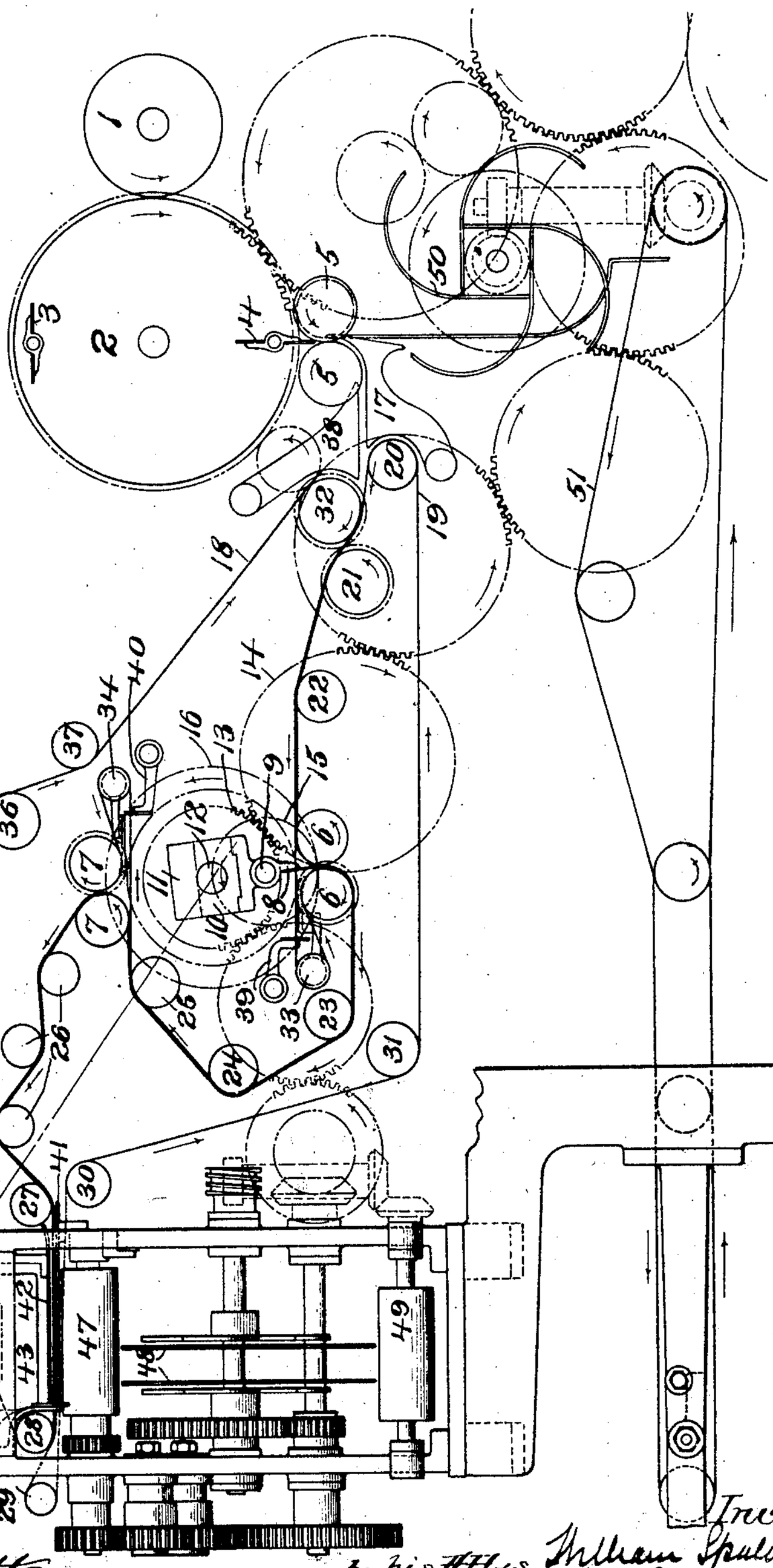
No. 839,899. PATENTED JAN. 1, 1907.

W. SPALCKHAVER.

FOLDING MACHINE.

APPLICATION FILED JULY 1, 1905.



Witnesses:
Geo. H. Gotts.
A. White

Inventor:
William Spalckhaver
by his Attys
Philipp & Simon. Rice & Kennedy

UNITED STATES PATENT OFFICE.

WILLIAM SPALCKHAVER, OF NEW YORK, N. Y., ASSIGNOR TO ROBERT HOE, OF NEW YORK, N. Y.

FOLDING-MACHINE.

No. 839,899. Specification of Letters Patent. Patented Jan. 1, 1907.

