(No Model.)

4 Sheets—Sheet 1.

W. SCOTT.

SHEET DELIVERY AND FOLDING MECHANISM FOR PRINTING MACHINES.

No. 361,376. Patented Apr. 19, 1887.

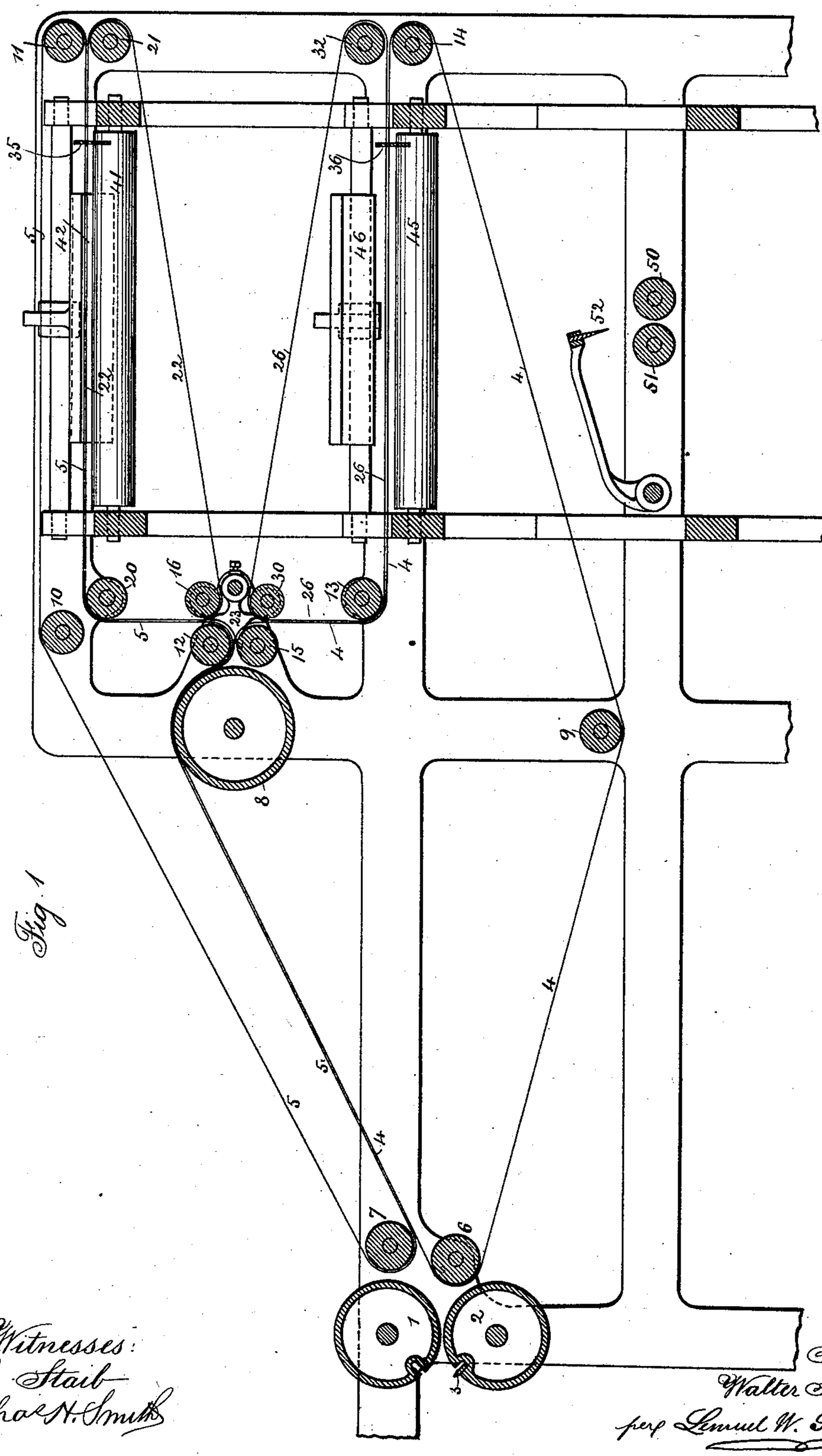

Fig. 1.

