

(No Model.)

5 Sheets—Sheet 1.

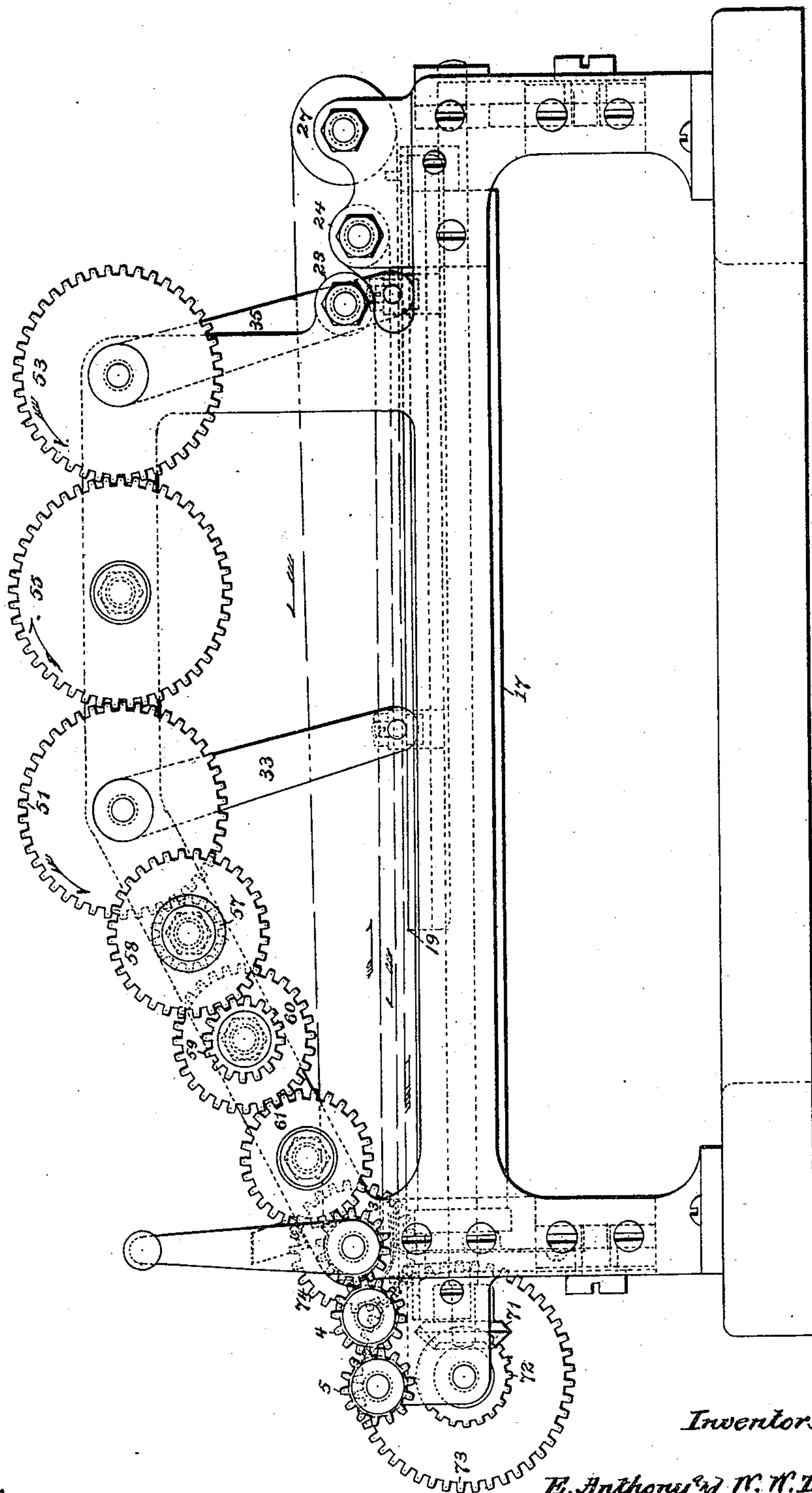
E. ANTHONY & W. W. TAYLOR.

Printing Machine.

No. 238,547.

Patented March 8, 1881.

Fig. 1.



Attest;
G. M. Graham
T. H. Palmer

Inventors,
E. Anthony & W. W. Taylor,
by Messrs. & Philipp
Attys.

(No Model.)