Application filed July 1, 1905. Serial No. 267,947.

To all whom it may concern:

Be it known that I, WILLIAM SPALCKHAVER, a citizen of the United States, residing at New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Folding-Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in folding-machines.

In folding sheets, and more particularly in folding printed sheets, such as newspapers, it is customary after the sheet has been folded to page size to give it a single fold at right angles to the columns of the page, this fold being known as the "carrier-fold." Most newspapers are delivered folded in this manner. In some instances the paper is given what is sometimes termed a "mailing-fold," which fold is on a line at right angles to the preceding or carrier fold, these papers being again folded by hand while a mailing-wrapper is being placed on them. In some instances still another fold is given the paper, this fold being parallel to the last fold and central of the folded sheet, this fold bringing the paper down to the proper size for the wrapper which is placed thereon, so that it is not necessary to fold during the wrapping operation.

Certain publications the pages of which are considerably smaller than the ordinary newspaper-page are prepared for delivery by giving them a fold transverse to the page and then a second fold parallel thereto. This method of folding has the advantage that the folded publication displays the entire page head or name of the publication. This method of folding cannot, however, be adopted in newspapers for the reason that two folds such as have been described would make a package too large to be easily handled, and if the paper be given still another parallel fold the package would be clumsy for mailing purposes.

It is the object of this invention to produce a folding-machine which shall reduce a sheet, newspaper, or similar publication to a convenient size for mailing or the pocket, the folds being produced in such a manner as to make it possible to display the head of the page which may contain the title of the publication.

The invention extends to certain details of construction, as will hereinafter appear.

With these and other objects not specifically referred to in view the invention consists in certain constructions and in certain parts, improvements, and combinations, as will be hereinafter fully described and then specifically pointed out.

In the drawing the figure represents in diagrammatic side elevation a folding-machine embodying the invention.

In the machine illustrated in the drawing, which machine is particularly adapted for folding newspapers, devices are employed for giving the sheet what may be termed a "central-page" fold. When a machine embodying the invention contains mechanism for giving this central-page fold, it may be of any suitable or desired character. In the particular construction illustrated there is provided a pair of cylinders 1 2, the cylinder 1 being a cutting-cylinder of ordinary construction and the cylinder 2 being a folding-cylinder, such as is commonly used in connection therewith, this cylinder being provided with rotating blades 3 4. These rotating blades coöperate with a pair of rolls 5, the construction and operation of devices of this character being well understood.

When devices such as have been described are employed in the machine, the sheet after being folded is forwarded to other folding devices by which it is given two parallel folds, the first of which is at unequal distances from the front and rear edges of the sheet, the sheet, if it be a folded sheet, being forwarded in a path at right angles to its folded edge.

The folding devices by which the folds just referred to are effected may be of any desired character. In the particular construction shown two pairs of rolls are employed, the rolls of one pair being marked 6 and the rolls of the other pair being marked 7. Coöperating with these rolls is a blade 8, which is mounted on a shaft 9. This shaft is mounted in bearings carried on projections 10 from a cross-bar 11, this bar rotating on journals 12. The bar is rotated by a gear 13 in mesh with a gear 14, which forms part of a train from the main driving-shaft of the machine, the speed of rotation being such that the blade meets and folds each sheet as it is advanced by the sheet-forwarding mechanism, to be

hereinafter described. The blade not only rotates about the axis of the bar 11, but also has a rotating movement about its own center, this being produced by a gear 15 traveling on a stationary internal gear, (indicated at 16.) These gears 15 16 are so related to each other that the blade is in tucking position with respect to the rolls 6 7 as it passes them in its rotation around the axis of the bar 11. This general type of folding mechanism is well known in the art, and any other suitable form of mechanism may be substituted therefor.

