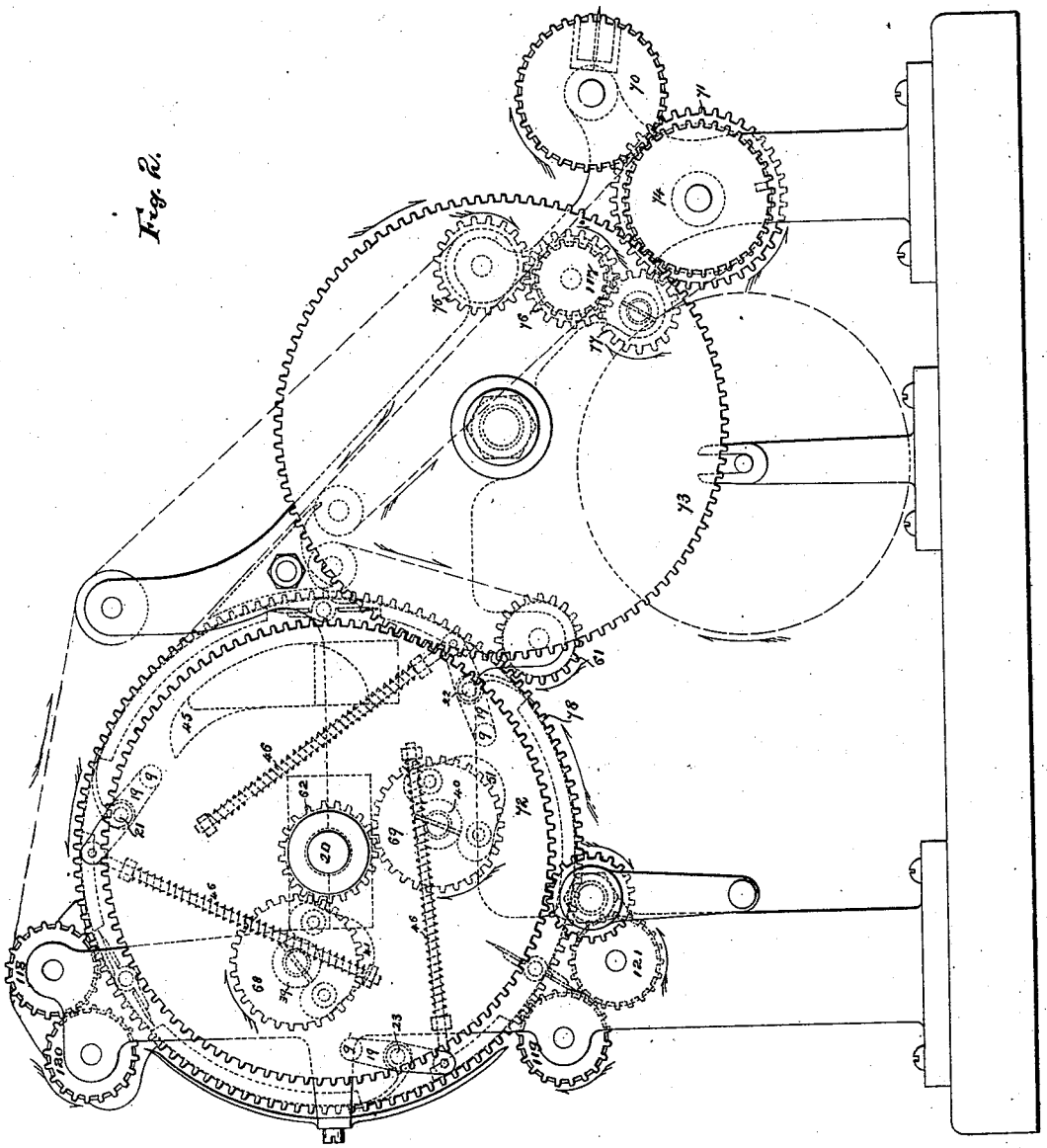
No. 197,700. **Patented Nov. 27, 1877.**

Fig. 2.



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5 Sheets—Sheet 3.

S. D. TUCKER.

Sheet-Delivering Apparatus for Printing-Machines.

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Fig. 4.

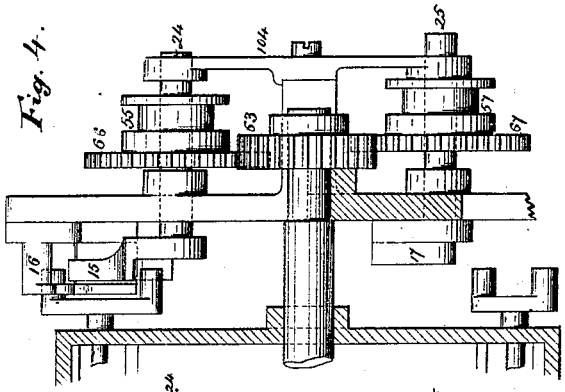
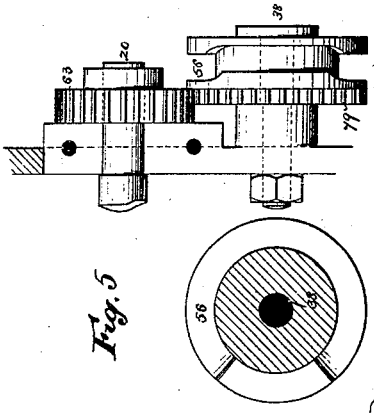