Witnesses:
I. Stair
Chas. H. Smith

Inventor
Walter Scott
per Samuel W. Serrell
Atty

(No Model.) 4 Sheets—Sheet 2.

W. SCOTT.

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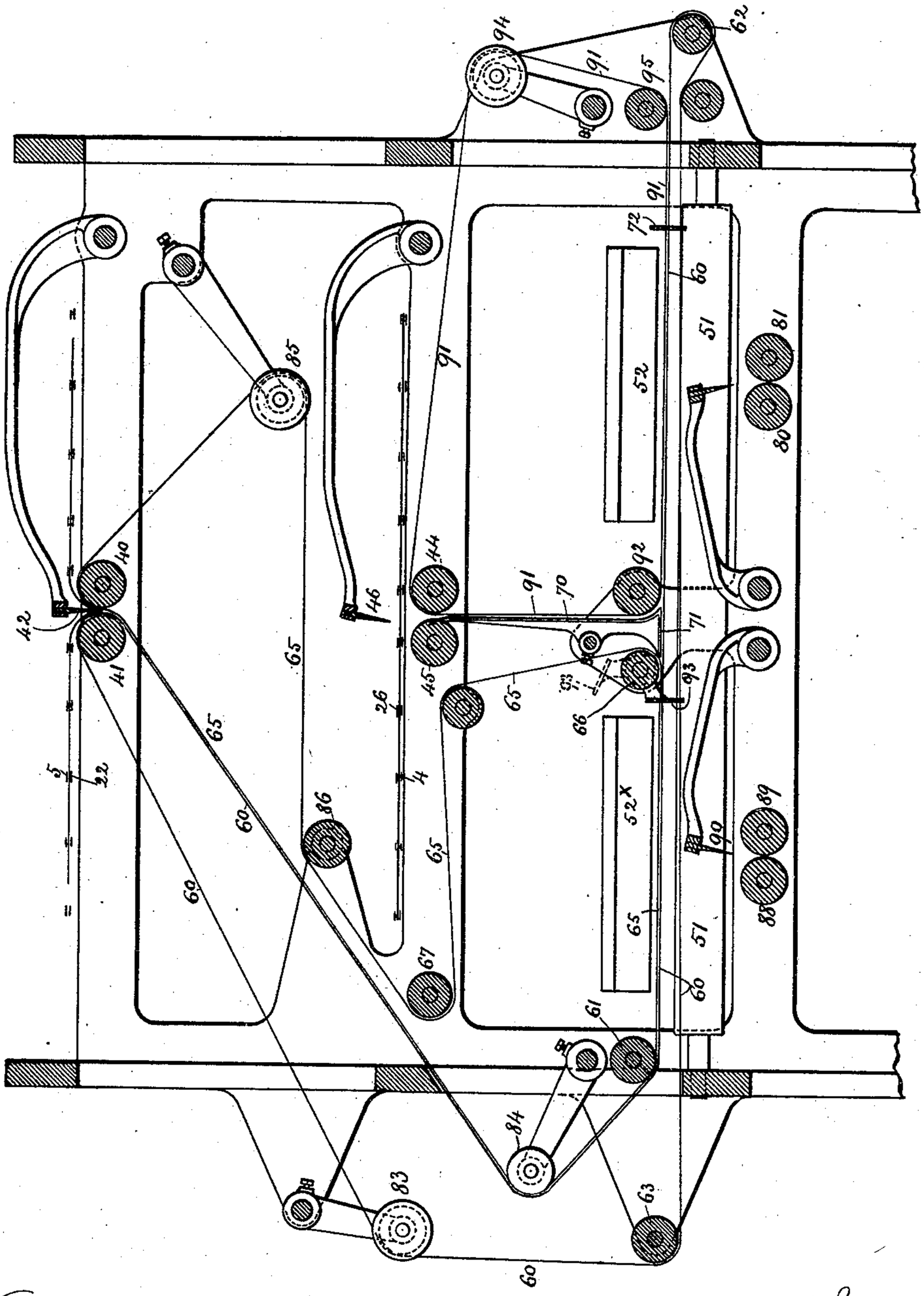

Fig. 2.

