

No. 646,341.

Patented Mar. 27, 1900.

R. C. ANNAND.

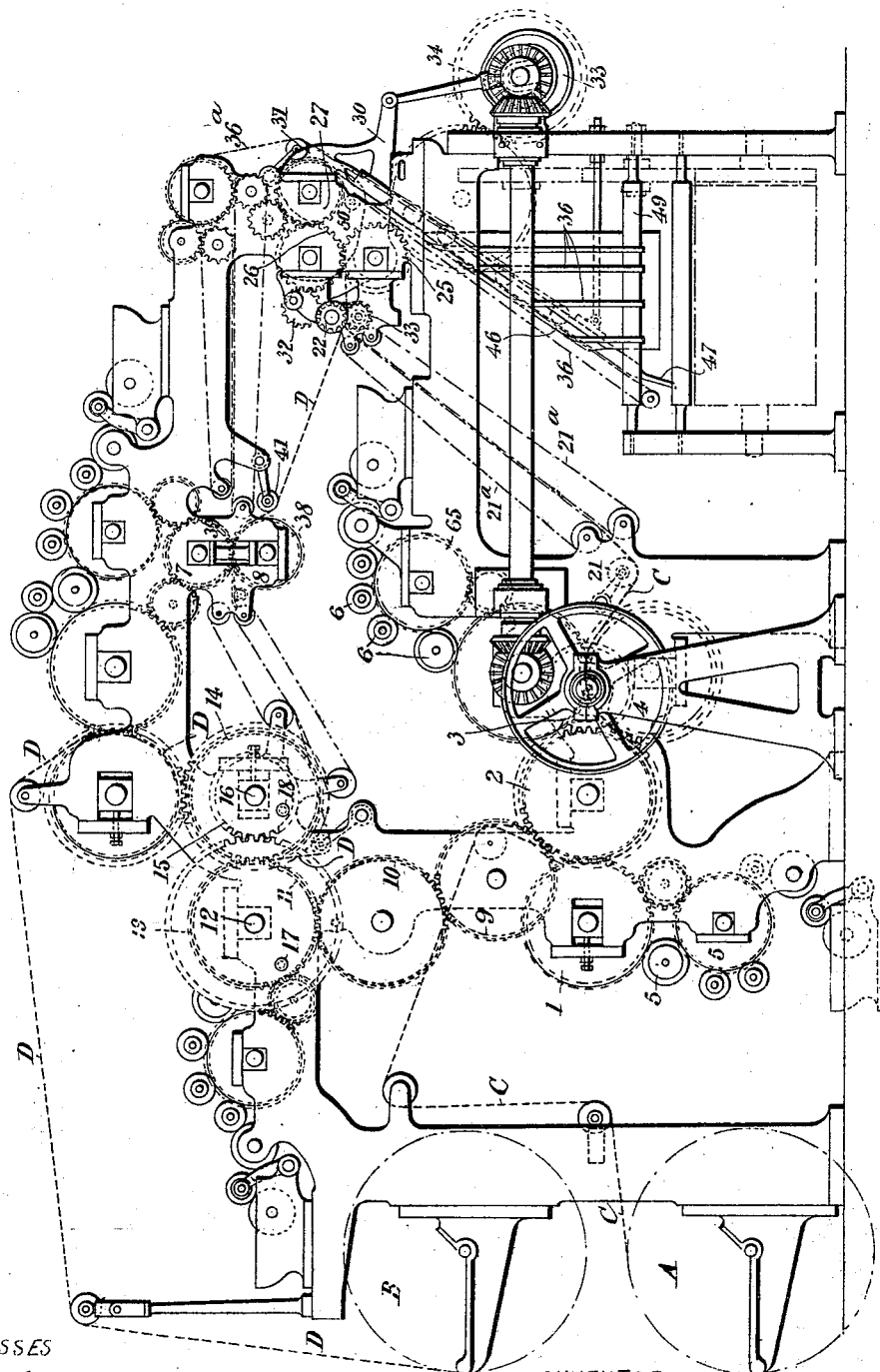
WEB PRINTING, ASSOCIATING, AND FOLDING MACHINE.

(Application filed Aug. 18, 1899.)

(No Model.)

6 Sheets—Sheet 1.

Fig. 1.



WITNESSES

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INVENTOR:

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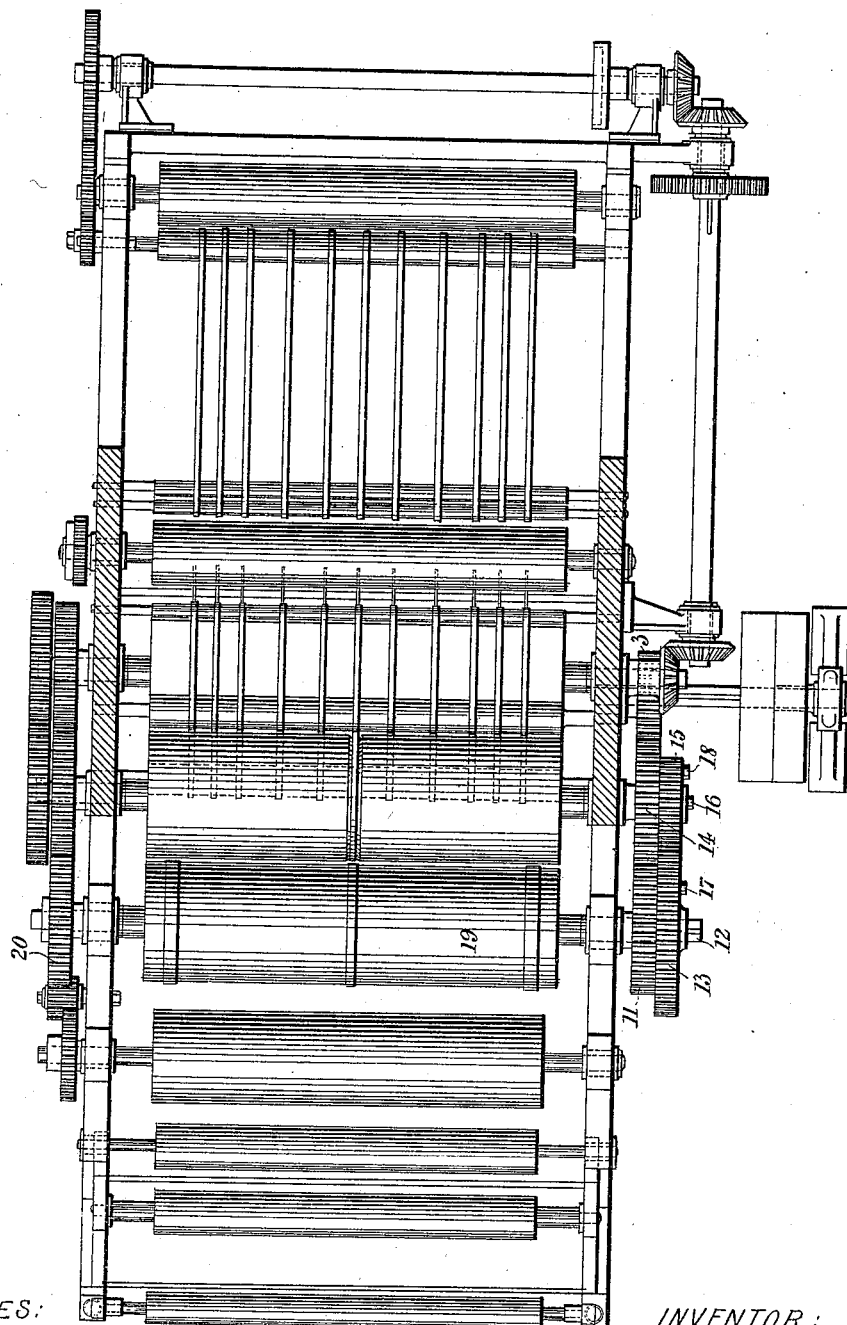
WEB PRINTING, ASSOCIATING, AND FOLDING MACHINE.

(No Model.)

(Application filed Aug. 18, 1899.)

6 Sheets—Sheet 2.

Fig. 2.