5 Sheets—Sheet 2.

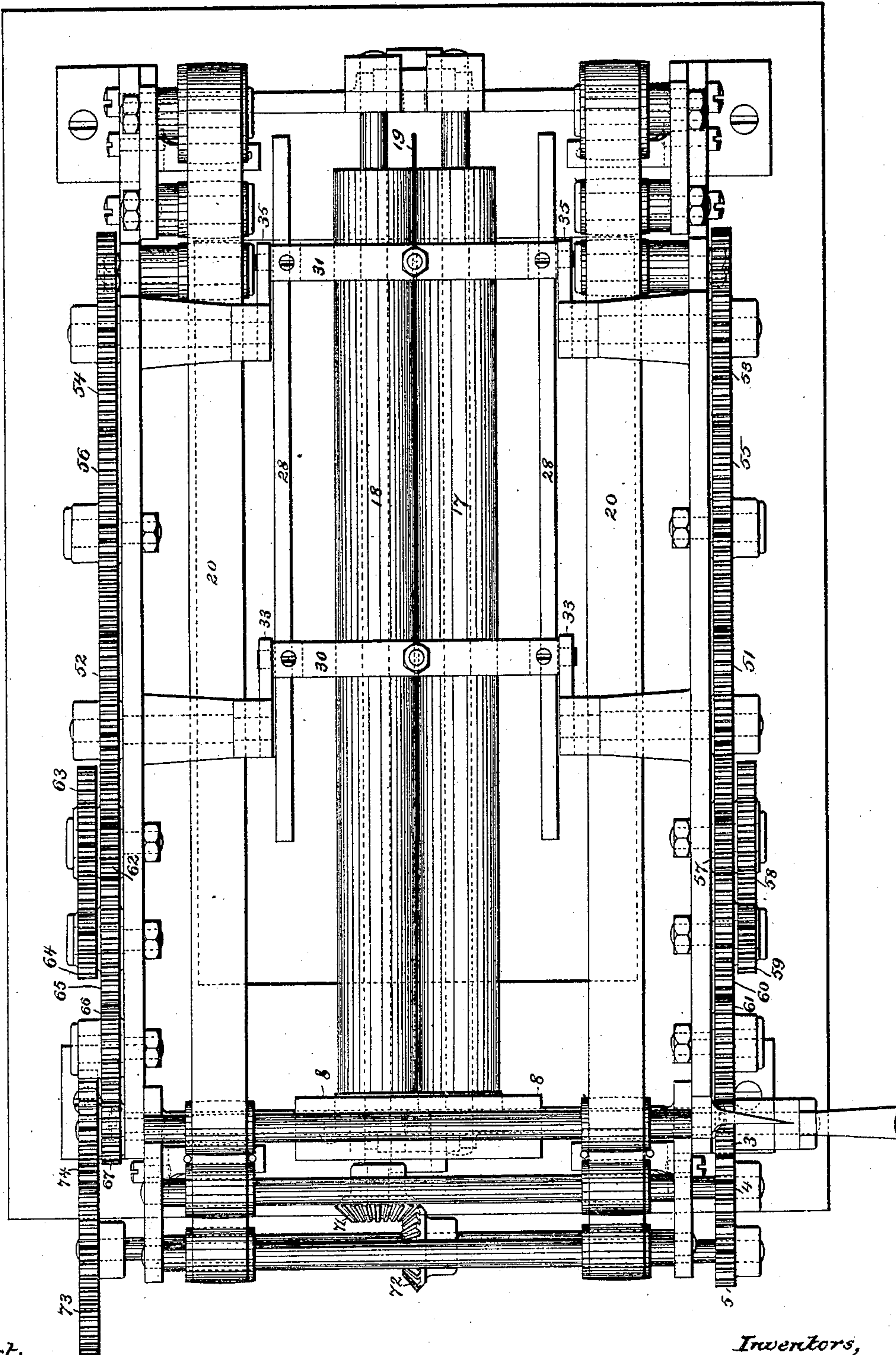
E. ANTHONY & W. W. TAYLOR.

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Fig. 2.



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(No Model.)

