6 Sheets—Sheet 1.

S. D. TUCKER.

FOLDING-MACHINE.

No. 192,035. Patented June 12, 1877.

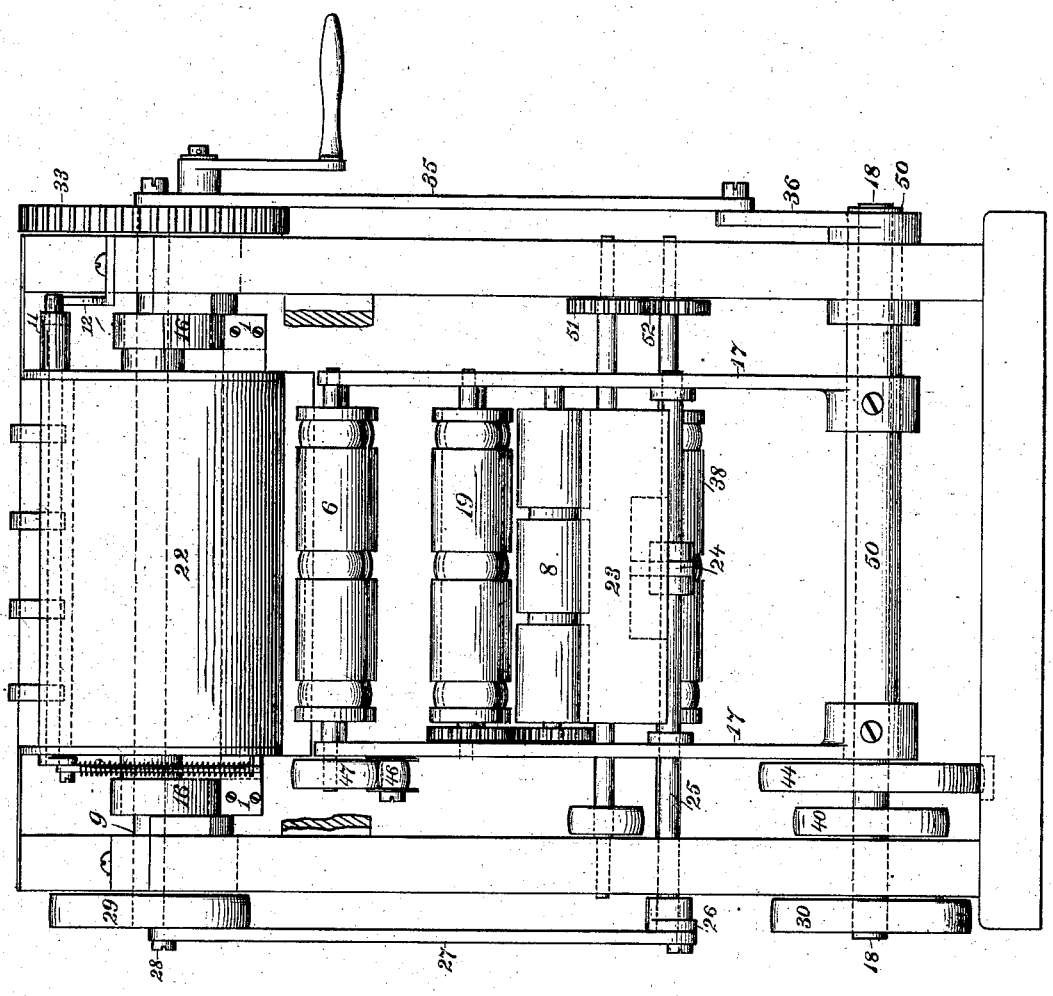

Fig. 1.

Witnesses
Jno. L. Patten
R. E. Grant

Inventor
STEPHEN D. TUCKER,
By Munson & Philipp,
ATTORNEYS.

6 Sheets—Sheet 2.

S. D. TUCKER.

FOLDING-MACHINE.