Fig. 5



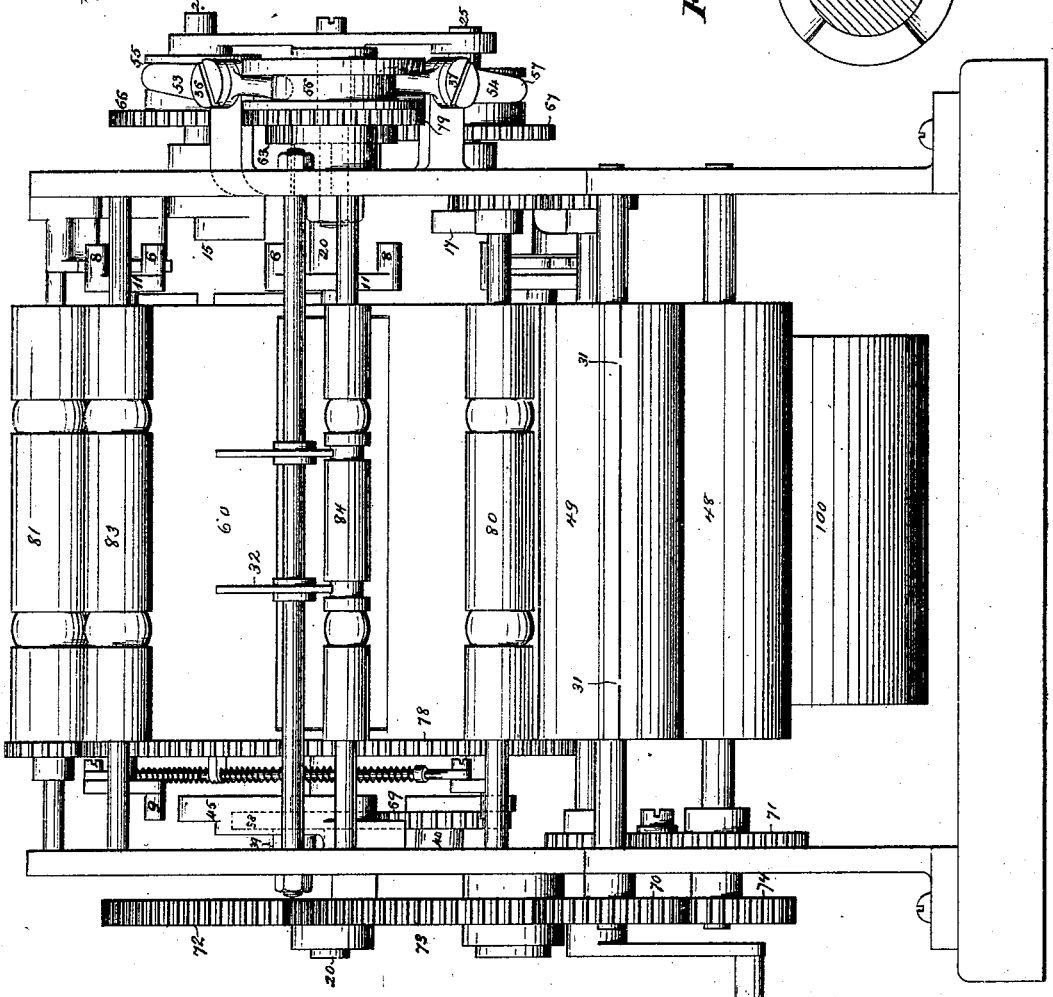


Fig. 3

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5 Sheets—Sheet 4.

S. D. TUCKER.

Sheet-Delivering Apparatus for Printing-Machines.

No. 197,700. Patented Nov. 27, 1877.