5 Sheets—Sheet 3.

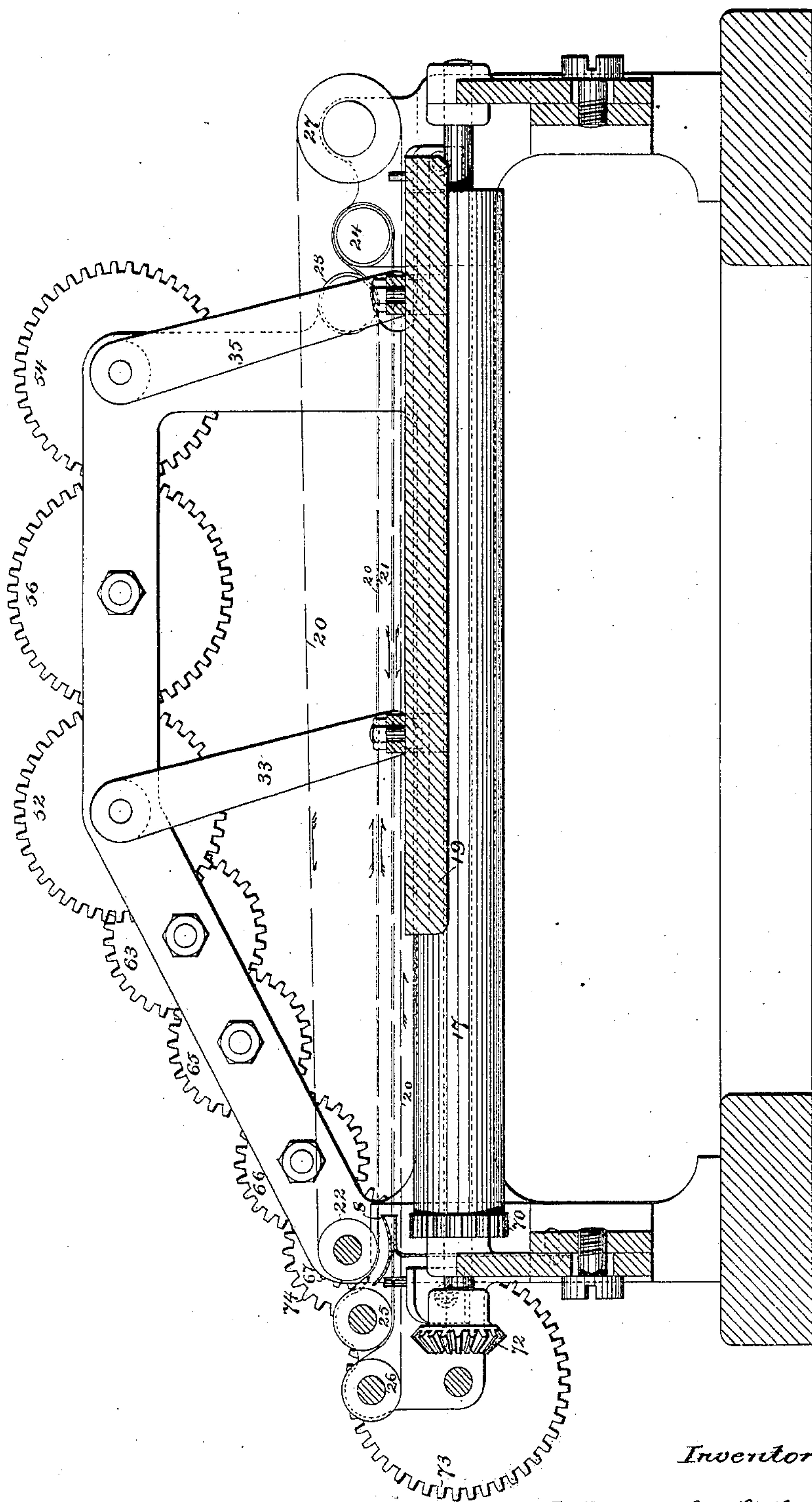
E. ANTHONY & W. W. TAYLOR.

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Patented March 8, 1881.

Fig. 3.



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(No Model.)

5 Sheets—Sheet 4.

E. ANTHONY & W. W. TAYLOR.

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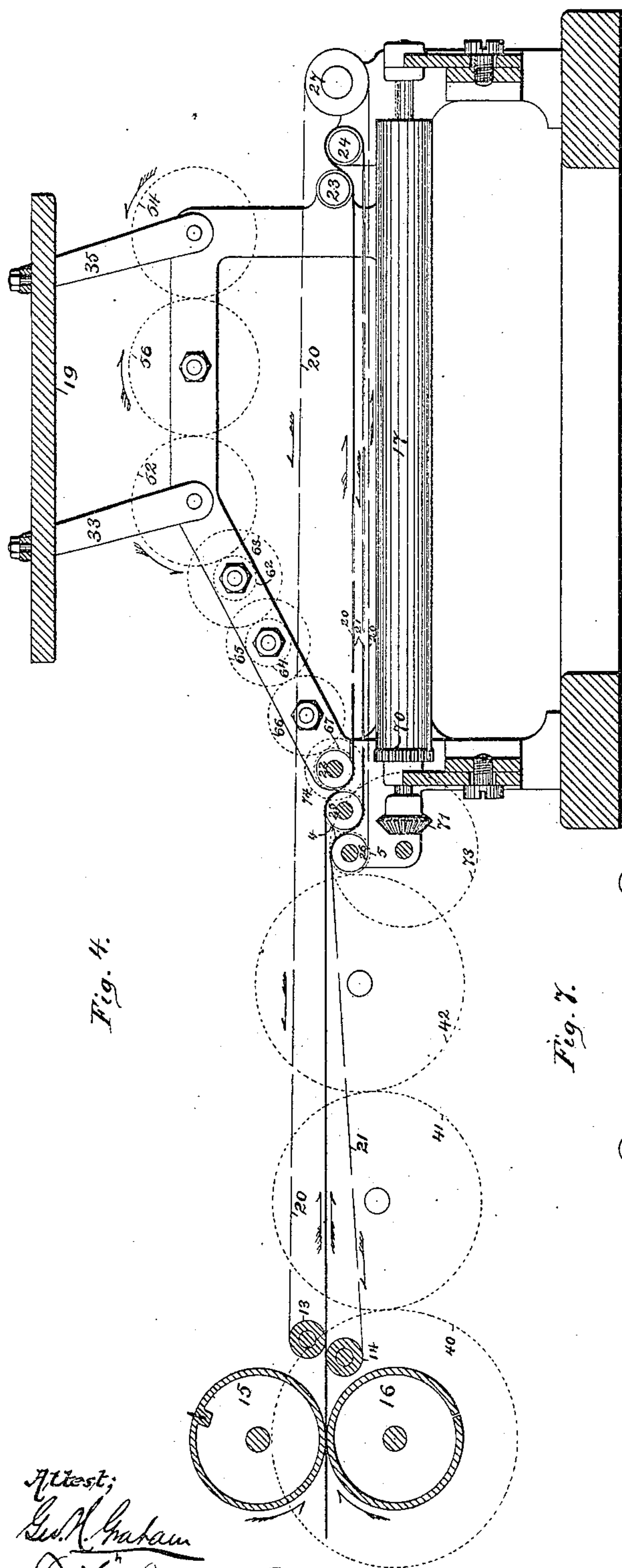