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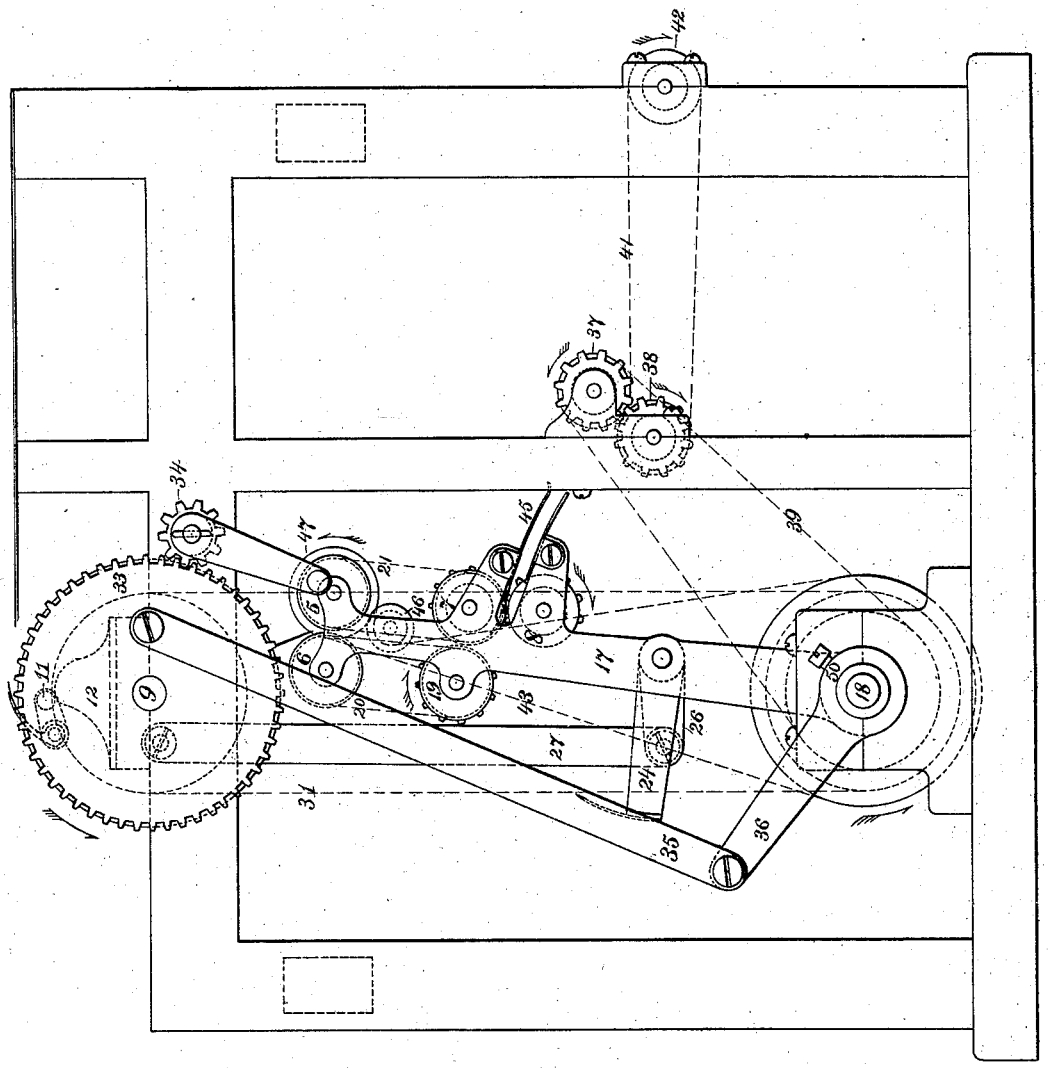

Fig. 2.

Witnesses
Jno. D. Patten
R. E. Traut

Inventor
STEPHEN D. TUCKER,
By Munson & Philipp,
ATTORNEYS.

6 Sheets—Sheet 3.

S. D. TUCKER.

FOLDING-MACHINE.