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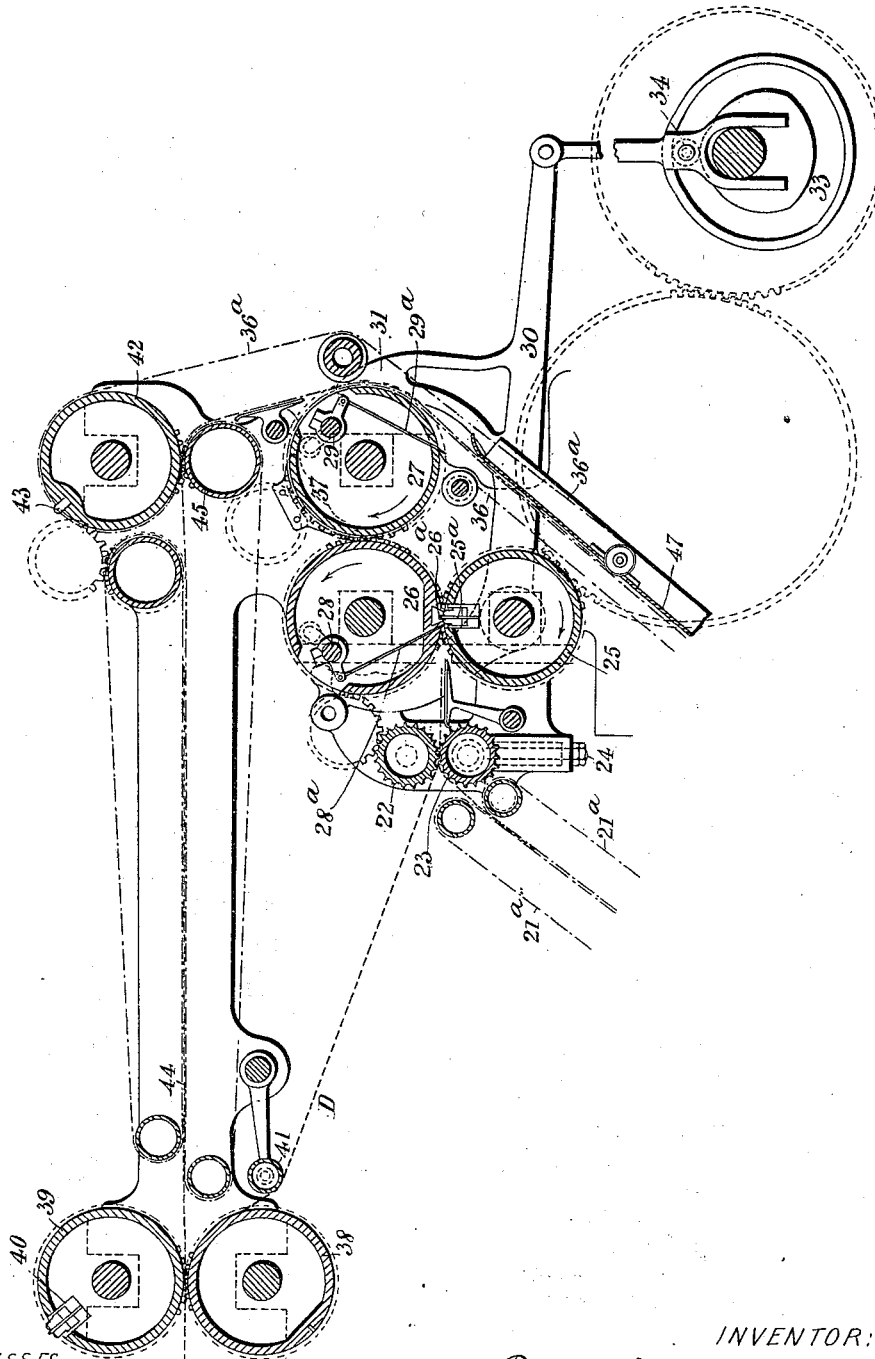
WEB PRINTING, ASSOCIATING, AND FOLDING MACHINE.

(No Model.)

(Application filed Aug. 18, 1899.)

6 Sheets—Sheet 3.

Fig. 3.



WITNESSES

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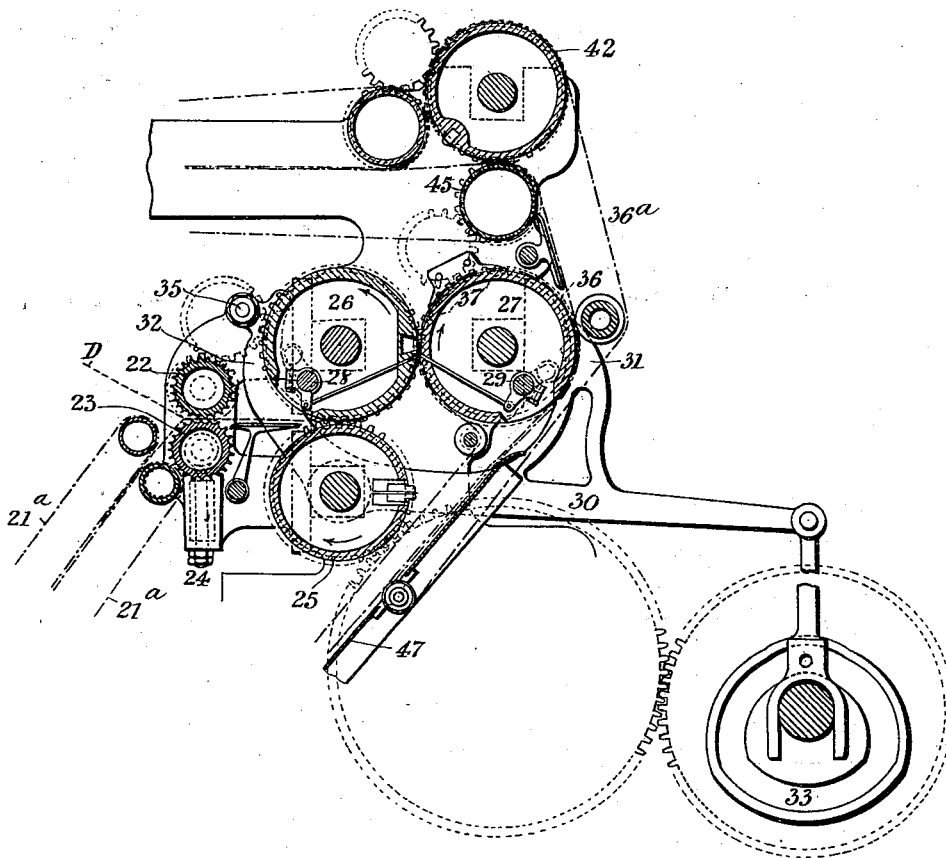
WEB PRINTING, ASSOCIATING, AND FOLDING MACHINE.