Fig. 4.

Fig. 7.

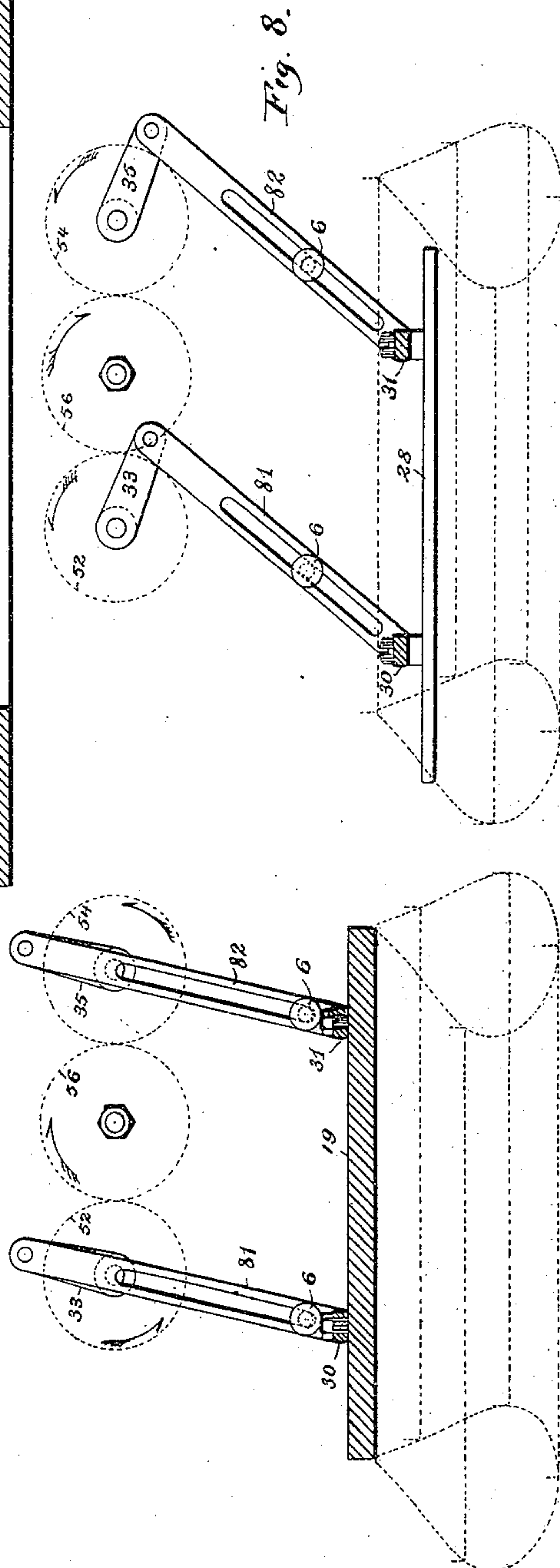


Fig. 8.

Attest;
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(No Model.)

5 Sheets—Sheet 5.

E. ANTHONY & W. W. TAYLOR.

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Fig. 5.