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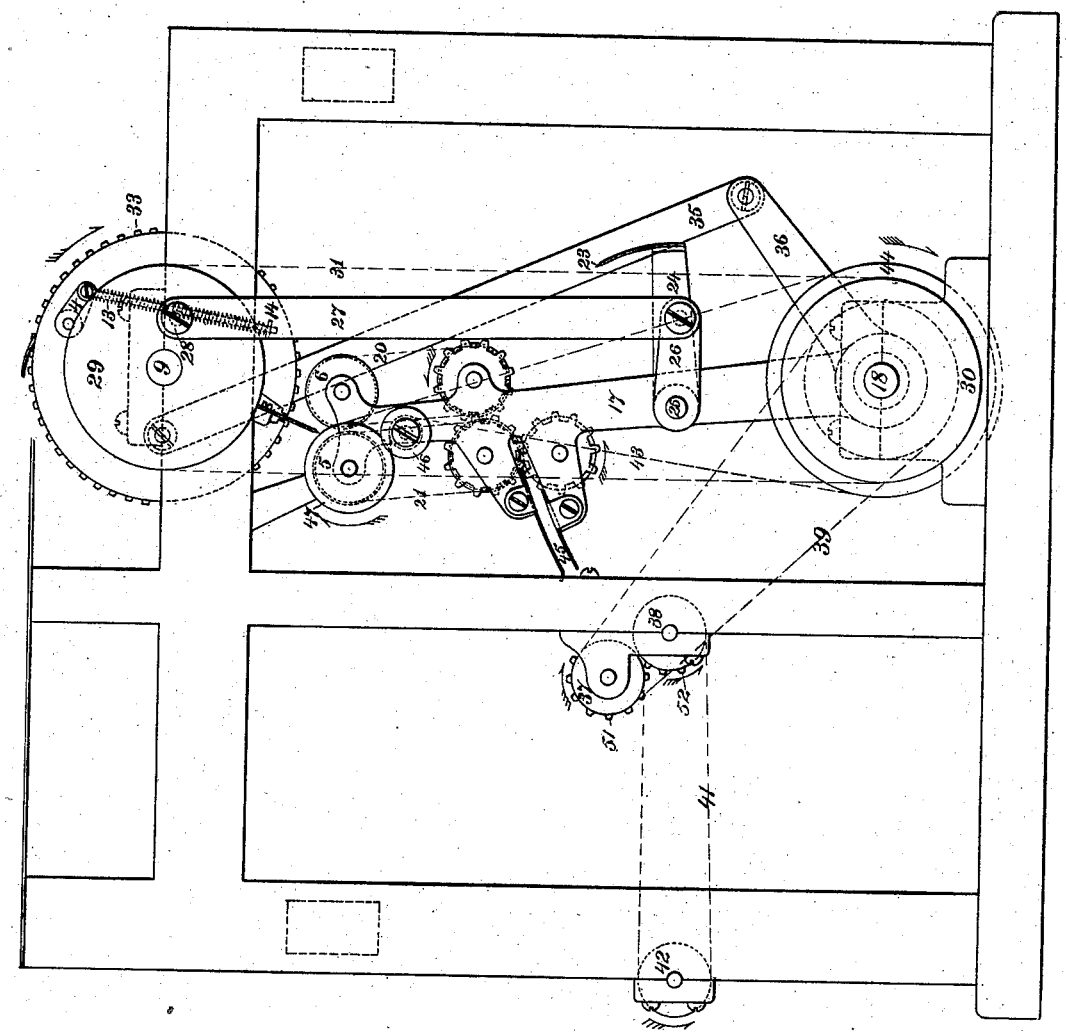

Fig. 3.

Witnesses
Jas. D. Patton.
R. E. Grant.

Inventor
STEPHEN D. TUCKER,
By Munson & Philipp,
ATTORNEYS.

6 Sheets—Sheet 4.

S. D. TUCKER.

FOLDING-MACHINE.