The sheets after leaving the rolls 5 are directed by a switch 17 into a tape-pathway consisting of upper and lower tapes 18 19. The tapes 19 pass over rolls 20, 21, and 22 to the right-hand one of the rolls 6. From this roll they pass down between the rolls 6, under the left-hand roll 6, and then over rolls 23, 24, and 25. From the roll 25 they pass between the rolls 7 and around the left-hand one of the rolls 7. After leaving the rolls 7 they pass over a series of guide-rolls 26 to a roll 27, which is located adjacent to another folding mechanism, which will be hereinafter described. From this roll 27 they pass under a roll 28 to and around a roll 29, located on the other side of the folding mechanism referred to and then back to guide-rolls 30 and 31. The tapes 18 run around a roll 32, which in the particular machine illustrated is shown as located between the rolls 20 and 21 and is positioned so as to give the tapes a nipping bend between these rolls. From the roll 32 these tapes pass over the rolls 21 and 22 before referred to and to and around a guide-roll 33, which is located to the left of the left-hand roll 6. From this roll 33 these tapes run between the rolls 6, around the left-hand roll, and then over the guides 23, 24, and 25 referred to. After leaving the roll 25 these tapes pass over a roll 34, located to the right of the right-hand roll 7. From this roll 34 they pass around the right-hand roll 7 and between these rolls. From these rolls they run through the group of rolls 26 referred to and around the rolls 27 and 28. From the roll 28 they return around rolls 35, 36, and 37. After leaving the rolls the sheet is directed by the switch 17 and an upper guide 38 into the pathway formed by the tapes before described and is carried along until it meets and is folded by the blade 8 and the coöperating rolls 6. The front end of the sheet is freed from the grip of the tapes as it passes over the right-hand roll, the loop formed by the run of the tapes 18 around the roll 33 forming a pocket into which the leading end of the sheet can run and out of which it is drawn by the folding operation. This blade 8 and the speed of the tapes are so timed that the blade, as has been before indicated, gives the sheet a fold which is at unequal distances from its front and rear edges. In the best constructions this fold will be at a distance from the front edge of the sheet equal to one-third of its length.

While the tape-pathway might be depended on entirely to properly present the sheet to the blade, in the construction shown a stop, as 39, is employed, against which the leading end of the sheet abuts as it comes into folding position. After the sheet has been tucked by the blade between the rolls 6 and the fold formed it is forwarded by the tapes around under the roll 7, the leading end of the sheet, as before, running into a pocket formed by the run of the tapes 18 around the roll 34. A stop, as 40, may, if desired, be employed to stop the sheet in the proper position with respect to the rolls to receive its second fold. At the time when a sheet is in position to receive its second fold it is struck by the blade 8, which has been rotated into folding position, and the sheet is therefore tucked between the rolls 7. This second fold in the best constructions will be made about centrally of the sheet as it lies over the rolls 7. This folding mechanism, therefore, operates to produce two folds in the sheet, these folds in the best constructions being made in such a way that the sheet, referring to its length as it enters the tapes, is reduced to one-third of its length by folds which are equal in size. In many cases it will be desirable to give the sheet an additional fold, which reduces its width. In the best constructions this fold will be made centrally of the width of the sheet, and it may be given the sheet by mechanism of any desired character. In the construction shown the sheet is carried by the run of the tapes heretofore described between guides 41 and 42, these guides underlying a folding-blade 43, having an upward extension 44, pivoted to a rock-arm 45, a link 46 being provided so that the blade receives a parallel motion. This is a usual construction of folding-blade and may be operated in any desired manner. This folding-blade tucks the sheet between rolls 47, which in turn deliver it to a rotating fly-delivery 48, also of usual type. This fly-delivery deposits the folded papers on a traveling belt, one of the supporting-rolls of which is indicated at 49. This rotating fly and the rolls 47 and 49 are driven in the usual manner by gearing, which is illustrated in the drawings, but which it is not necessary to describe.

In addition to the delivery before described it may be desired to deliver the papers directly from the rolls 5 without further fold than it receives from these rolls. When this is desired, the machine may be provided with a rotating fly-delivery 50, and the guide 17, before referred to, will be formed as a switch, which may be thrown in so as to close the pathway between this guide and the guide 38. When this is to be done, the papers will be de-

livered directly from the rolls 5 into the rotating fly-delivery and will be deposited by it on traveling tapes 51. This fly-delivery 50 will be driven by gearing, (generally indicated in the drawings,) which it is unnecessary to describe.

Changes and variations may be made in the construction by which this invention is carried into effect. The invention is not, therefore, to be limited to the specific details of construction hereinbefore described.

What is claimed is—

1. In a delivery for folding newspapers for mailing, the combination with a rotary folder for giving a sheet a central fold, of a sheet-forwarding mechanism operating to forward the sheet in a path at right angles to its folded edge, means for giving the sheet a fold at unequal distances from its front and rear edges, and means for giving the sheet thus folded another fold parallel to the preceding fold.

2. In a delivery for folding newspapers for mailing, the combination with a rotary folder for giving a sheet a central fold, of a sheet-forwarding mechanism operating to forward the sheet in a path at right angles to its folded edge, means for giving the sheet a fold at unequal distances from its front and rear edges, means for giving the sheet thus folded another fold parallel to the preceding fold, and means for giving the sheet thus folded a fold at right angles to said folds.