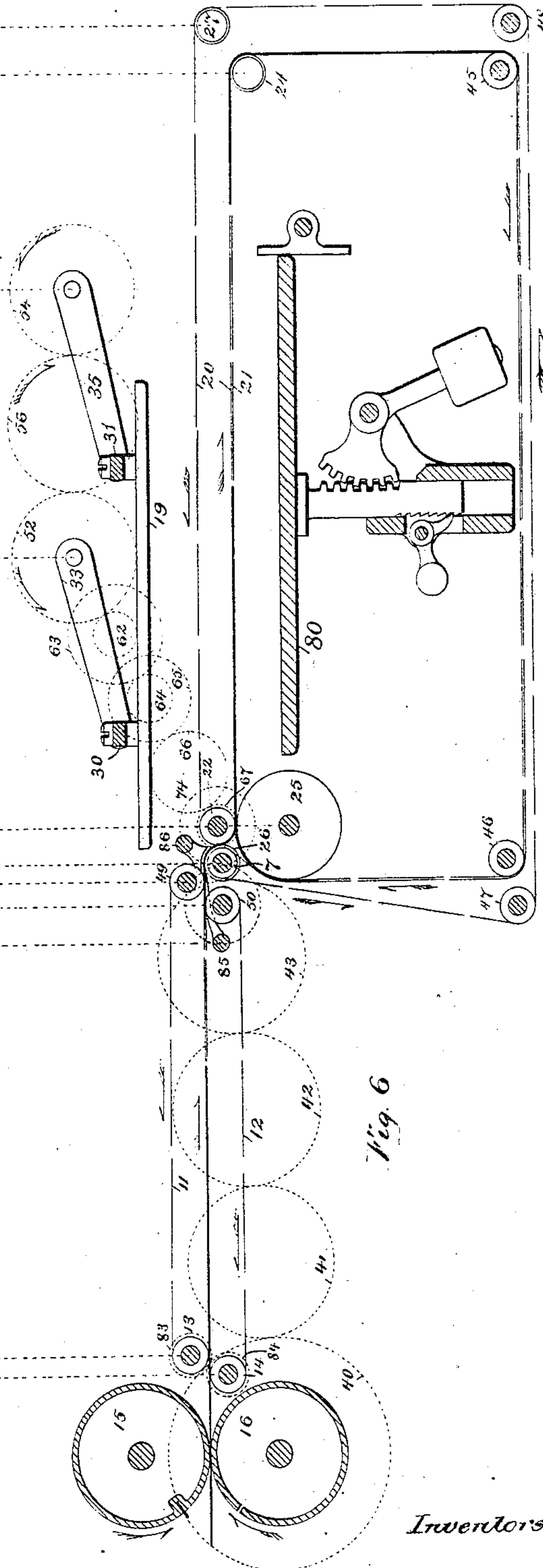
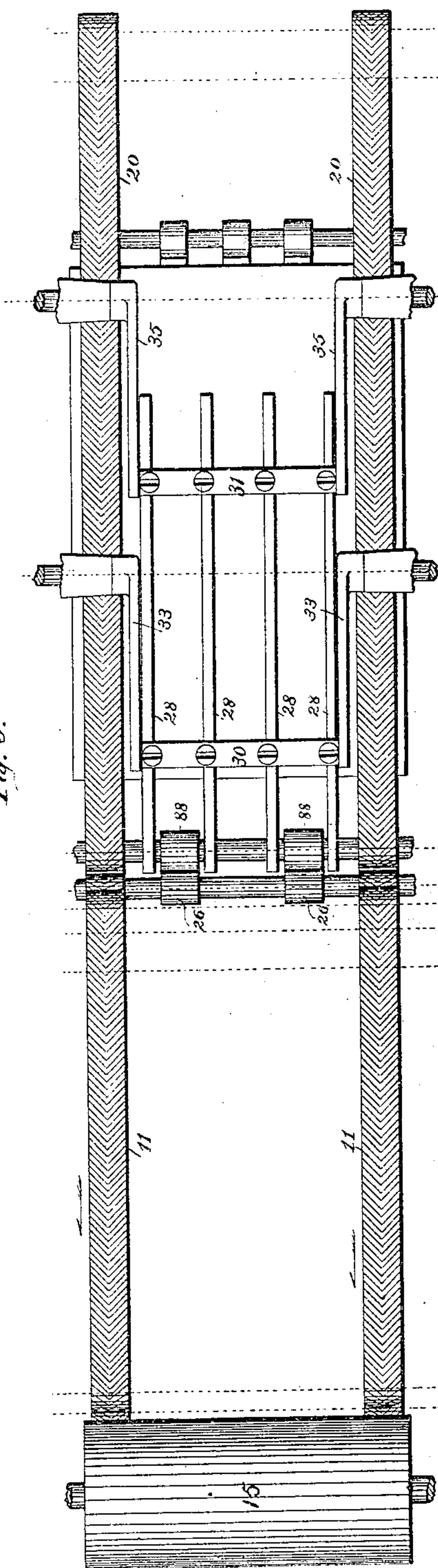


Fig. 6.

Attest,
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UNITED STATES PATENT OFFICE.