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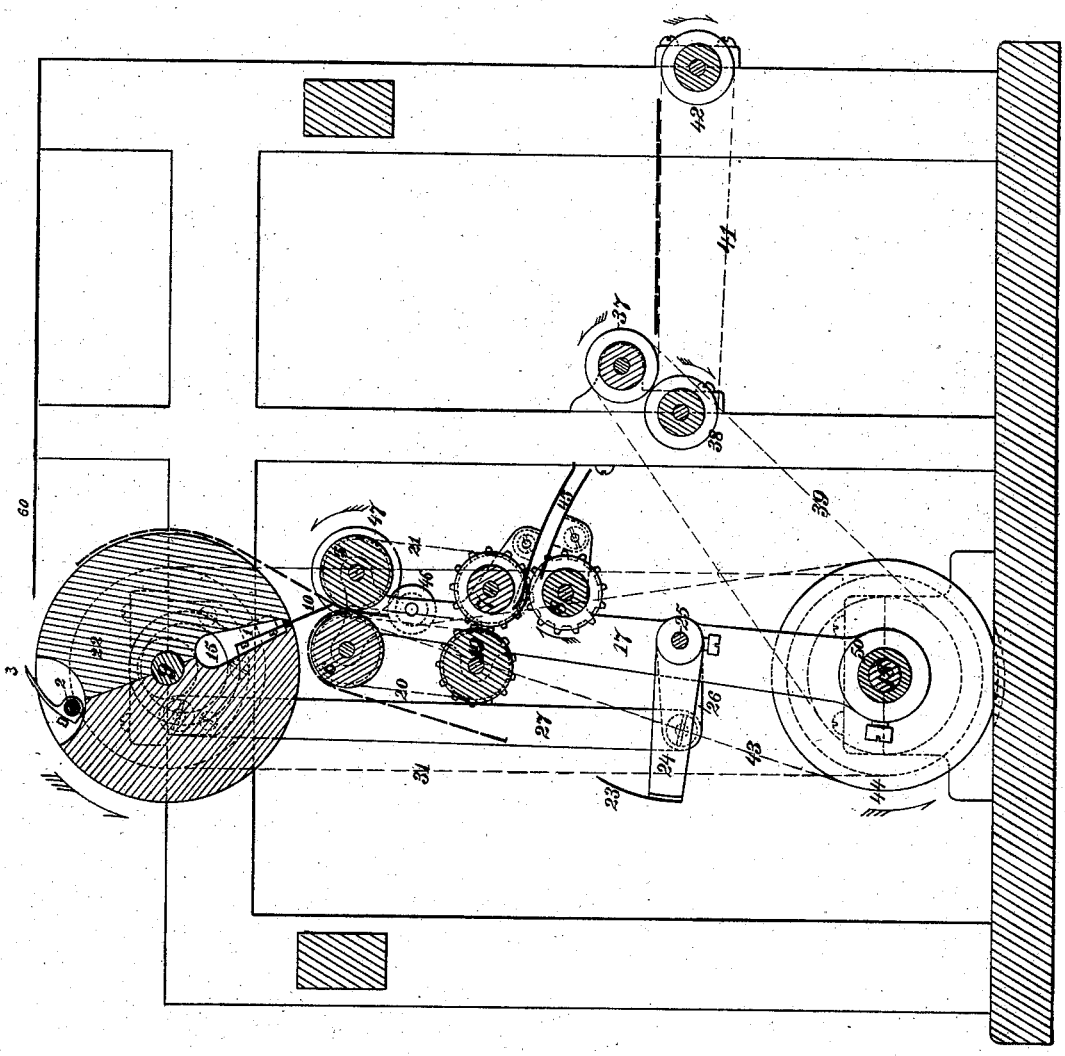


Fig. 4.

Witnesses
Jno. D. Patten
R. E. Grant

Inventor
STEPHEN D. TUCKER,
By Munson & Philipp,
ATTORNEYS.

6 Sheets—Sheet 5.

S. D. TUCKER.

FOLDING-MACHINE.

No. 192,035. Patented June 12, 1877.

Fig. 5.

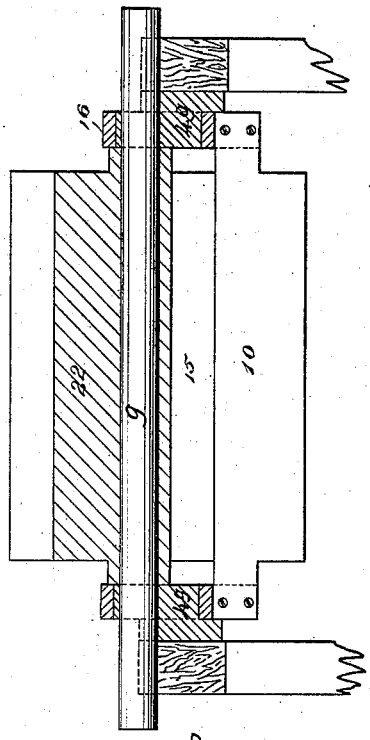


Fig. 8.

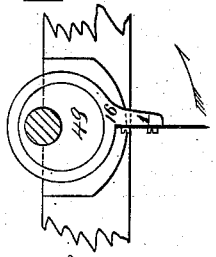


Fig. 7.