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(No Model.) 4 Sheets—Sheet 3.

W. SCOTT.

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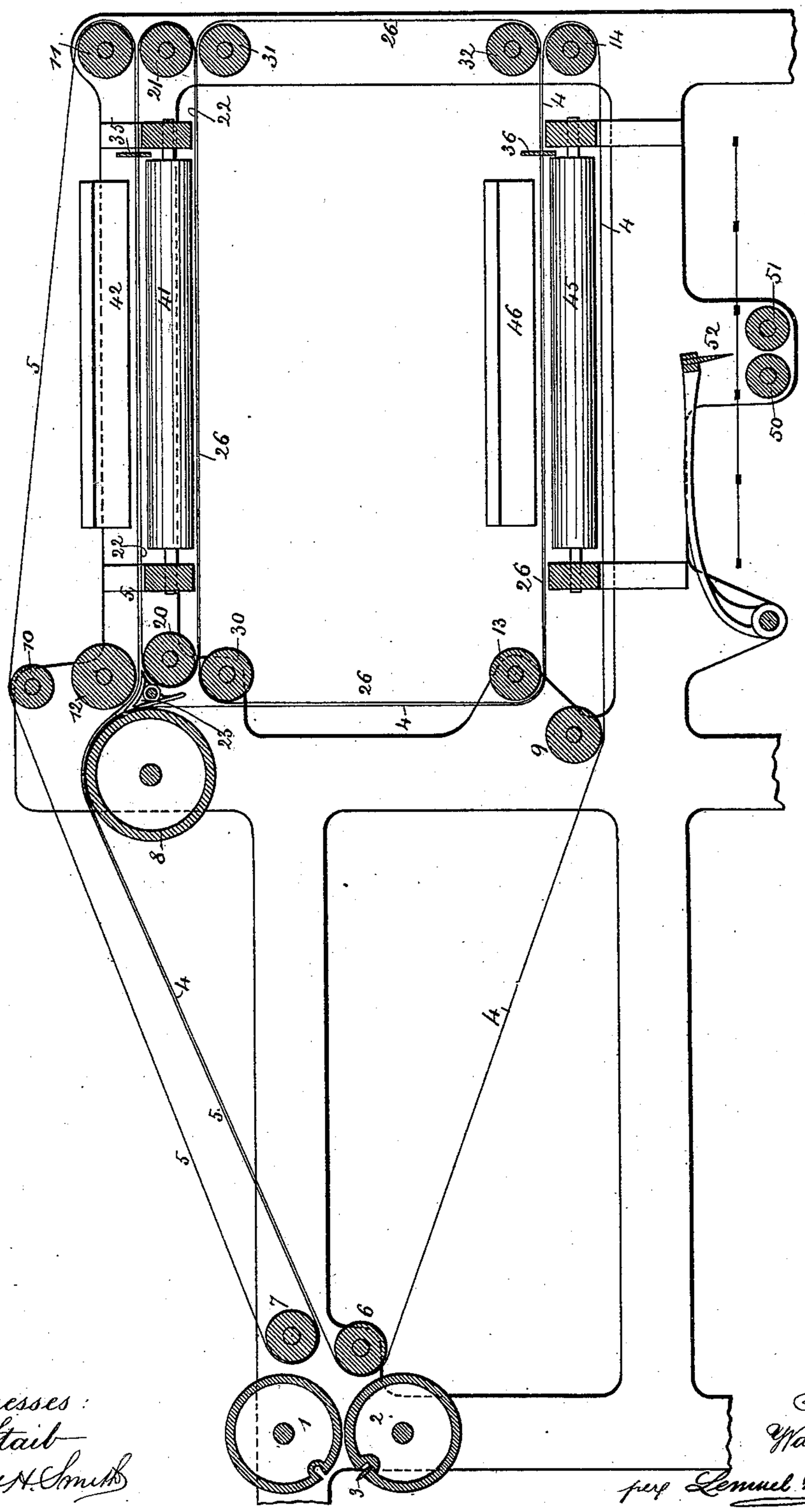