(Application filed Aug. 18, 1899.)

(No Model.)

6 Sheets—Sheet 4.

Fig. 4.



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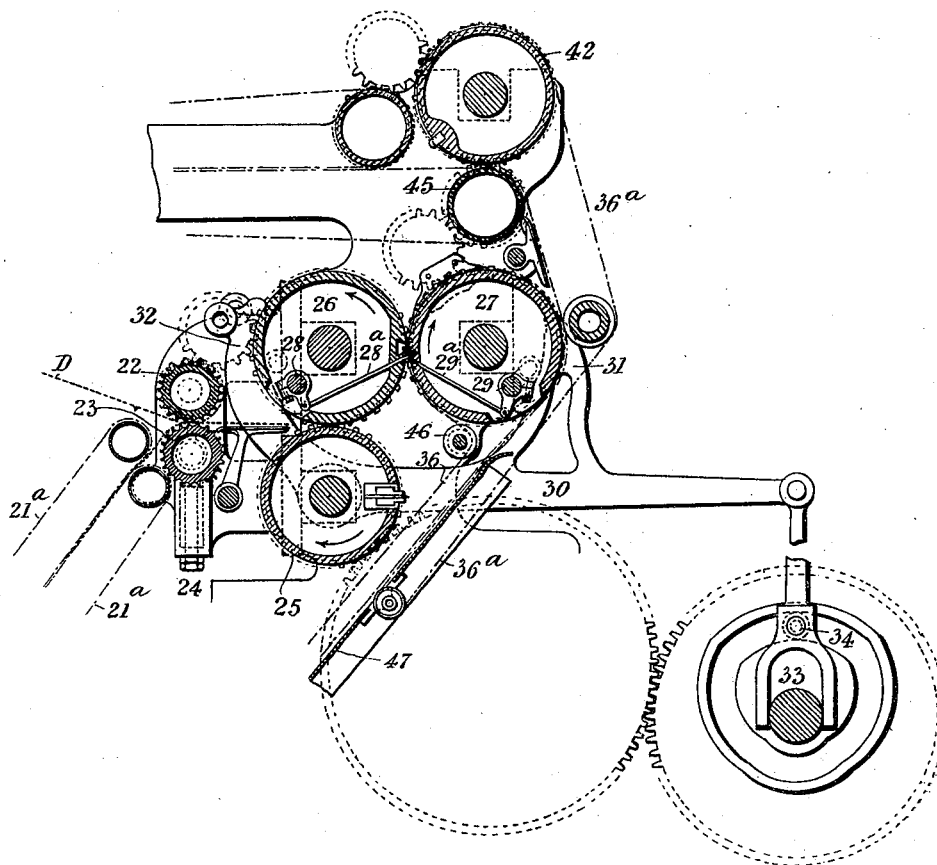
WEB PRINTING, ASSOCIATING, AND FOLDING MACHINE.

(Application filed Aug. 18, 1899.)

(No Model.)

6 Sheets—Sheet 5.

Fig. 5.