EDWYN ANTHONY, OF HEREFORD, COUNTY OF HEREFORD, AND WILLIAM
W. TAYLOR, OF FLEETWOOD, COUNTY OF LANCASHIRE, ENGLAND.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 238,547, dated March 8, 1881.

Application filed August 7, 1880. (No model.) Patented in England August 31, 1875.

To all whom it may concern:

Be it known that we, EDWYN ANTHONY, residing in Hereford, Hereford county, England, and WILLIAM WILBERFORCE TAYLOR, formerly residing in Cambridge, Cambridge county, and now residing in Fleetwood, county of Lancashire, England, subjects of the Queen of England, have invented certain new and useful Improvements in Printing-Machines, fully described and represented in the following specification and the accompanying drawings, forming part of the same.

An apparatus embodying the present improvements is illustrated in the accompanying drawings, Figure 1 representing a side elevation thereof; Fig. 2, a plan view, and Fig. 3 a longitudinal central sectional elevation. Fig. 4 is a view of an apparatus like that shown in Fig. 3, but further illustrates its attachment to a web-printing machine. Figs. 5 and 6 are, respectively, a plan and sectional elevation of the apparatus slightly modified. Figs. 7 and 8 illustrate a modified form of actuating the sheet detaching device.

The object of this invention is to provide a rapid means for the delivery of sheets received from a web-printing machine; and the same consists, principally, in an arrangement of tapes into which the sheets are entered after they have been cut from a web, which tapes carry the sheets within the range of action of a sheet-detaching device. It also embraces a peculiar construction of the sheet-detaching device for removing the sheets from the tapes. It further includes constructions and combinations of parts too fully hereinafter described to need further preliminary description.

Referring now to the drawings, the sheet-carrying tapes will be found to consist of an outer series of endless tapes, 20, and an inner series of endless tapes, 21. The outer series of tapes, 20, run from pulleys 22 under pulleys 23, thence around pulleys 24, from which they return rearward, passing under pulleys 25, and around pulleys 26. from whence they run outward and return over pulleys 27 to the pulleys 22. The inner series, 21, run from the pulleys 25 under the pulleys 22, thence under pulleys 23, and return around the pulleys 24 to the pul-

leys 25. Each series of these tapes are shown to be composed of two sets; but it is obvious that when the sheet-detaching device operates also to fold there may be as many sets widthwise as the dimensions of the paper or its quality demands. The space between the pulleys 22 and 25 constitutes the entrance for the sheets, and the tapes are so arranged that sheets entered between said pulleys will be conducted by the tapes in a pathway which leads them forward over pulleys 24 and returns them rearward, the tapes thus forming a pathway which is reversed, so that the sheets it conducts will lie in parallel planes which are superposed so as to bring the sheets conveyed by each portion of said pathway into such close proximity that they may be manipulated together, as will more fully hereinafter appear. These tapes are moved in the proper direction and driven by means of toothed wheels 3 4 5, with which their shafts are provided, and whereby they are geared together so as to revolve in unison and move the tapes in the directions indicated by the arrows in Fig. 3. With these tapes is arranged a sheet-detaching device, the carriers of which consist of cross-bars 30 31, which are pivoted to parallel cranks 33 and 35. These cranks are fixed upon shafts suitably journaled in the side frames, to which shafts are geared toothed wheels 51 52 53 54. The toothed wheels 51 53 and 52 54 are connected by intermediates 55 56, so as to turn in unison, and they are driven in the proper direction and speed by means of a train of toothed wheels 57 58 59 60 61, connecting the toothed wheel 51 with the toothed wheel 3 on one side of the machine, and by a similar train, composed of the wheels 62, 63, 64, 65, and 66, connecting the toothed wheel 52 with a toothed wheel, 67, on the shaft of the pulleys 22 on the other side of the machine. Any other arrangement of gearing may be substituted for these driving toothed wheels.

The sheet-detaching device may have fly-rods, as 28, attached to its cross-bars 30 31, and operate to force the sheets from the tapes and deposit them upon a receiving-board, from which they could be removed by hand,

or consist of a folding-blade, as 19, fixed to said cross-bars and arranged to coact with folding-rollers 17 18. This folding-blade 19 is shown as attached centrally to the cross-bars 30 31, and may be used with or without the side flier-rods, 28 28. The flier-rods or folding-blade will thus be moved by the action of the cranks in an oblong path, their lines of greatest movement being parallel with the tapes 20 21. In such movement the rods 28 or blade 19 will be caused to descend below the planes in which the tapes are arranged, and after traversing said planes in their rearward movement to rise therefrom, move forward, and repeat the operation.

The folding-rollers 17 18 are suitably journaled in the end frames of the apparatus, so that their upper surface lies just below the plane occupied by the lowermost tapes. They are geared together by toothed wheels, as 70, which are covered by a shield, 8, and driven by means of bevel-wheel 71 on a shaft of one of them, which meshes with a bevel-wheel, 72, carried by a shaft that is driven by a toothed wheel, 73, that meshes with a toothed wheel, 74, fast upon the shaft of the pulleys 22.