Fig. 3

Witnesses:
I. Stair
Chas. A. Smith

Inventor:
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(No Model.) 4 Sheets—Sheet 4.

W. SCOTT.

SHEET DELIVERY AND FOLDING MECHANISM FOR PRINTING MACHINES.

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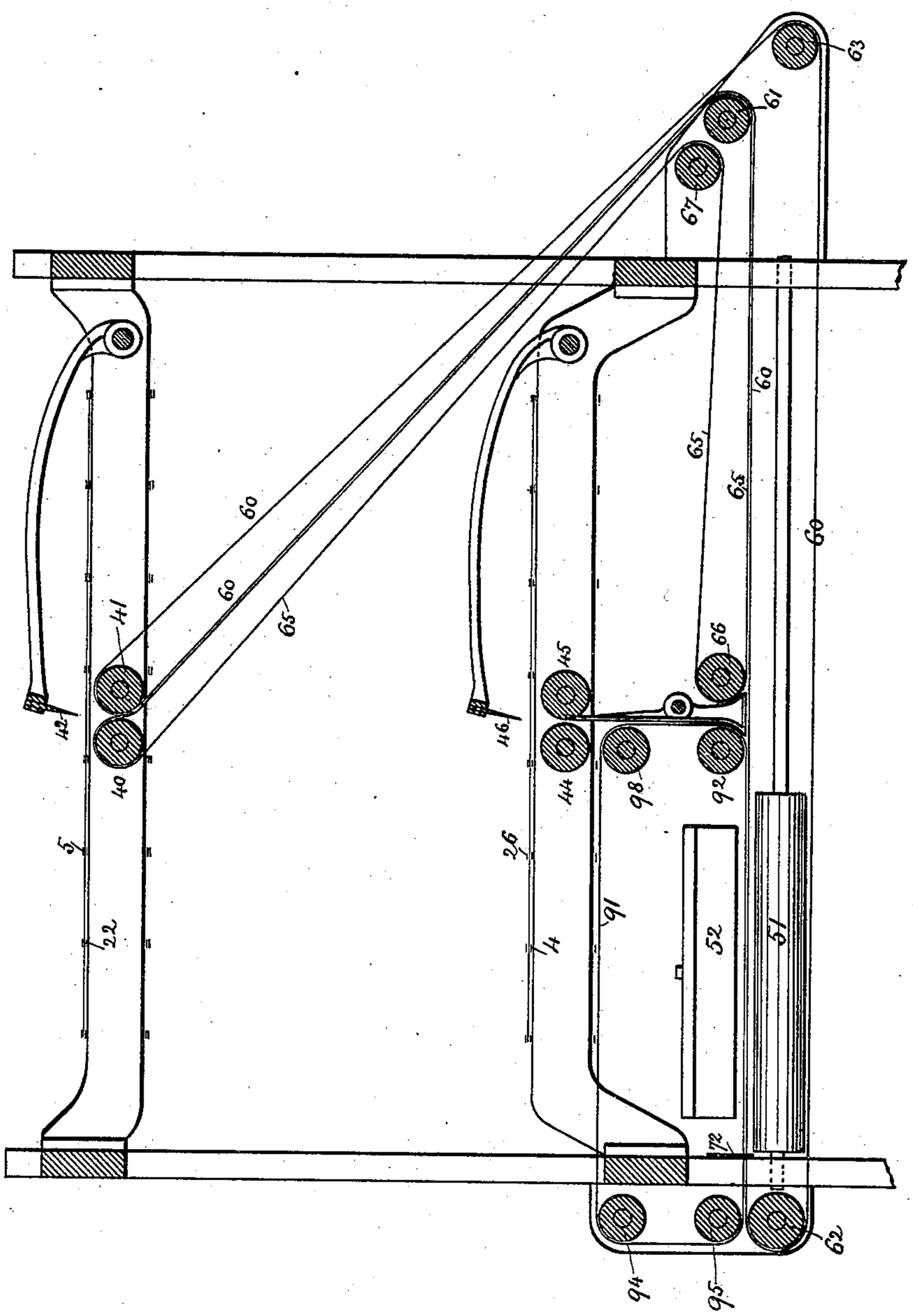
Fig. 4.