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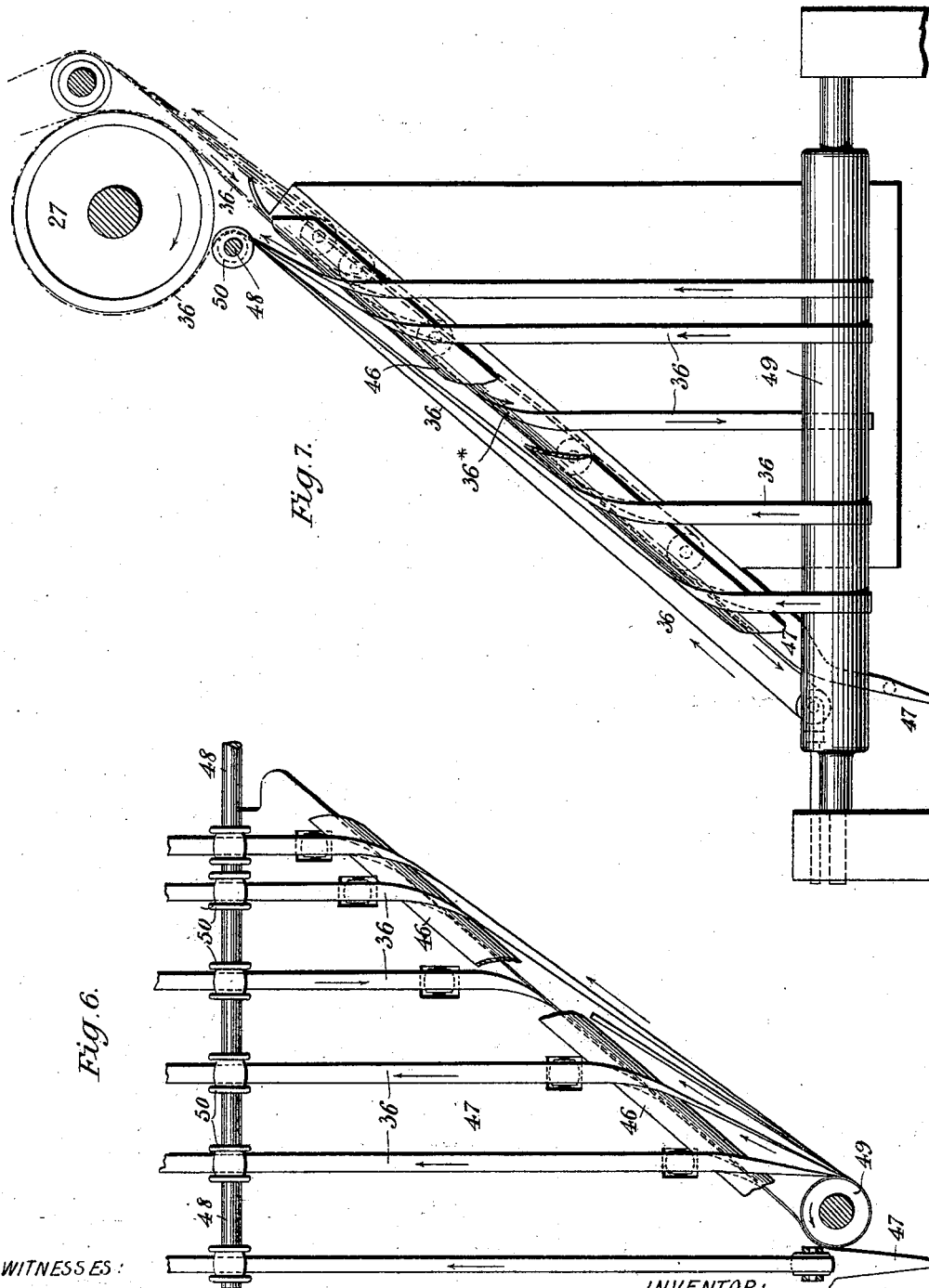
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WEB PRINTING, ASSOCIATING, AND FOLDING MACHINE.

(Application filed Aug. 18, 1899.)

(No Model.)

6 Sheets—Sheet 6.



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# UNITED STATES PATENT OFFICE.

ROBERT CUMMING ANNAND, OF SOUTH SHIELDS, ENGLAND.

## WEB-PRINTING, ASSOCIATING, AND FOLDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 646,341, dated March 27, 1900.

Application filed August 18, 1899. Serial No. 727,621. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT CUMMING ANNAND, of South Shields, England, have invented certain new and useful Improvements in Web-Printing, Associating, and Folding Machines, of which the following is a specification.

My invention consists of a particular arrangement or combination of two web-printing machines with one folder, means whereby one machine can be run at the same speed or at half the speed of the other machine, and improved associating and folding mechanism for dealing with the webs printed in both machines, so that a large variety of sizes of products can be produced from the combined mechanism.

The arrangement of the various members of the combined machine is such that it occupies comparatively-small space, is simple and handy to look after, and can be changed from producing one size to another with little alteration, these alterations being so simple and safeguarded that risk of damage in unskilled hands through making the alterations is reduced to a minimum.

A special feature of the invention is the position in which the various parts of the combined machine stand in relation to one another.

Another feature is in the arrangement whereby the cut-off sheets printed in the top press when running at half the speed of the bottom press are associated in register with the sheets printed in the bottom press.

Machines of this class as hitherto made have been so arranged that the cut-off sheet from the half-speed mechanism joins the uncut web from the other press and both the cut sheet and the uncut web pass through between a pair of cutting-cylinders. Unless the cut-off sheet is shorter (which is objectionable) than the space between the cutting-knives on the second pair of cutting-cylinders it has been found practically impossible to get such absolute register as to always get the ends of the added sheets to come exactly where the cuts take place in the main web. The result is that occasionally part of the cut sheets overlaps the perforator and is partly cut off, and these shavings or strips get about the machine and are folded up with the papers,

giving them a ragged and unfinished appearance. In my associating arrangement the mechanism is so constructed that the cut sheet from the slow-printing mechanism does not join the sheets from the main press until after they are cut off from the web. This avoids any risks of having these objectionable shavings or strips of paper being sent out with the papers.

In the accompanying drawings, Figure 1 is a general diagrammatic elevation of a machine in which my invention is embodied. Fig. 2 is a general plan of same, but with the mechanism for printing the first side of the web in the top press and the corresponding inking mechanism removed. Fig. 3 is a sectional view, on a larger scale, of the cutting and associating mechanism, the parts being arranged to collect two or more sheets before folding. Fig. 4 is a similar view to Fig. 3, but with the parts so arranged that each sheet or set of sheets is cut and passed on without "collecting." Fig. 5 is a similar view to Fig. 3, but showing the cutting and collecting mechanism at a different period of the cutting and collecting operation. Fig. 6 is a partial front view, and Fig. 7 a side view, of the fold-forming mechanism.