Practically this apparatus will be connected with a web-printing machine, as is shown in Fig. 4, where only the cutting-cylinders 15 16 of which are shown, it being understood, as is the practice, that these cylinders are geared together and to the printing-cylinders, so that all run in unison, and the printed web is severed into proper-sized sheets in passing between the said cutting-cylinders.

This delivery apparatus is connected with the printing-machine by means of a toothed wheel, as 40, on the shaft of one of the cutting-cylinders, and intermediates 41 42 that gear with a proper toothed wheel of the apparatus, as the wheel 5, and the wheel 40 is so proportioned as to make the delivery apparatus run faster than the printing-machine. In this arrangement the outer series of tapes, 20, instead of returning around the pulleys 22 are continued rearward and return around pulleys 13 placed in advance of the cutting-cylinders. The set of lower tapes, 21, instead of returning around the pulleys 25 are continued rearward over the pulleys 26 and return around the pulleys 14 situated beneath the pulleys 13. The printed web emerging from the cutting-cylinders 15 16 is severed or partially severed transversely thereby, to form sheets. It thence passes into the tapes 20 21, whereby it is conducted to the entrance-point of the delivery apparatus, or between the pulleys 22 25. Being nipped by these rollers it is thus advanced rapidly enough (the speed of the delivery apparatus being greater than that of the printing-machine) to separate the leading end or sheet from the web to provide a working-space between the successive sheets.

The first sheet entering the delivery apparatus will be conducted, by the tapes 20 21, through

the upper plane in which said tapes lie, while the rotating sheet-detaching device is making its upward and rearward movement, said first sheet thus unobstructedly passing outward between these tapes and returning over the pulleys 24, passing rearward between such tapes in their lower plane, the next succeeding or second sheet in the meantime passing between such tapes outwardly in their upper plane. The first sheet will thus be carried rearwardly while the second sheet is moving outwardly, the two thus traveling in opposite directions in different planes, and ultimately lying one above the other. At or about the time they are thus superposed the rotating sheet-detaching device will have reached the point where it is moving outward and forward, when it will bear upon the uppermost sheet, and, forcing it out of the embrace of the tapes, carry it downward upon the lowermost sheet, which will also be drawn out of the tapes, and the two sheets will then be simultaneously delivered onto a receiving-table, or folded between the rollers 17 18, as the case may be. This accomplished, the sheet-detaching device will make its upward and rearward movement, while the third and fourth sheets, in like manner, are carried forward and superposed for simultaneous delivery. This operation accomplishes the collecting or accumulating of the two successive sheets by the onward or progressive feeding action of the tapes 20 21. These tapes may be arranged as shown in Fig. 6, where the forward and rearward paths of travel of the tapes 20 21 are separated a considerable distance apart. In this modification the tapes 21 run from the pulleys 25, pass over the pulleys 24, downward under pulleys 45, thence to pulleys 46, and return to the pulleys 25. The tapes 20 are extended in like manner, and passing over small pulleys 7, running loose on the shaft of the pulleys 26, and turning rearward return under pulleys 47 and 48. In this instance the pulleys 22, 25, and 26 are so located, and the tapes 20 and 21 are so arranged, that the latter form a continuous pathway, with an entrance-point for the sheets between the pulleys 22 25, and tapes 11 12 are provided to form conductors leading from the pulleys 13 14, which are geared together by the wheels 83 84 in rear of the cutting-cylinders 15 16 to said entrance-point, the tapes 11 returning over pulleys 49 and the tapes 12 over the pulleys 50. The proper speed and direction of movement are imparted to the delivery apparatus, in this instance, by the addition of a wheel, 43, to the train of intermediates 41 42, by which the shaft of the pulleys 26 is driven, and guards or guides on the rod 85 are stretched from the pulleys 50 to the pulleys 26 on the one side of the sheets, and on the rod 86, from the pulleys 49 to the pulleys 22 on the other side of the sheets, to connect the pathway formed by the tapes 11 and 12 with that formed by the tapes 20 21, said guards lying within the peripheries

of said pulleys. The pulleys 26 in this modification run in pressing contact with corresponding pulleys 88, fast on the shaft of pulleys 22, whereby proper nipping-surfaces are provided to forward the sheets. The delivery apparatus in this instance is geared to run faster than the printing-machine, as before described, and the sheets received by it and separated a distance apart, as before explained, are led successively into the pathway formed by the tapes 20 21, which conducts said sheets onward in the circular or endless pathway formed by said tapes. The sheets will successively enter the tapes 20 21 and be carried by them through the upper plane in which said tapes run; thence downward and rearward through the lower plane in which said tapes run, and thence upward to the entrance-point. The sheets will thus successively make the circuit which the pathway of the tapes 20 21 forms, and consequently each sheet will meet a companion-sheet at the entrance-point each time the circuit is made. Thus any number of sheets may be collected together, and the movement of the flier may be arranged so that said flier will take off a single sheet or two or any number of superposed sheets each time it operatively descends through the upper plane occupied by said tapes. The length of the circuit of travel of these tapes will, however, determine the number of sheets so collected and delivered. As arranged in Fig. 5, the sheet-detaching device is so timed that when pairs of sheets are collected they will be delivered.