Witnesses:
I. Staib
Chas. N. Smith

Inventor:
Walter Scott
per Lemuel W. Serrell
Atty

UNITED STATES PATENT OFFICE.

WALTER SCOTT, OF PLAINFIELD, NEW JERSEY.

SHEET DELIVERY AND FOLDING MECHANISM FOR PRINTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 361,376, dated April 19, 1887.

Application filed May 12, 1886. Serial No. 201,902. (No model.)

To all whom it may concern:

Be it known that I, WALTER SCOTT, of Plainfield, in the county of Union and State of New Jersey, have invented an Improvement in Sheet Delivery and Folding Mechanism for Printing-Machines, of which the following is a specification.

In printing newspapers it is often desirable to fold two separate sheets and then bring the two folded sheets together with the folds adjoining each other, and fold them together so as to inclose the inner folded sheet within the outer folded sheet. This object I accomplish by my improvement, so that a paper of sixteen pages, or any other desired number, is delivered from the folding-machine, and when it is desired to deliver two eight-paged papers from the same folding-machine it is accomplished by the adjustments without varying the parts themselves.

In the drawings, Figure 1 is a diagrammatic view of the folding devices in a plane at right angles to the axis of the cutting-cylinders, and Fig. 2 is a diagrammatic elevation of the parts at right angles to Fig. 1. Figs. 3 and 4 correspond generally to Figs. 1 and 2; but the rollers and belts are arranged for modifying the action of the folder.

The web of papers, after being printed, passes to the cylinders 1 and 2, and by the knife 3 the paper is perforated at the line between one sheet and the next, and the tapes 4 5, passing around the rollers 6 7, convey away the sheet.

The cylinder or roller 8 and the rollers 9 12 13 14 15, when placed as shown in Fig. 1, cause the belts or tapes 4 to pass up over the rollers 8 and 15, down below the rollers 12 13, along horizontally around the roller 14, and thence return below the roller 9 and around the roller 6. The tapes or belts 5 pass up over the roller 8, below the roller 12, up over the roller 20, along horizontally beneath the roller 11, and return back over the roller 10 and beneath the roller 7.

The tapes 4 and 5 are speeded to run faster than the web of paper, and the advancing end of each sheet is nipped between the belts 4 and 5 as they pass up over the roller 8, and in so doing the separation of one sheet from the next is completed, as usual in printing-presses.

Below the rollers 11 and 20 are the rollers 21 and 16, with tapes 22 passing around the same and over 20. These belts 22 are adjacent to the tapes 5, and there is a switch at 23 between the rollers 12 and 15, and this switch is moved so as to direct one sheet off between the belts 5 and 22 and then to allow the next sheet to pass down between the belts 4 and 26. It is to be understood that the rollers or cylinders 12 and 15 are to be composed of pulleys or grooved rollers, in order that the switch 23 may be swung beyond the line of the respective belts in either one direction or the other to deflect the advancing ends of the sheets first in one direction and then in the other.