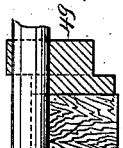


Fig. 6.

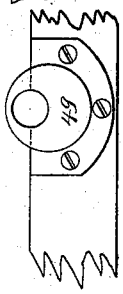


Fig. 11.

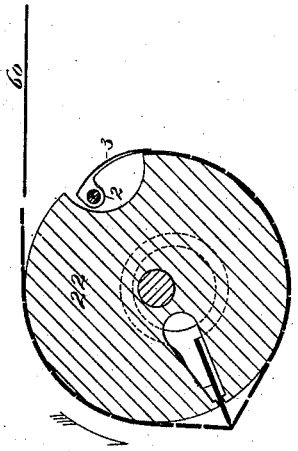


Fig. 10.

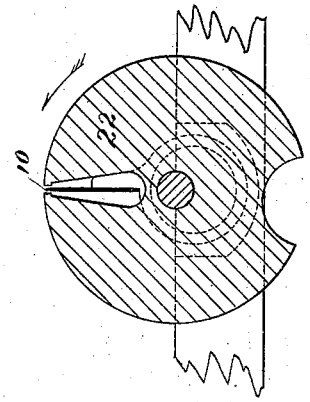
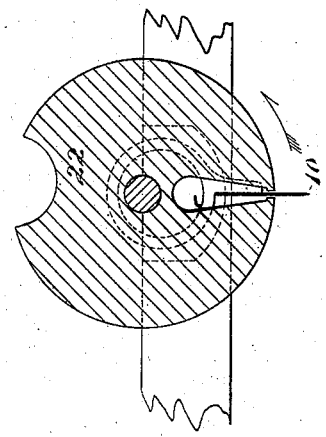


Fig. 9.



Witnesses
Jno. D. Patten
R. E. Traut.

Inventor
Stephen D. Tucker
By Munson & Philipp
Attorneys.

6 Sheets—Sheet 6.

S. D. TUCKER.

FOLDING-MACHINE.

No. 192,035. Patented June 12, 1877.

Fig. 14.

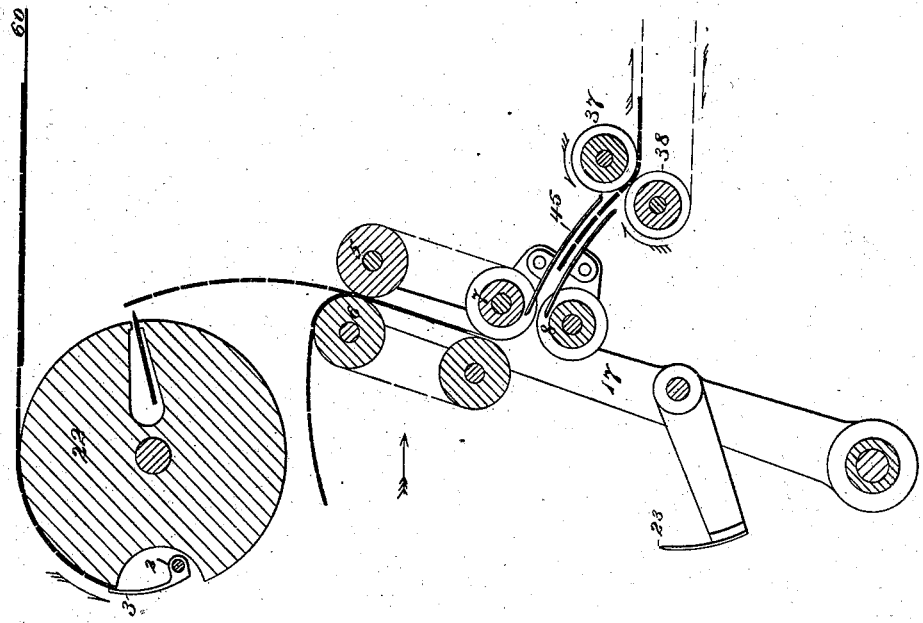


Fig. 13.