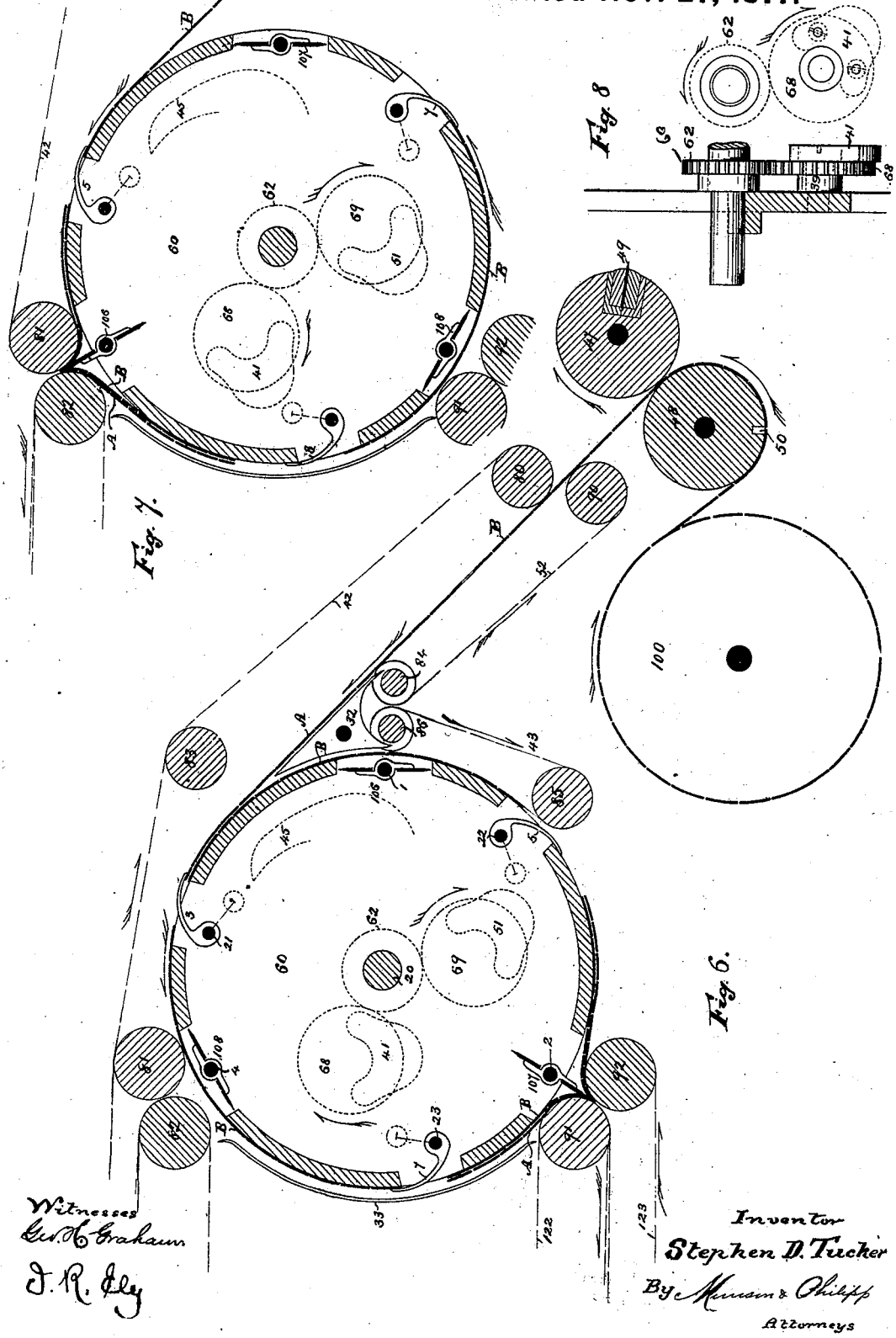

Fig. 7.

Fig. 8

Fig. 6.

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5 Sheets—Sheet 5.

S. D. TUCKER.

Sheet-Delivering Apparatus for Printing-Machines

No. 197,700. **Patented Nov. 27, 1877.**

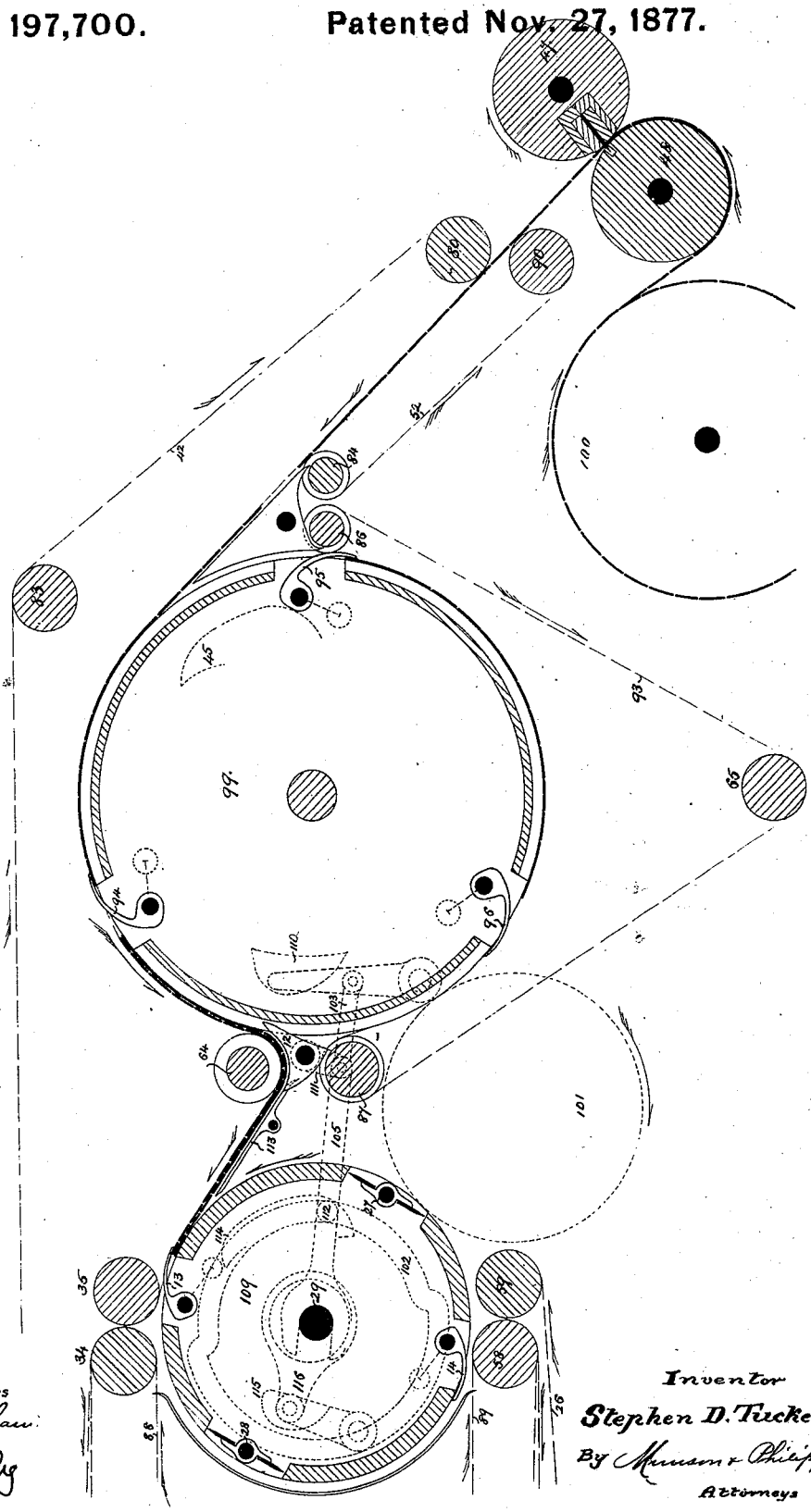

Fig. 9.