It is obvious that in either of the arrangements shown and described, the sheet-detaching device may consist of parallel bars 28, as shown in Figs. 5 and 6, and deliver the sheets it disengages from the tapes onto a receiving-table, as 80, which receiving-table may be arranged to properly descend as the weight and height of the pile of sheets increase, or said sheet-detaching device may be constructed as is shown in Figs. 2 and 3—that is, with a centrally-arranged folding-blade, 19—in which case the folding-rollers 17 18 that are shown may be substituted for the receiving-table 80.

The sheet-detaching device, whether it carries the rod 28 or the folding-blade 19, or the latter with the side rods only, may have its movement imparted by the structure of devices shown in Figs. 7 and 8, where the cranks 33 35 are connected to the cross-bars 30 31 of the flier by means of pivoted rods 81 82, that are slotted so as to embrace fixed pivots 6 over which they slide as their centers of motion. This arrangement, it is obvious, will cause the sheet-detaching device, when at its lowermost point, to move parallel with the tapes 20 21, and rise and fall as in the structure hereinbefore described, but with a slower motion.

The sheet-conducting pathway formed by the tapes may, if desired, be extended longitudinally, so as to provide for the delivery of sheets at two points of its length, by provid-

ing a second sheet-detaching device, or extending one so as to become the equivalent of two.

The sheet-detaching device, whether in the form of a flier or a folding-blade, may in some cases have a direct vertical action; but to avoid the danger of smutting the printed surface, and in order that such device may not interfere with the movement of the sheets when they closely follow each other, the peculiar motion described is preferable.

It will be apparent that rollers may be substituted for the pulleys, and the sheet-detaching device may be simply a vertically-reciprocating device; also, that any of the well-known reciprocating or rotating folding mechanisms may be substituted for that shown, and that such rollers as require to be driven may be geared to revolve in the proper direction, as is common.

What we claim is—

1. The combination, with the tapes 20 21 and means whereby the same are stretched so as to form a reversed pathway, of the pulleys 22 25, between which the sheets enter into said pathway, and a sheet-detaching device for forcing the sheets out of said tapes for delivery, substantially as described.

2. The combination, with the tapes 20 21 and means whereby the same are stretched so as to form a reversed pathway, of the pulleys 22 25, between which the sheets enter into said pathway, and a folding-blade and folding-rollers, whereby the sheets are forced out of said tapes and folded, all substantially as described.

3. The combination, with the tapes 20 21 and means whereby the same are stretched so as to form a reversed pathway, of the pulleys 22 25, forming the entrance for the sheets into said pathway, with cutting-cylinders and means for conveying the sheets therefrom to said tapes 20 21, all substantially as described.

4. The combination, with the tapes 20 21 and means whereby the same are stretched so as to form a reversed pathway, of the pulleys 22 25, forming the entrance for the sheets into said pathway, and a sheet-detaching device, with cutting-cylinders and means for conveying the sheets therefrom to said tapes 20 21, all substantially as described.

5. The combination, with the tapes 20 21 and means whereby the same are stretched so as to form a reversed pathway, of the pulleys 22 25, forming the entrance for the sheets into said pathway, a folding-blade and folding-rollers with cutting-cylinders, and means for conveying the sheets therefrom to the said tapes 20 21, all substantially as described.

6. The combination, with the tapes 20 21 and means whereby the same are stretched so as to form a reversed pathway, of the pulleys 22 25, forming the entrance for the sheets into said pathway, with the rotating sheet-detaching device provided with rods 28, all substantially as described.

7. A sheet-detaching device consisting of the bars 28 or blade 19, mounted upon cranks, so as to move in a circuitous path and traverse the plane in which the sheet is supported, all substantially as described.

5 8. The combination, with the tapes, as 20 21, in which a sheet is held by its margins or edges, of a sheet-detaching device consisting of the bars 28 or blade 19, and means for moving them through the plane in which the sheet is held, all substantially as described.

10 In testimony whereof we have hereunto set

our hands each in the presence of two subscribing witnesses.

EDWYN ANTHONY.

WILLIAM WILBERFORCE TAYLOR.

Witnesses as to signature of Edwyn Anthony:

H. MUNSON,

T. H. PALMER.

Witnesses as to signature of William Wilberforce Taylor:

EDWARD S. FOSTER,

ALFRED BARKER.