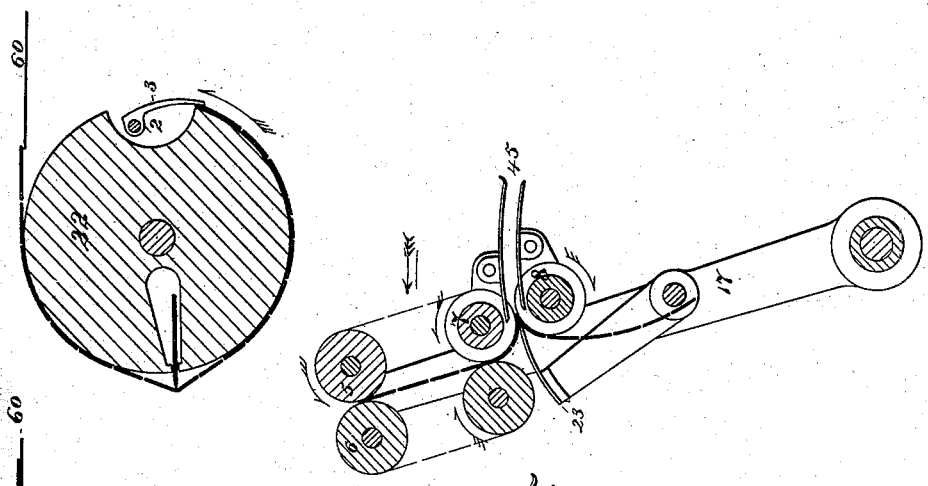
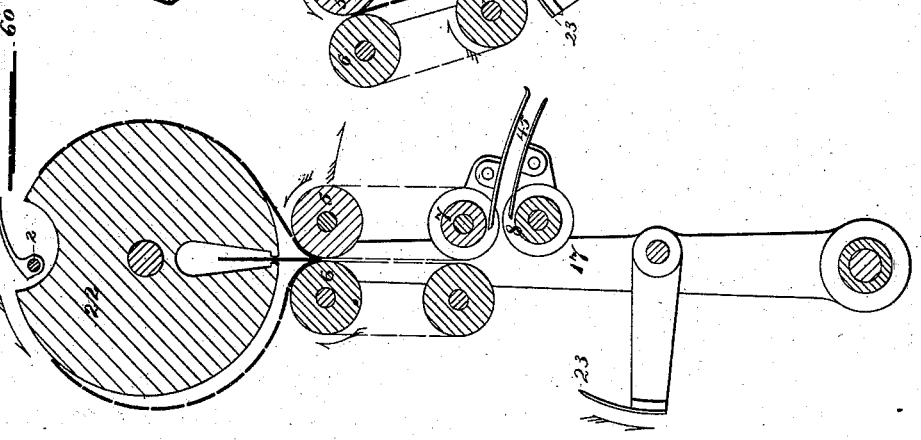


Fig. 12.



Witnesses
Jno. P. Patten
R. E. Grant

Inventor
Stephen D. Tucker
By Munson & Philipp
Attorneys

UNITED STATES PATENT OFFICE.

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

IMPROVEMENT IN FOLDING-MACHINES.

Specification forming part of Letters Patent No. **192,035**, dated June 12, 1877; application filed December 1, 1876.

CASE B.

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 a certain new and useful Improvement in Paper-Folding Machines, of which the following is a specification:

In the accompanying drawings, Figure 1 is an end elevation, Fig. 2 a right-hand side elevation, Fig. 3 a left-hand side elevation, Fig. 4 a sectional elevation, Fig. 5 a longitudinal section of the main cylinder and its hangings, Figs. 6, 7, 8, 9, 10, and 11 details thereof, and Figs. 12, 13, and 14 diagrams, showing the position of the mechanisms at different periods of the folding operations.

This apparatus is designed to be employed in connection with web-perfecting printing-presses, which are furnished with means for not only printing a web of paper, but with means for severing the same into sheets, which sheets are automatically presented within the range of action of this folding mechanism, and by its action folded one or more times and delivered.

The invention consists principally in a novel construction and mode of operating the folding-rollers, which coact with the rotating folding-blade carrier; but it also includes various details, as will more fully hereinafter appear.

The rotating folding-blade carrier is shown as a cylinder, 22, mounted in suitable bearings in a frame-work, and supporting in a longitudinal recess in its periphery a shaft, 2, which carries gripers or fingers 3. This shaft is rocked to open the fingers by means of its crank 11 engaging with the cam-plate 12 fixed to the frame-work. It is rocked to close the fingers down upon the surface of the cylinder by means of a spring-seated rod, 13, hung to the rock-arm 4, and guided in an eye, 14, upon the opposite end of the cylinder.