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UNITED STATES PATENT OFFICE.

STEPHEN D. TUCKER, OF NEW YORK, N. Y.

IMPROVEMENT IN SHEET-DELIVERING APPARATUS FOR PRINTING-MACHINES.

Specification forming part of Letters Patent No. **197,700**, dated November 27, 1877; application filed November 22, 1877.

To all whom it may concern:

Be it known that I, STEPHEN D. TUCKER, of the city, county, and State of New York, have invented an Improvement in Sheet-Delivering Apparatus for Printing-Machines, of which the following is a specification:

This invention relates to that class of delivering mechanisms for printing-machines wherein two or more sets, each consisting of two or more sheets, (as the inside and outside sheets of a newspaper composed of two separate sheets,) are collected or accumulated upon a rotating carrier, and said sets of sheets delivered therefrom in succession at the same or different points of the said carrier; and it consists, essentially, of a sheet-delivering carrier, having a circumference which is equal to the length in their line of travel of the number of sheets to be collected or accumulated together in a set, plus one, upon its surface; or its circumference may be a multiple of said number, plus one. This cylinder is provided with collecting or accumulating mechanisms whereby sheets delivered in succession upon it will be associated in sets consisting of twos, threes, fours, and so on, each of which sets comprises the separate sheets, forming a complete whole, and, in combination therewith, a corresponding number of folding-blades, whereby said sheets may not only be associated in sets, but said sets of sheets be delivered folded.

The invention also embraces details of construction and operating mechanisms, fully hereinafter pointed out.

An apparatus embodying the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a right-hand elevation; Fig. 2, a left-hand elevation; Fig. 3, a front-end elevation. Figs. 4 and 5 are views of part of the mechanisms for operating the folding-blade cams; Fig. 6, a longitudinal section of the apparatus, as seen from the left-hand side; Fig. 7, a similar view of the delivering-carrier; Fig. 8, detail views of a revolving griper-opening cam; and Fig. 9, a longitudinal section of a delivering-carrier combined with a separate folding mechanism.

Though this apparatus is particularly designed to be attached to and form a part of a rotary "web-perfecting" printing-machine, in which the type-cylinders carry two forms, printing, respectively, the inside and outside sheets of a newspaper, it may obviously receive and manipulate sheets fed to it by hand or mechanically, and whether blank, as from a paper-making machine, or printed, as from a printing-machine. As here shown, the cylinders 47 48, one of which supports a cutting-blade, 49, and the other of which is provided with a cutting-slot, 50, are supposed to form a part of a rotary web-perfecting printing-machine. They are geared together by toothed wheels 70 74, so as to run in unison, and they will be driven (preferably by gearing connecting them with the printing-machine) so as to run in unison with the type-cylinders of the printing-machine, and the male cylinder 47 will have a circumference equal to one-half the size of said type-cylinders.

The delivering-carrier 60, while provided with mechanisms which adapt it to collect or accumulate three separate sets of sheets upon its surface, each of which consists of two sheets laid one upon another, may, also, and, preferably will, be furnished with means for folding said bodies of sheets, thus becoming a combined accumulating and folding mechanism, as in the Patent No. 191,494, granted to S. D. Tucker, May 29, 1877; but it may be an accumulating mechanism only, and deliver its several sets of collected or accumulated sheets to an independent folding mechanism, as will be hereinafter more fully explained.

This delivering-carrier 60, which is herein shown in the form of a cylinder, is furnished with three sets of gripers, 3 5 7, on shafts 21 22 23, the office of which is to seize, convey, and release the sheets at proper times. These griper-shafts 21 22 23 each have on one of their ends an overhanging cross-head, as 19, one end of which is provided with a friction-roller, as 9, to ride over the cams, to open the gripers, and its other end is furnished with a rod and spiral spring 46, to close them. This carrier is also furnished with three rotating double folding-blades, 106 107 108, on shafts 1 2 4, which blades co-operate with folding-rollers arranged in pairs, as 81 82 and 91 92, at proper points of the periphery of the said carrier 60. The said gripers are arranged at equidistant

points in the carrier 60, as are the said folding-blades, the leading edges of the latter being midway between each two sets of gripers, each set of gripers being thus adapted to receive a sheet, and hold it upon the carrier in position to be manipulated by an appropriate one of the folding-blades.

The mechanisms actuating these folding-blades are arranged to operate them at two delivering-points from the carrier 60, as will be explained, which said points of delivery are occupied by the pairs of folding-rollers 81 82 and 91 92. These folding-rollers are driven by a toothed wheel, 78, fixed at one end of the shaft 20 of the carrier 60, which wheel gears with and drives the pinion 118 on the roller 81, and the pinion 119 on the roller 91, and these in turn gear with and drive the pinions 120 121 on the companion rollers 82 92. The carrier 60 has a toothed wheel, 72, secured to the outer end of its shaft 20, by which it is rotated through the intermediate toothed wheel 73 by the toothed wheel 74 on the shaft of the cutting-cylinder 48, and these wheels 72 74 are so proportioned to each other that the cutting-cylinders will make three revolutions to one of the carrier 60—that is to say, they will cut a sheet for each set of its gripers 3 5 7, or each corresponding folding-blade that passes a given point.