The particular arrangement of the two printing-presses in relation to one another and of the different cylinders in the combined machine are best seen in Fig. 1. The first stereo-cylinder 1 of the lower press is placed immediately above the ink-cylinder and inking mechanism 5 5 and its upper surface is fully exposed for handiness in putting on the stereo-plates. The first blanket-cylinder 2 is in the same horizontal plane as its stereo-cylinder 1, while the second pair of stereo and blanket cylinders 3 and 4 are in a vertical plane, a line passing through the centers of 1 and 2 touching the point of contact between them. The second inking mechanism 6 6 slopes upward in order to leave room for the folding mechanism. The top press is arranged with the mechanism for printing the first side of the web in a horizontal plane. The mechanism for printing the second side is also in a horizontal plane; but it is as much lower as allows the blanket-cylinder of the second side to go immediately under the blanket-cylinder of the first side, thereby shortening the

machine and providing space underneath the first printing mechanism for the extra pair of cutting-cylinders 7 and 8.

The rolls of paper A B are mounted one above the other on the outside of the machine, as shown, and the course of the webs of paper C and D as they pass through the respective presses is clearly indicated. The lower press is driven by any well-known means, and the upper press receives its motion from the train of gearing 9 and 10.

A feature of the invention is the means employed for changing the speed of the top press to half the speed of the lower press or back again to the same speed. This is effected as follows: The gear-wheel 11, which is driven by the wheel 10, runs loose on the end of the stereo-cylinder axle 12. In front of this wheel, on the same axle, is keyed a larger wheel 13. The wheel 14 also runs loose on the blanket-cylinder shaft 16. In front of this wheel, on the same axle, is another loose wheel 15, revolving on the axle as a stud. It will be seen that these wheels 11 14 15 when not connected up will revolve without driving the top machine.

In order to run the top machine at the same speed as the bottom one, a bolt 17 is passed through a hole in wheel 13 and screwed into a corresponding hole in wheel 11. The loose wheel 11 thereby carries with it the wheel 13, because they are fastened together by the bolt 17. As wheel 13 is keyed to the shaft, motion is thereby communicated to the top machine through the stereo-cylinder 19 and the gearing 20 on the opposite end of the shaft. The wheels 14 and 15 merely run loose when the top press is thus made to run at the same speed as the bottom press.

In order to run the top press at half the speed of the bottom press, the bolt 17 is taken out of wheels 11 and 13 and put into wheels 14 and 15, as shown at 18. This allows the loose wheel 11 to drive the loose wheel 14, and as wheel 15 is bolted to wheel 14 the motion is carried through these wheels back to wheel 13, which is keyed on the axle. As the wheel 13 has double the number of teeth that there is in wheel 15, the speed of the top press is thereby reduced to one-half of that of the bottom press. This arrangement is much more simple and safe than the usual arrangement, in which the wheels are taken off and others put on to change the speed. It is only necessary to have one bolt to fasten the wheels together, and that bolt has only to be removed from one set of wheels to the other set to change the speed. There is therefore no risk of the attendants locking the mechanism and attempting to start, with the result that damage is caused.

The inking mechanism may be of any kind suitable for the work the machine has to do.

The manner of associating the webs is shown in Fig. 1 and more in detail in Figs. 3, 4, and 5. The web from the bottom press after it leaves the last pair of printing-cylinders

passes the registering-roller 21. It is then conveyed, preferably by margin tapes 21<sup>a</sup>, to the pair of drawing-rollers 22 and 23. These rollers are made with an equal number of longitudinal flutes in them, and the lower one 23 is spring-seated and made adjustable in relation to the top one by the nuts 24. 25 and 26 are a pair of ordinary cutting-cylinders, the perforator 25<sup>a</sup> being placed in the bottom cylinder and the bolster 26<sup>a</sup> in the upper one. The cylinder 26 also carries a rock-shaft 28, which operates the pins 28<sup>a</sup> immediately behind the perforating-bolster in the cylinder. 27 is a conveyance-cylinder, which carries a rock-shaft 29 and a set of pins 29<sup>a</sup>. The pins both in this cylinder and in the upper cutting-cylinder are operated by the cam 30, which is hinged on the axle of the cylinder 25. This cam has double ends 31 32, and it is operated by the box-cam 33 in the cross-shaft. The cylinders 25, 26, and 27 are all of one size and preferably half the size of the printing-cylinders of the machine, and they make two turns for one turn of the stereo-cylinders. The cylinder 26 can be caused either to cut off and pass on each sheet singly—that is, without collecting—or to collect the whole product of the machine. When it is desired to cut off and pass on each sheet or set of sheets singly without collecting, the cam 30 has to be made stationary. This is done by taking out the bolt-stud of the same roller 34, (see Fig. 4,) thereby rendering this cam inoperative. The same bolt is then screwed through the framework 35 into the lug of the cam 32, as is also seen in Fig. 4. By using the same bolt and making it of any special form the risk of the cam being bolted to the framework at 35 while the cam 30 is not disconnected, and thus inevitably causing a breakage of the mechanism, is avoided. The leading edge of the sheet after it passes the perforator is carried around by the pins 28<sup>a</sup>. When these pins arrive at the nearest point of contact with the conveyance-cylinder 27, the pins 28<sup>a</sup> are withdrawn by the cam 32 and the pins 29<sup>a</sup> in the conveyance-cylinder 27 pick up the leading edge of the sheet and carry it around into the bight of the tapes 36. The conveyance-cylinder has a series of tapes passing around it and from thence down the fold-former, when the sheet will be longitudinally folded. The pins in the conveyance-cylinder are withdrawn at every revolution by the permanent cam 37. This arrangement of the machines will produce single sheets, which might be a four-page newspaper if only the bottom press is used. If a half-width web is used in the top press also and it runs at the same speed as the bottom press, it will produce six-page papers. Full-width webs in top and bottom presses would produce two sheets inset or eight pages.