3. In a delivery for folding newspapers for mailing, the combination with a tape-pathway, of means located in said pathway for giving the sheet two parallel folds, the first of which is at unequal distances from the front and rear edges of the sheet, and means for giving the sheet thus folded another fold at right angles to said folds.

4. In a delivery for folding newspapers for mailing, the combination with a tape-pathway, of a blade, coöperating folding devices, means for operating the blade to give the sheet passing along the pathway two parallel folds, the first of which is at unequal distances from the front and rear edges of the sheet, and means for giving the sheet thus folded another fold at right angles to said folds.

5. In a delivery for folding newspapers for mailing, the combination with two pairs of folding-rolls, of a folding-blade arranged to coöperate at one time with one pair and at another time with the other pair, of means for presenting a sheet to the blade and rolls, so that it will be given two parallel folds, the first of which will be at unequal distances from the front and rear edges of the sheet, and means for giving the sheet thus folded another fold at right angles to the preceding fold.

6. In a delivery for folding newspapers for mailing, the combination with two pairs of folding-rolls, of a rotating folding-blade arranged to coöperate at one time with one pair of rolls and at another time with the other pair of rolls, and a tape-pathway arranged to present a sheet to the first pair of rolls, so that the sheets will receive a fold at unequal distances from their front and rear edges and to the second pair of rolls so that they will receive a fold centrally of the folded sheet.

7. In a delivery for folding newspapers for mailing, the combination with two pairs of folding-rolls, of a rotating folding-blade arranged to coöperate at one time with one pair of rolls and at another time with the other pair of rolls, a tape-pathway arranged to present a sheet to the first pair of rolls, so that the sheets will receive a fold at unequal distances from their front and rear edges and to the second pair of rolls so that they will receive a fold centrally of the folded sheet, a second folding-blade and coöperating folding devices, and means for presenting the sheet thereto so that it will receive a fold at right angles to the preceding folds.

8. In a delivery for folding newspapers for mailing, the combination with means for giving a sheet a central fold, of a blade, two pairs of folding-rolls with which the blade coöperates, and means for forwarding the sheet in a path at right angles to its folded edge and for presenting the sheet to the blade and rolls so that it will receive two parallel folds, the first of which is at unequal distances from its front and rear edges.

9. In a delivery for folding newspapers for mailing, the combination with means for giving a sheet a central fold, of a blade, two pairs of folding-rolls with which the blade coöperates, means for forwarding the sheet in a path at right angles to its folded edge and for presenting the sheet to the blade and rolls so that it will receive two parallel folds, the first of which is at unequal distances from its front and rear edges, and means for giving the sheet a fold at right angles to the preceding folds.

10. In a delivery for folding newspapers for mailing, the combination with means for giving a sheet a central fold, of a blade, two pairs of folding-rolls with which the blade coöperates, means for forwarding the sheet in a path at right angles to its folded edge and for presenting the sheet to the blade and rolls so that it will receive two parallel folds, the first of which is at unequal distances from its front and rear edges, and a folding-blade and coöperating devices for giving the sheet a fold at right angles to the preceding folds.

11. In a delivery for folding newspapers for mailing, the combination with means for giving the sheet a central fold, of a delivery for the sheets thus folded, means operating to forward the sheet in a path at right angles to its folded edge, means for giving the sheet

two parallel folds, the first of which is at unequal distances from the folded edge, means for giving the sheet a fold at right angles to the preceding fold, and means for sending the sheet either to the delivery or the folding mechanism.

12. In a delivery for folding newspapers for mailing, the combination with means for giving the sheet two parallel folds, of means including suitable stops for presenting the sheet to the folding devices so that the first fold will be at unequal distances from the front and rear edges of the sheet, and means for giving the sheet a fold at right angles to the preceding folds.

13. In a delivery for folding newspapers for mailing, the combination with means for giving the sheet a central fold, of two pairs of folding-rolls, a rotating folding-blade coöperating with both pairs of rolls, and means including a tape-pathway and suitable stops for forwarding the folded sheet and presenting it to the blade and pairs of rolls so that it will receive two parallel folds, the first of which is at unequal distances from the front and rear edges of the sheet.

14. In a delivery for folding newspapers for mailing, the combination with means for giving the sheet a central fold, of two pairs of folding-rolls, a rotating folding-blade coöperating with both pairs of rolls, means including a tape-pathway and suitable stops for forwarding the folded sheet and presenting it to the blade and pairs of rolls so that it will receive two parallel folds, the first of which is at unequal distances from the front and rear edges of the sheet, and a blade and suitable folding-rollers for giving the sheet an additional fold at right angles to the preceding folds.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM SPALCKHAVER.

Witnesses:
GEORGE F. READ,
AUGUSTA WHITE.