The sheets are conducted to the carrier 60 by means of endless carrying-tapes 42 52, the set 42 of which pass around the roller 80, up to and partially around the said carrier, between the folding-rollers 81 82, and return over the roller 83 to the roller 80. The set of tapes 52 pass around the roller 90, up to and around the roller 84, and return to the roller 90, and these two sets of tapes are caused to run in unison by means of the toothed wheels 75 76, which gear their rollers 80 90 together. A guard, 33, covers that portion of the carrier 60 which lies between the rollers 82 91, and a set of tapes, 43, running over the rollers 85 86, are driven by means of a pinion, 61, fixed upon the shaft of the roller 85, which pinion gears into and is driven by the toothed wheel 78 on the shaft 20 of the carrier 60. These tapes 43 cover that portion of the carrier 60 which lies between the point where the gripers release sheets which are to be folded through the rollers 91 92 and the point of reception for the sheets upon the carrier. This point of reception for the sheets is occupied by a conductor, 32, whose upper surface is aligned with the tapes 42, and whose inner surface coincides with the periphery of the carrier 60.

The diameter of the carrier 60 is somewhat greater than three times that of the cutting-cylinders, so that its circumferential speed is a little greater than theirs, and the carrying-tapes are driven at the same speed as the carrier by the toothed wheel 71, secured to the cutting-cylinder 48, driving the toothed wheel 117, fast upon the shaft of the roller 90, through the intermediate toothed wheel 77, the wheels 117 71 being so proportioned to each other as to accomplish this.

The web of paper (herein shown as passing from a reel, 100) will be led from the printing-machine directly through the cutting-cylinders 47 48, and, as the cutting-blade 49 in the cylinder 47 has portions of its edge removed at certain places, as 31, the web will be but partially severed on the lines dividing it into sheets, thus being left joined at those places.

As the partially-severed web enters between the carrying-tapes 42 52, it is forced to run at the speed of the cutting-cylinders until its leading edge, guided by the conductor 32, is directed onto the carrier 60, where it is nipped between the tapes 42 and the periphery of the said carrier, and at the same time is seized by one set of its gripers, and these instrumentalities carry it forward at an increased rate of speed, and detach or tear it apart upon its line of partial severance, which has then just entered between the tapes 42 52.

Each set of gripers as it approaches the point of reception of the sheets to receive the leading edge of an incoming sheet, then undetached from the web, is opened by the stationary griper-cam 45, over whose surface a friction-roller on its cross-head is forced to ride, and closed (by the spring-rod 46) in passing off from said cam 45, to seize, aid in detaching it from the web, and carry the sheet around upon the carrier, until said set of gripers is again opened by the cam 45 to receive a second sheet upon the first, and carry both around upon the carrier until said gripers are again opened.

Each set of gripers is at proper times also opened to release the sheets, so that they may be folded into one of the two pairs of folding-rollers 81 82 or 91 92, by riding over one of two revolving cams, 41 or 51. The revolving cam 41 is fixed to the side of a toothed wheel, 68, which rotates on a stud, 39, secured to the side frame, and driven by a pinion, 62, fastened to the shaft 20 of the carrier 60. Similarly the revolving cam 51 is fixed to the side of the toothed wheel 69, which runs on a stud, 40, and is driven by the same pinion 62. Now, the proportion of the pinion 62 is to the wheels 68 69 as 1 is to $1\frac{1}{3}$, so that the carrier 60 will make one and one-third revolution to one revolution of the revolving cams 41 51, and, as the carrier 60 is provided with three sets of gripers, 3 5 7, it follows that the revolving cams 41 51 will each make one revolution to each one and one-third revolution of the carrier and to each fourth set of gripers that passes them; but these cams are so timed as to be brought into position to act alternately on the sets of gripers passing them, whence it follows that each second set of gripers will be alternately opened by the cams 41 51, while the intermediate sets will pass by unoperated.

The folding-blade shafts 1 2 4 each have on one of their ends an overhanging cross-head, as 11, each end of which is furnished with fric-

tion-rollers, as 6 8, which ends, as the carrier revolves, alternately come into contact with a flying cam, 15 or 17, and a stationary cam, 16 or 18, the co-operation of which cams will cause the folding-blades to make a semi-rotation, and fold the sheets overlying them into the nip of the folding-rollers 81 82 or 91 92, which operation is particularly described in a companion application filed November 6, 1877.

On the outer end of the shaft 20 of the carrier 60, opposite to that supporting the wheel 72, a broad-faced pinion, 63, is secured, which pinion gears into and drives the toothed wheel 66, fixed on the shaft 24, and also the toothed wheel 67, fixed on the shaft 25. The outer ends of these shafts are supported in a bracket, 104, and they run through the side frame, and on their inner ends they each carry one of the flying cams 15 and 17. These shafts 24 25, in addition to their revolving motion, have a lateral reciprocating motion imparted to them, for a purpose which will be presently explained. This lateral reciprocating motion is effected by the broad-faced pinion 63, driving a toothed wheel, 79, which runs loosely on a stud, 38, and has a grooved cam, 56, fixed to its outer side. A vibrating lever, 53, is pivoted near its center to a stud, 36, and its short arm enters the groove of the cam 56, while its long arm engages with a groove, 55, cut in the hub of the wheel 66, so that, as the cam 56 revolves, it causes the wheel 66, its shaft 24, and the flying cam 15, on its inner end, to reciprocate laterally. A similar vibrating lever, 54, also engages with the grooved cam 56 and with a groove, 57, in the hub of the wheel 67, and thus gives a similar reciprocating motion to the shaft 25 and its flying cam 17. But this pinion 63 is of such a width that the wheels 66 67 can move laterally without being disengaged from it, so that the wheels 66 67, their shafts 24 25, and flying cams 15 17, will continue to revolve while being reciprocated laterally.