Opposite to the point occupied by the shaft 2 the cylinder is provided with a recess, 15, within which the folding-blade 10 operates. This folding-blade is hung at its opposite ends to arms 1 projecting from the rings 16, the actuating eccentric 49 of which surrounds the shaft 9 of the cylinder 22, but is fast to the frame-work, as is seen in Figs. 5 and 7.

By this construction of parts the said blade is automatically projected from and drawn into the cylinder 22 at each revolution thereof, for a purpose yet to be explained.

A vibrating frame-work, consisting of arms 17 fast upon a sleeve, 50, which surrounds the shaft 18, has mounted in suitable bearings at its upper extremity folding-rollers 5 and 6, whose peripheries are in working contact, and in suitable arms projecting nearly at right angles to said frame a second pair of folding-rollers, 7 and 8, are in like manner journaled. A tape-roller, 19, is journaled in this same frame at a point opposite the upper roller 7 of the second pair of folding-rollers, which tape-roller and said upper folding-roller are connected with the first pair of folding-rollers 5 and 6 by tapes 20 and 21. A series of curved arms, 45, which constitute a guideway, project from before the second pair of folding-rollers in a direction toward the delivery side of the machine.

This frame 17 also supports a folding-blade, 23, connected by an arm, 24, with a shaft, 25, whose cranked end 26 is connected by a rod, 27, to a pin, 28, projecting from the side of the pulley 29 fixed on the shaft of the cylinder 22, and which imparts motion to a pulley, 30, on the shaft 18 by means of a belt, 31.

Motion is imparted to the shaft 9 of the cylinder 22 by means of a toothed wheel, 33, which is driven by a gear-wheel, 34, actuated in any well-known manner.

A connecting-rod, 35, pivoted to the wheel 33 imparts motion to the rock-arm 36 fast to the hollow shaft 50, which latter is thereby rocked to oscillate the frame 17 and the device it carries.

Delivering-rollers 37 and 38 are driven by a belt, 39, from a pulley, 40, on the shaft 18, the roller 37 imparting motion to the roller 38, through gear-wheels 51 and 52, and to the tapes 41 and pulleys 42. The first folding-rollers are driven by a belt, 43, from pulley 44 on shaft 18, which belt, passing around an idler, 46, actuates a pulley, 47, on roller 5. Roller 5 communicates motion to the roller 7 by means of the endless tapes 21, and the rollers 7, 8, and 19 are geared together, communicating motion to one another, and by the tapes 20 to the roller 6. The rollers 5, 6, 7, 8, and 19 thus revolve in perfect unison.

The mechanism operates as follows: Sheets

of paper, or similar fabric, taken singly from a pile upon the feed-table 60, or received from a printing mechanism, wherein they are severed automatically from a continuous web, are successively delivered within the range of action of the griping-fingers 3, carried by the cylinder 22, when said fingers are in the open position, shown in Figs. 4 and 12. The sheet thus fed is seized by the fingers 3, which close and clamp its leading edge upon the cylinder 22, as in Fig. 14. The cylinder constantly rotates in the direction of the arrow, and carries the sheet with it in its circular course, until said sheet is released from the hold of the griping-fingers. When its leading end has reached the position shown in Fig. 13, the vibrating-frame 17 will have been rocked to the position therein shown and the folding-blade will have been partially protruded from the cylinder, carrying the sheet outward with it and supporting it upon its edge, as is also seen in Fig. 13. After reaching this position, which is the limit of its motion in the direction of the arrow, Fig. 13, the vibrating frame 17 will be moved in a contrary direction and travel with the cylinder 22, the said frame being actuated so that the curvilinear movement of the folding-rollers 5 6 it carries shall be equal to the surface-speed of the folding-blade at its point of contact with the rollers. As the cylinder 22 continues its rotation, carrying the sheet with it, the folding-blade 10 will, by the action of the eccentrics 49, be gradually projected from the cylinder until it has reached the limit of its protrusion, which is accomplished when it arrives at the position shown in Fig. 12, at which time the frame 17, having been vibrated into the position therein shown, will have received the said folding-blade fully between its folding-rollers, whereby the sheet will have been forced into the nip of the said rollers. The griping-fingers release the leading end of the sheet at the same moment, and the sheet, now free, has its folded edge griped by the folding-rollers, and by their rotary motion is fed through them. The continued rotation of the cylinder 22 withdraws the folding-blade from the rollers, and the griping-fingers are opened to receive a new sheet, as in Fig. 4. The vibrating frame continues to move in the same direction as the cylinder, during which movement the tapes 20 and 21 carry the folded sheet down before the second folding-rollers, as in Fig. 14, but this movement of it is not completed until the frame, reaching the limit of its movement in the direction of the arrow in Fig. 14, is vibrated in the opposite direction, reaching the limit of which, as in Fig. 13, the folding-blade 23 is vibrated to double the once-folded sheet into the nip of the second folding-rollers. As the frame is a second time rocked in the opposite direction, the second folding-rollers will deliver the twice-folded sheet to the nip of the delivering-rollers 37 38, as in Fig. 14, it being guided by the conductor 45, and the same will be fed out of the machine, or to auxiliary folding devices.