The belts 26 pass around the guide-rollers 30 and 32, as well as below the roller 13, and the sheet which is deflected downwardly between the belts 4 and 26 is carried beneath the roller 13 and taken off horizontally toward the rollers 14 and 32, and there are fences or stops at 35 and 36 to arrest the movement of the respective sheets, so that the upper sheet may be folded by the rollers 40 and 41 when the center of the sheet is carried down between said rollers by the folding-blade 42, and the lower sheet may be folded by the rollers 44 and 45 when the center of the sheet is carried down between said rollers 44 and 45 by the folding-blade 46.

One of the special features of my present invention relates to the devices for bringing the sheets from the folding-rollers 40 and 41 to the same folding apparatus that takes the sheets from the rollers 44 and 45. With this object in view I provide the folding-rollers 50 and 51 and the folding-blade 52, and the sheets, after being folded, as aforesaid, are carried to these folding-rollers 50 and 51 and beneath the folding-blade 52 by tapes or belts, as next described.

The belts or tapes 60 pass around the folding-roller 41, around and beneath the roller 61, along to the roller 62, and around the same, and return beneath the roller 63 to the roller 41. The ranges of tapes or belts 65 pass around the roller 40, beneath the roller 61, along horizontally and beneath the roller 66, and return beneath the roller 67 up to the roller 40. There is a range of deflecting-fingers, 70, and guide-bars 71. The deflecting-fingers 70 turn the fold of the sheet toward the roller 62 and over the rollers 50 and 51 after the blade 46 has

folded the center of the sheet down between the rollers 44 and 45, and the sheet is carried along upon the belts 60 and beneath the folding-blade 52 and stopped by the fence 72. The sheet that is folded by the blade 42 between the rollers 40 and 41 is carried down by the belts or tapes 60 and 65, around and beneath the rollers 61, along beneath the rollers 66, and beneath the guide-bars 71, and over the folding-rollers 50 and 51 to the fence 72.

The folding-blades 42, 46, and 52 are to be actuated by any suitable mechanism—such as levers and cams or other well-known devices—and these parts are to be movable, so that the respective folding-blades can be actuated at the proper times.

If one sheet is to be laid upon another, the parts are to be timed so that the sheet that is folded between the rollers 40 and 41 passes along upon the belt 60, and receives upon it the sheet folded between the rollers 44 and 45, so that the folded edges coincide and reach the fence 72 together, the sheet folded between 44 and 45 being laid upon the sheet folded between 40 and 41, and in this condition the sheets are stopped against the fence 72. The blade 52 is now brought down and the imposed folded sheets are folded together and passed off by the rollers 50 and 51 into a delivery-box, or the sheets may be folded again by rollers and a blade at right angles to the rollers 50 and 51, if desired, and as illustrated at 80 81, Fig. 2.

If the sheets are to be discharged separately, instead of lying one upon the other, (and thereby deliver, say, an eight-page paper instead of a sixteen-page paper,) it may be accomplished by timing the folding-blades 42 and 46 in such a manner that the folded sheets will pass along in succession to and beneath the folder 52. In this case it will be necessary to give to the blade 52 two reciprocations to each movement of the blades 42 and 46; but if the folding-blade 52 is sufficiently long, or is made in two parts, as seen in Fig. 2, the second folded sheet may pass beneath the blade 52 in the rear of the first one, so that the two sheets can be folded at the same time without lying one upon the other.

The foregoing description is generally applicable to the devices shown in Figs. 3 and 4, as well as to those shown in Figs. 1 and 2. In Fig. 3 the roller or cylinder 8 is placed higher up than it is in Fig. 1, and the switch 23 acts between the rollers 8 and 12, and the rollers 15 and 16 are dispensed with, and the belt 26 is preferably guided by another roller, 31. The operations of these parts are the same; but in Fig. 1 the two sheets have the same distances to travel and reach the fences 35 and 36 in regular succession; but in Fig. 3 one sheet has a less distance to travel in reaching the fence 35 than the other sheet has in reaching the fence 36; hence more time will be consumed, and the distance traveled by the sheet in reaching the fence 72 has to be allowed for in timing the parts.