The object of this lateral reciprocation is to move the flying cams 15 17 at certain times, inwardly into the path of travel of the leading friction-roller 6 or 8, on the overhanging cross-heads of the folding-blade shafts, and thus intercept them, and, in combination with the stationary cams 16 18, to cause the folding-blades to be projected between the folding-rollers in performing the folding operation. The flying cams are withdrawn or moved outward beyond the path of travel of the friction-rollers 6 or 8, so that the folding-blades may pass them without being operated.

The proportion of the pinion 63 to the wheels 66 67 79, is as 1 is to 1⅓, so that the carrier 60 will make one and one-third revolution to one revolution, and also to one reciprocation of the flying cams 15 17, in and out of the path of travel of the said friction-rollers 6 and 8. Now, the carrier 60 has three folding-blades, so that, as it revolves, four blades will pass by during each revolution and reciprocation of the flying cams. But these flying cams are, by the position of the levers 53 54 in the cam 56, caused to reciprocate alternately—that is to say, each folding-blade, as it passes, will be operated by the flying cam 15 or 17 to double the sheets overlying it into the nip of a pair of folding-rollers, 81 82 or 91 92. This operation, it will be observed, coincides with the opening of each second set of gripers to liberate its sheet for the action of said folding-blades. Furthermore, the movement of the griper-cam 41 is so timed as to open the gripers just as the flying cam 15 begins to operate to double the sheets they carry into the nip of the pair of folding-rollers 81 82, and, in like manner, the movements of the griper-cam 51 and flying cam 17 will correspond to deliver the next second set of associated sheets to the pair of folding-rollers 91 92.

In order to a clearer understanding of the operation of this apparatus, its manipulation of the sheets will now be described. For this purpose, the mechanism will be assumed to have been in operation, so that the carrier 60 will be receiving sheets in sets upon its surface, and discharging the same.

When in the position of Fig. 6, the revolving cam 51 will have been so rotated as to have intercepted and opened the gripers 5 to release the set of sheets A B carried by them, and the flying cam 17 will have been reciprocated inwardly, and revolved so as to intercept the friction-roller 6 and partially rotate and project the folding-blade 107, as in Figs. 1 and 6, to double said set of sheets into the nip of the folding-rollers 91 92, which rollers will deliver said set of sheets to the tapes 122 123, which will deliver them once folded. The sheet B, held by the gripers 7, will be carried around with the carrier as it revolves, the folding-blade 108 not being projected at this time when passing the rollers 81 82, for the reason that the flying cam 15 then stands in its outermost position, as in Fig. 3; and the said folding-blade 108 will also pass the rollers 91 92 without being projected into their nip, for the reason that the flying cam 17 will at that time have also been reciprocated into its outermost position, (see Fig. 7,) the cams 41 51 also being out of position to open the gripers 7. But as the folding-blade 106, which underlies the set of sheets A B held by the gripers 3, arrives at the folding-rollers 81 82, it will be projected to double said set of sheets into their nip by the operation of the flying cam 15, which has then been reciprocated into its innermost position to thus actuate it. The revolving cam 41 will also have moved into position to open the gripers 3 and release said set of sheets. At this time the gripers 5 will be receiving a sheet, B, which will pass the rollers 81 82 without being folded by the folding-blade 107, as the flying cam 15 will then stand in its outermost position, and which sheet will also pass the folding-rollers 91 92 without being folded through them by the said folder 107, the cams 41 51 then being out of position to open the gripers 5.

The next sheet, A, will be received by the gripers 7 and laid upon the sheet B, and this set will pass the rollers 81 82, and be folded through the rollers 91 92 by the folder 108, as was the first set described as undergoing the folding operation, and the operations described will be repeated.

It is to be observed that, in order to associate alternate sheets—that is, such as, differing from each other and taken together, form a complete whole, as the inside and outside sheets of a newspaper—in proper sets upon the carrier 60, it is necessary to provide it with a circumference which is equal to the length, in the direction of their travel, of three sheets plus the necessary space between the heads and tails of each set to provide for the operation of the gripers, or to prevent the sheets interfering with each other, for the reason that by such an arrangement only can non-duplicate sheets passing in succession onto the carrier be laid one upon the other, and be properly associated in sets thereon; and this is equally true whether the said sheets are to be folded, as has been described, or delivered unfolded, as will be described.

When this carrier is to collect and fold alternate sets composed of two four-page sheets, its circumference must be large enough to hold singly three such sheets, as before explained, by reason of the manner in which the forms are placed on the type-cylinders, whereby an inside and an outside sheet will always come alternately. Thus an outside sheet will always be collected upon an inside one. The carrier must also have three folding-blades and three sets of gripers, and the folding and griper cams must be arranged to operate only as every second folding-blade passes, as has been hereinbefore explained, for every second sheet is an outside one, and has an inside sheet beneath it, and it is their folding-blade that, as it passes, is operated by the cam to thus fold the complete pair of sheets into the nip of the folding-rollers. The alternate sheets that are missed by the folding-blades are at that time inside sheets, which, at their next revolution, will receive an outside sheet on top of them, and will then be folded in like manner.