When working the machine to obtain the above products, the perforator 40 in the top printing-press carried by cutting-cylinders 38 and 39 is removed. The printed web D from



the top press passes through between the cylinders 38 and 39 under the registering-roller 41, and from thence to the drawing-rollers 22 and 23, where it is associated with the web

5 from the lower press.

In order to obtain four sheets representing sixteen pages of a newspaper or the full product of the top and bottom presses, the manner of operating the pins in the collecting and conveyance cylinders has to be changed. The cam 30 has to be released by the removal of the bolt at 35, which bolt is then inserted into the box-cam-roller 34, thereby allowing the cam 30 to be rocked on its pivot at 25.

15 Fig. 5 shows the pins 28<sup>a</sup> on cylinder 26, carrying around the leading end of the sheet past the pins 29<sup>a</sup> in the conveyance-cylinder 27. The cam 33 is round, with its highest side at the top. This rocks the double cam 31 and 20 32. The cam 32 is set back to the left, and thus allows the cam-roller on the pin-shaft 28 to pass without withdrawing the pins. When the cam 32 is out of contact, cam 31 is set forward, so that the cam-roller on pin-shaft 29 is made to withdraw the pins 29<sup>a</sup> inside the conveyance-cylinder 27 as they pass the point of contact. The sheets are thereby held by the pins on the collecting-cylinder 26 and carried 30 around to the point of contact with cylinders 25, when the second lot of sheets is impaled on the pins above the first lot. By the time the leading edge of the collected sheets on the cylinder has been carried around to the point of contact with the conveyance-cylinder, (see Fig. 5,) the box-cam 33 has so far advanced that the double cam 30 has been 35 rocked to the right hand. This causes the pins 28<sup>a</sup> in the collecting-cylinder to withdraw, while the pins 29<sup>a</sup> in the conveyance-cylinder seize hold of the leading edge of the sheets and transfer them to the conveyance-cylinder, by which they are passed on to the longitudinal folding mechanism. The arrangement already described will produce 45 issues of one sheet or four pages, one and a half sheets or six pages, two sheets or eight pages, and four sheets or sixteen pages. In order to obtain products of two and a half sheets or ten pages and three sheets or twelve 50 pages, the top printing-press is arranged to run at half speed in the manner I have already explained. The ten-page size is obtained by using a full-width web on the bottom press and a half-width web on the top 55 press, and a twelve-page product is obtained by using two full-width webs. The same arrangement of the mechanism will produce either size, and the following description will refer to both.

60 The perforator 40, Fig. 3, is put into the cylinder 39. This is made to perforate the web from the top press, but not to completely sever it. The paper after it passes the cylinders 38 and 39 is carried by top and bottom 65 sets of endless tapes 44 to the breaking and conveyance cylinder 42. The tapes 44 run at the same surface speed as the bottom press

and the folder mechanism, while the web from the top press is only advancing at half-speed. The two sets of tapes are kept a little 70 distance apart to prevent smearing the freshly-printed sheet. The leading edge of the sheet is timed to reach the bight of the tapes between cylinders 42 and 45, so that the projection 43 in the cylinder 42 nips the 75 sheet on its unprinted margin on the cylinder 45, and thereby completely severs the sheet from the web and advances it down to the conveyance-cylinder 27, where it is timed to join the two sheets which were produced in 80 the lower press in the time the one sheet was produced from the top press.

It is found in practice in conveying sheets by means of tapes any distance after they are cut off from the web that they are apt to lose 85 time and cause the fold to be irregular. In order to obviate this, I increase the diameter of the rollers which drive the tapes, lap the tapes around these rollers about three-fourths or more of their surface, and place these rollers 90 as near to the top of the fold-former as possible.