As the sheet emerges from the folding-rollers 7 8 its doubled edge may be delivered to the rollers, as hereinbefore described, or to any suitable receiving devices, such as nippers which open to receive, close to hold, and reciprocate to deliver, said sheet. The folded sheet may be delivered direct upon a piling-table or before a fly or other suitable delivering device.

Though the cylinder 22, as shown, performs the double function of carrying the sheet as well as the folding-blade, it is to be understood that its construction may be such that it will act as a blade-carrier only, in which case it may be made up of a frame-work. Sheets will then be introduced by means of tapes leading between the said cylinder and the path of travel of the folding-rollers 5 6, and introducing the sheets at proper intervals, so that the co-operation of the folding-blade and folding-rollers will cause the said sheets to be doubled on the proper line.

In such construction the blade will, of course, be cut away, so as not to interfere with the tapes.

Where the tapes are used to feed the sheet, a folding-blade, hung in fixed bearings, so as to be reciprocated therein, and thus protruded at the proper time to act upon the sheet and retract to clear the path of travel of the folding-rollers and sheet, might be employed.

While a folding-blade reciprocated radially in its carrier has been particularly hereinbefore described, it is to be observed that the said blade may be fixed in its rotating carrier without impairing the efficiency of its co-operation with the first folding-rollers, since the folding-blade carrier and the folding-roller carrying-frame can be made to move in such arcs as will cause the fixed blade to properly enter and leave said folding-rollers in the act of doubling the sheet.

As the folding-blade 23 acts on the sheet just as the swinging frame is stopped at its return stroke, it is evident that the blade need not necessarily be pivoted in the frame, but may turn in fixed bearings.

I am aware of the mechanism shown in English Patent No. 1,581 for 1870, which is embodied in an application for Letters Patent of the United States.

What, therefore, is claimed is—

1. A pair of folding-rollers, as 5 6, mounted in an oscillating or swinging frame, which moves them to and fro to approach, engage, and pass a folding-blade in combination therewith to double or fold a sheet, substantially as described.

2. The combination of a revolving folding-blade carrier with a pair of folding-rollers mounted in an oscillating or swinging frame, substantially as described.

3. The combination of a revolving carrier, a folding-blade reciprocating therein, and a pair of folding-rollers mounted in an oscillat-

ing or swinging frame, substantially as described.

4. The combination of a folding-blade mounted in a moving carrier with the folding-rollers 5 6 7 8 and vibrating folding-blade 23 supported in an oscillating or swinging frame, substantially as described.

5. The combination, with a single stationary sheet-nipping device, of a pair of sheet-delivering rollers carried by a frame, which oscillates or swings to and from said sheet-nipping device, all substantially as described.

6. The combination of a vibrating frame, rollers 7 8, angular or inclined conductor 45, and rollers 37 38, all substantially as described.

7. The combination, with rollers 7 8 and rollers 37 38, of a frame oscillating or swinging to carry the rollers 7 8 to and from the rollers 37 38 to deliver the sheets to the latter, as and for the purpose described.

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

STEPHEN D. TUCKER.

Witnesses:

H. BERNARD GOMBERS,

CYRILLE CARREAU.