If it is desired to fold the sheets singly, instead of in pairs, the grooved cam 56 must be replaced by one that will at each revolution give two complete reciprocations back and forth to the flying cams. The flying cams are replaced by others that will act twice to each of their revolutions, as illustrated in Fig. 32 of the Patent No. 191,494, granted to S. D. Tucker, May 29, 1877. Each flying cam will then actuate every second folding-blade that passes, and the two cams together will operate all the folding-blades, and hence, while one folding-blade will operate at the folding-rollers 81 82, the next will operate at the folding-rollers 91 92, the next at the rollers 81 82, and so on, whereby the sheets received upon the carrier in the order 1, 3, 5, &c., will be folded through the rollers 81 82, and those received in the order 2, 4, 6, &c., will be folded through the rollers 91 92. An additional revolving griper-cam is put on each of the wheels 68 69, so as to open the appropriate gripers, as they pass proper points, to release sheets alternately at the said folding-rollers 81 82 and 91 92.

It is obvious that if it is required to associate in sets upon and deliver from a carrier, as 60, three, four, or any other number of non-duplicate sheets fed in succession thereto, said delivering-carrier must have a circumference equal to the length of the number of the sheets to be so collected in a set, plus one, upon its surface, and delivered therefrom, and if these sets of sheets are to be folded by folding-blades supported by said carrier, then said folding-blades must correspond in number with that of the sets of sheets upon the surface of the carrier, and these folding-blades must be timed to fold the said sets of sheets, when the same are completed in their number of sheets, alternately through the folding-rollers 81 82 and 91 92; but it may be preferable to increase the number of these folding-rollers as the number of sets of sheets is increased.

Duplicate sheets to any convenient number—as, say, 10, 20, 25—may be collected in sets and folded together, thus forming packages folded and counted ready for delivery.

This delivering-carrier may, however, perform only the office of collecting or associating said sheets in sets, and have the same directed to an independent folding mechanism. This is illustrated in Fig. 9, wherein is shown a delivering-carrier adapted to collect or associate non-duplicate sheets in succession in sets of pairs upon its surface—such as, say, two four-page sheets to form an eight-page newspaper. Its circumference must be large enough to take on singly three sheets, for the same reasons that are explained in the case of the folding accumulating-carrier hereinbefore described, and this carrier may deliver its collected inside and outside sheets in pairs to a folding mechanism to be folded, or to a sheet-flier to be piled flat. Such an apparatus is shown in Fig. 9, where 99 is the delivering-carrier, provided with three sets of gripers, 94 95 96, to seize and carry forward the sheets, and with a switch, 12, to discharge them at the proper time.

A folding-carrier, 109, will receive the sheets from the collecting-carrier, and fold them into the nip of the pairs of folding-rollers 34 35 or 58 59. The series of endless conducting-tapes 42, stretched from the roller 80, near the upper cutting-cylinder 47, extend partially around the carrier 99, under the roller 64, to the folding-carrier 109, under the folding-roller 35, over the folding-roller 34, around a roller not shown, and return over the roller 83 to the roller 80. The companion set 52 run from the roller 90, near the lower cutting-cylinder 48, around the roller 84, back to the roller 90. A third set of tapes, 93, run from the roller 87, around the lower surface of the carrier 99,

around the roller 86, and return around the roller 65 to the roller 87. Other tapes, 88 89 26, convey the once-folded sheets off from the folding-rollers 34 35 and 58 59, to be further folded or otherwise disposed of. The folding-carrier 109, which is geared to the collecting-carrier by the intermediate wheel 101, is just two-thirds the diameter of the collecting-carrier, and runs at the same surface speed, so that it will make one revolution while the collecting-carrier makes but two-thirds of a revolution—that is to say, while two sets of gripers are passing. This folding-carrier is provided with two sets of gripers, 13 14, and two rotary folders, 27 28. The blade 27 will fold its sheets into the pair of folding-rollers 34 35, and the blade 28 will deliver its sheets to the pair of rollers 58 59 by the co-operation of flying and stationary folding-cams, as already described in a patent granted to S. D. Tucker, December 14, 1875, No. 171,196. As the folding-blades must operate but once to each revolution of the folding-carrier, the flying cam will run turn for turn with the carrier; consequently, when the blade 27 passes the rollers 58 59, the point of the flying cam will at that time be turned toward the center of the carrier, and the blade will pass on unoperated; and the same will be the case when the blade 28 passes the rollers 34 35. Thus each blade will always deliver its sheets into the same rollers and into no others. A grooved cam, 102, is secured to the shaft 29 of the folding-carrier, and imparts motion to the switch 12, and through the link 103 to the griper-opening cam 110, by means of a connecting-rod, 105, one end of which is jointed to an arm, 111, on the switch-shaft, and the other end is forked to embrace the shaft 29 of the folding-carrier. This rod 105 is provided with a pin, 112, that runs in the groove of the cam 102, and thus gives motion to the griper-cam and switch. The shape of the cam 102 is such that it will bring the griper-cam and switch into operation as each second set of gripers approach it, and the gripers will be opened and the points of the switch enter the grooves in the cylinder through the space between the sets of sheets, and thus direct the sheets off, and the cam is so timed that these gripers are just the ones that then carry complete pairs of inside and outside sheets.

As the pairs of sheets are directed off from the carrier by the switch 12 they are conducted by the guides 113 and assisted by the tapes 42 to the folding-carrier, where they are seized by the gripers 13, which have been opened by the stationary cam 114. The sheets are then seized and carried around until the gripers are intercepted by the vibrating griper-cam 115, which opens them just in time for the folding-blade 27 to fold the sheets into the rollers 34 35.