The upper run of tapes 36, which passes over the fold-former, is driven by the conveyance-cylinder 27, around which they pass. 95 The bottom run 36<sup>a</sup>, passing down the former, is driven by the cylinder 42, these cylinders being of the same diameter as the cutting-cylinder. In order to return the top run of tapes to the conveyance-cylinder 27, I adopt 100 new and novel means. Instead of returning the tapes to the driving-cylinder by a series of tape-pulleys set at several angles, as is usual, and thereby crowding the folder I place a segment of a tube or similar rounded device 105 above the angle edges of the fold-former and parallel thereto, leaving a space of about half an inch between the under side of these tube-segments and the edge of the former to allow the paper to pass between them. The 110 tapes, after passing down the sides of the former and around the drawing or folding rollers, are led over these tube-segments, which form a convenient and suitable guide to lead the tapes back to the conveyance-cylinder or driving-roller above the fold-former. 115

Fig. 6 shows a front view of one-half of the fold-former, and Fig. 7 a side view. The tube-segments are shown at 46, being represented as broken away in the middle to show 120 the side of the fold-former 47 itself and the tapes in their downward course at 36<sup>x</sup>. The tube-segments 46 thus act as guides for the return of the top tapes 36, the tapes sliding over the rounded and smooth surface of the 125 guides. As the guides are only a little way above the edge of the former 47, over which the tapes carry the sheets, the tapes returning over these guides practically return in line with the advancing tape, any tendency 130 of the tape to wander out of its course is corrected by the flanged tape-pulleys 50 on the rod 48. 49 represents one of the drawing or folding rollers, around which the tapes 36

pass and from which they are led up over the tube-sections 46.

What I claim, and desire to secure by Letters Patent, is—

1. In a two-web rotary printing-machine having a lower printing mechanism and an upper printing mechanism, the combination of (a) the first stereo-cylinder and first blanket-cylinder of the lower printing mechanism, said cylinders being in the same horizontal plane, (b) the second stereo-cylinder and second blanket-cylinder of said printing mechanism in the same vertical plane and so disposed relatively to the first stereo and blanket cylinders that a line passing through the centers of said last-named cylinders touches the point of contact between said second stereo and blanket cylinders (c) the first stereo-cylinder and first blanket-cylinder of the upper printing mechanism said cylinders being in the same horizontal plane, (d) the second stereo-cylinder and second blanket-cylinder of said printing mechanism said cylinders being in the same horizontal plane but much lower than the plane of the first stereo and blanket cylinders of said upper printing mechanism and the second blanket-cylinder being immediately below the first blanket-cylinder of said printing mechanism (e) roll-carriers at one end of the combined machine (f) associating and folding mechanism at the other end of the machine and (g) means whereby the webs are carried from the roll-carriers to the two printing mechanisms respectively and from said mechanisms to the associating and folding mechanisms, substantially as set forth.
2. The combination with the gear-wheels 9 and 10 which transmit motion from a lower printing mechanism to an upper printing mechanism, of a gear-wheel 11 loose on the stereo-cylinder axle 12 of said upper printing mechanism and meshing with said wheel 10, a wheel 13 keyed on said axle 12, a wheel 14 loose on the blanket-cylinder axle 16 of said upper printing mechanism a wheel 15 also loose on said axle 16 and a bolt-hole in each of said wheels 11, 13, 14 and 15 whereby when a bolt is inserted into the holes of wheels 11 and 13 the two printing mechanisms run at the same speed and when a bolt is inserted into the holes 14 and 15 the upper printing mechanism runs at half the speed of the lower printing mechanism, substantially as set forth.

3. In a two-web rotary printing-machine, the combination with the two printing mechanisms, mechanisms for cutting the webs into sheets, means for conveying said webs from the respective printing mechanisms to the respective cutting mechanisms, an associating mechanism, means for conveying the webs to said associating mechanism, a longitudinal folding mechanism, and means for conveying the associated sheets to said folding mechanism, of means for causing the cutting mechanisms to act respectively upon the respective webs before association, and means for causing one of said cutting mechanisms to act upon the associated uncut webs, whereby the respective webs can either be associated in an uncut state, then cut together transversely and the cut and associated sheets be folded longitudinally, or the respective webs can be cut separately, the cut sheets be then brought together, associated and folded longitudinally, as required, according to the product to be obtained.

4. In a rotary web-printing machine the combination with the mechanism for cutting the printed web, of a cam 30 with two ends 31 and 32 operating the cutting mechanism, a cam 33 operating said cam 30 a cam-roller 34 working in said cam 33 and a bolt for securing said roller but capable of being removed and placed into the cam end 32 whereby said cam 30 can be made as required either inoperative or operative and the cutting-cylinder therefore caused either to cut and pass on each sheet or set of sheets singly without collecting or to collect the sheets or sets of sheets, substantially as described.

5. In the folding mechanism of a rotary web-printing machine, the combination with the fold-former the tapes which carry the sheets down said former and the drawing or folding rollers below said former, of tubular segments above the edges of said former and parallel therewith, said tapes passing over said tubular segments in their upward travel after passing around said drawing or forming rollers, substantially as and for the purpose set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ROBERT CUMMING ANNAND.

Witnesses:

GEORGE C. BACON,  
ROBERT M. SPEARPOINT.