The devices shown in Fig. 2, which are additional to those shown in Fig. 4 and before described, are made with reference to adjusting the action of the parts.

The tighteners 83 85 are preferably ranges of pulleys set upon swinging crank-arms upon cross-shafts, and the roller 84 is for adjusting the parts. By varying the position of the adjusting-roller 84, the lengths of the belts 60 and 65 between the folding-rollers 40 41 and the guides 70 and 71 will be varied and the adjustment made so that the distance traveled by the sheet as folded between 40 and 41 will insure the arrival of the folded edge of the sheet at the junction of 70 and 71 at the same moment as the sheet folded between 44 and 45 arrives at the same place; hence one sheet is properly laid on the other.

The tighteners 83 and 85 are adjusted to give the proper tension to the belts after the guide-roller 84 has been properly placed. A guide-roller, 86, serves to keep the tapes 65 clear of the folder 46.

When it is desired to fold the two sheets separately, the roller 84 is properly placed so that the distance traveled by the respective sheets brings the end of one sheet to the fence 93 at the same time that the end of the other sheet reaches the fence 72, so that the folders 52 and $52^{\times}$ can be brought down together in folding the sheets.

Where the sheets are folded separately, the blade $52^{\times}$ acts upon one at the same time as the folder 52 acts on the other. A folder, 90, and rollers 88 89 are used to fold the sheets that receive one fold by the blade $52^{\times}$, if so desired.

It will be understood that this sheet-delivery apparatus is especially useful in printing-offices where a variety of work is done, because it can be used to assemble and fold into one all the sheets or pages that are printed at one revolution of the press, or to deliver them separately with one or with two or with three or more folds.

It is usually preferable to employ the belts 91 around the guide-pulleys 92 94 95, to convey the sheet along in connection with the belts or tapes 60, and these tapes 91 may go over the roller 44, Fig. 2, instead of over the roller 98, Fig. 4.

When the folder $52^{\times}$ is used, a fence, 93, Fig. 2, should be provided to arrest the sheet; but this is turned up out of the way when the sheets are laid one upon the other and folded by the blade 52.

If desired, the cylinder 8 may be provided with any of the known means for imposing one sheet upon another, so that the sheets may be discharged in pairs to pass to the folding devices described, in which case the type-cylinder may be four times the size of the cutting-cylinders, so that the products of the two folders will be one complete paper or signature.

I claim as my invention—

1. The combination, with the long folding-rollers 50 and 51 and the separate folding-blades 52 and $52^{\times}$, of two sets of folding roll-

ers and tapes, one set including the tapes 60, to bring a folded sheet to one end of the folding-rollers 50 51, and the other set to bring the other folded sheet to the middle of such folding-rollers 50 and 51, the two folded sheets being moved in the same direction by the tapes 60, that are parallel with the said rollers 50 51, and the deflector 70 and guide-bars 71 and the movable fence 93, whereby the apparatus is adapted to laying one folded sheet upon another and folding them together, or of folding the sheets separately, substantially as set forth.

2. The pairs of folding-rollers 40 41 and 44 45 and their respective folding-blades 42 and 46, and the ranges of belts for conveying the sheets to such folding devices, in combination with the tapes 60 and 65 and the rollers around which such tapes pass, the deflectors 70 and guide-bars 71 and the folding-rollers 50 and 51 and folding-blade 52, the folding-blade 52× and movable fence 93, the tapes 60 extending the entire length of the rollers 50 51, so as to convey one folded sheet beneath the other when the fence 93 is raised, substantially as set forth.

Signed by me this 10th day of May, A. D. 1886.

WALTER SCOTT.

Witnesses:
GEO. T. PINCKNEY,
WILLIAM G. MOTT.