The griper-cam 115 is vibrated by an eccentric, 116, on the shaft 29 of the folding-carrier, so that at each revolution of the carrier it is moved out to open the gripers 13 and drawn in to escape the gripers 14. These latter are opened at the proper time for the operation of the blade 28 upon its sheets by the stationary cam 114. It will be seen that when sheets collected in pairs are to be folded they are always seized by the gripers 13, and folded by the blade 27 into the rollers 34 35, the other blade and set of gripers working uselessly, or they may be rendered inoperative. But when it is desired to fold the four-page sheets singly, the switch 12 and griper-cam 110 are detached from the cam 115, and made stationary, so as to guide off each sheet singly to the folding-carrier, where they will be seized in succession by the gripers 13 14 and folded into the rollers 34 35 and 58 59, alternately.

The folding-carrier 109 may be of but one-half its present size, and have but one folding-blade and set of gripers, and one pair of folding-rollers. In that case it will make three revolutions to the collecting-carrier's one, so that when folding the sheets collected in pairs every second revolution will be an idle one; but when the sheets are to be folded singly it will fold one at each revolution. Three or more sheets may be thus collected and folded, and in so adapting it the carrier must always be of sufficient size to hold the number of sheets to be collected in a set, plus one, as before described.

The once-folded sheets as they issue from the folding-rollers of this apparatus may be again folded, either parallel with or at right angles to the first fold. This may be done by either of the rotary mechanisms herein described, or by the constantly-rotating blade, (shown in Figs. 17, 18, 22, 23, of the Patent granted to S. D. Tucker, December 14, 1875, No. 171,196, or as in No. 191,494, May 29, 1877,) or by reciprocating blades.

The accumulating carrier or cylinder 60 or 99 will preferably be provided with gripers, as before explained, to seize and retain the sheets received upon it; but said gripers may be dispensed with.

It is apparent that longitudinal or transverse lines of paste may be applied to the upper side of the inside sheets, or to the under side of the outside sheets, at proper points thereof, according as said sheets, when associated, are to be subsequently folded after receiving their first fold by the folding-blades of this apparatus.

The following is not herein claimed: Printing, cutting, web or sheet controlling, and rotary folding mechanism, in all their combinations with each other.

What, therefore, is claimed is—

1. An accumulating-carrier having a circumference equal to the length of the number, plus one, of sheets to be collected together in a set upon its surface, in combination with means for collecting or accumulating many separate sets of sheets thereon, and with means for delivering the same in succession therefrom, all substantially as described.

2. A sheet-delivering carrier having a cir-

cumference equal to the length of the number, plus one, of sheets to be collected together in a set upon its surface, in combination with means for so collecting sheets thereon, whereby sheets delivered in succession upon said carrier will be associated together in sets, all substantially as described.

3. A sheet-delivering carrier having a circumference equal to the length of the number, plus one, of the sheets to be collected together in separate sets upon its surface, in combination with means for so collecting sheets thereon, and with a corresponding number of folding-blades, whereby sheets delivered in succession upon said carrier will be associated and folded together in sets, all substantially as described.

4. A sheet-delivering carrier combined with means for collecting or accumulating many separate sets of sheets thereon, and provided with one point of reception and two points of delivery for said sheets, all substantially as described.

5. A sheet-delivering carrier combined with means for collecting or accumulating separate sets of sheets thereon, and with three or more folding-blades and mechanisms operating the same at proper intervals so as to fold said bodies of sheets, all substantially as described.

6. A sheet-delivering carrier combined with means for collecting or accumulating separate sets of sheets thereon, and with three or more folding-blades and mechanisms for operating the same at proper intervals to fold said sets of sheets, in combination with two sets of co-operating folding-rollers, all substantially as described.

7. A sheet-accumulating carrier provided with three or more sets of gripers, in combination with mechanisms actuating said gripers so as to release the sheets at two points of delivery from said carrier, all substantially as described.

8. In combination with a cutting mechanism adapted to sever a web into suitably-sized sheets, a delivering-carrier whose circumference is equal to the length of three or other uneven number of such sheets, and means for accumulating sheets thereon, whereby sets of two sheets may be collected or accumulated and delivered as a single product, all substantially as described.

9. In combination with a cutting mechanism adapted to sever a web into suitably-sized sheets, a delivering carrier whose circumference is equal to the length of three or other uneven number of such sheets, and which is provided with three or other corresponding uneven number of folding-blades, and means for accumulating sheets thereon, whereby sets of two sheets may be collected or accumulated and simultaneously folded as a single product, all substantially as described.

10. In combination with a cutting mechanism adapted to sever a web into suitably-sized sheets and a delivering-carrier whose circumference is equal to the length of three or other uneven number of such sheets, and which is provided with three or other uneven number of folding-blades, and mechanisms operating the same at proper intervals, two independent pairs of folding-rollers with which said folding-blades co-operate, all substantially as described.

11. The combination, with a cutting mechanism adapted to sever the web into suitably-sized sheets, of a delivering-carrier whose circumference is equal to the length of three or other uneven number of such sheets, and which is provided with three or other uneven number of folding-blades, and with a corresponding number of gripers, and with means for accumulating sheets thereon, all substantially as described.

12. A folder-carrier supporting two or more rotary folding-blades, in combination with two flying cams and mechanisms for automatically reciprocating them laterally into and out of position to operate said folding-blades, all substantially as described.

13. A rotating carrier provided with two or more sets of sheet-controlling gripers, in combination with two revolving cams for operating said gripers, all substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

STEPHEN D. TUCKER.

Witnesses:
H. T. MUNSON,
GEO. H. GRAHAM.