

No. 715,517.

Patented Dec. 9, 1902.

R. C. SEYMOUR.

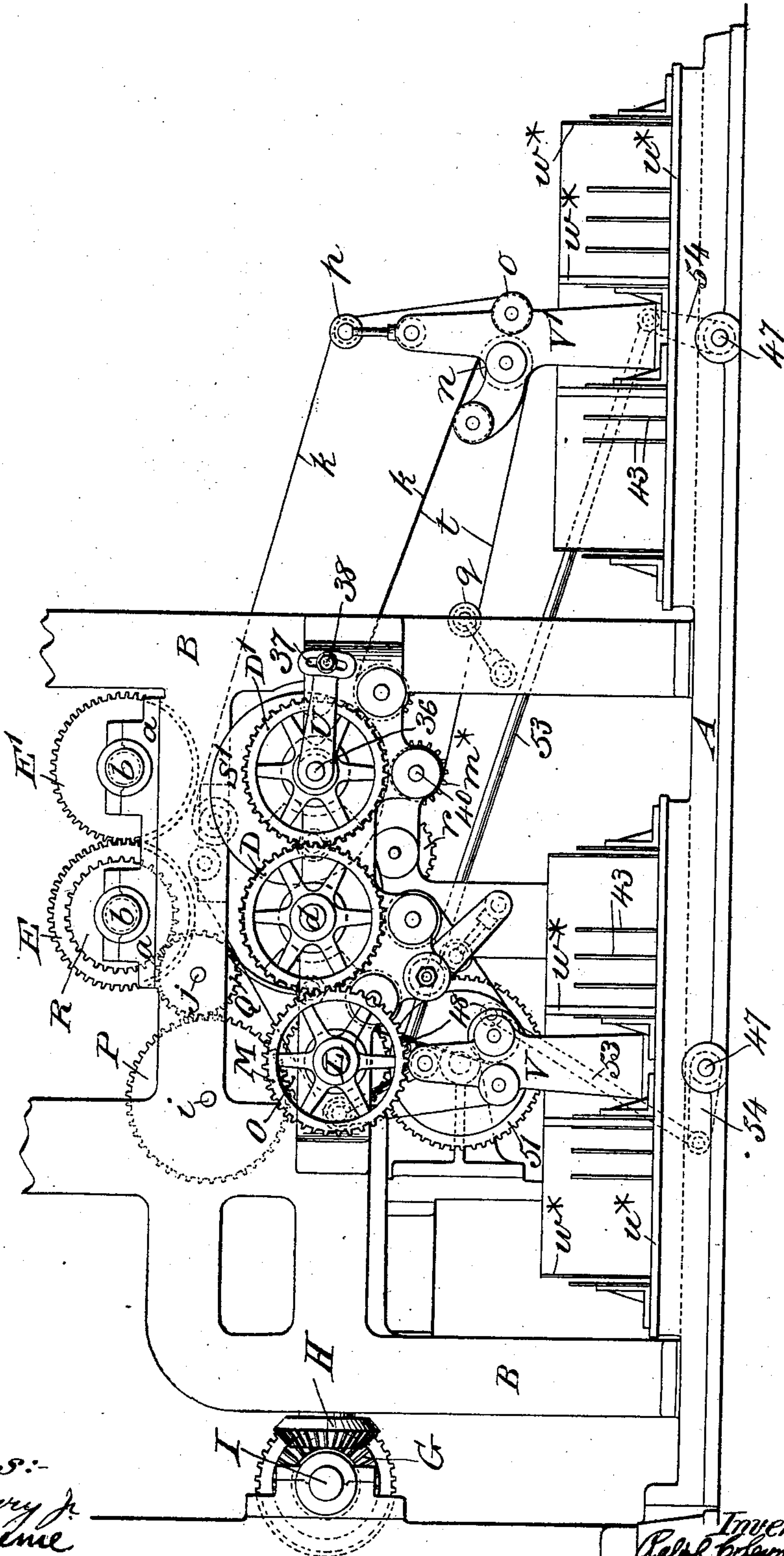
MACHINERY FOR CUTTING AND FOLDING PAPER, &c.

(Application filed June 26, 1902.)

(No Model.)

5 Sheets—Sheet 1.

Fig. 1.



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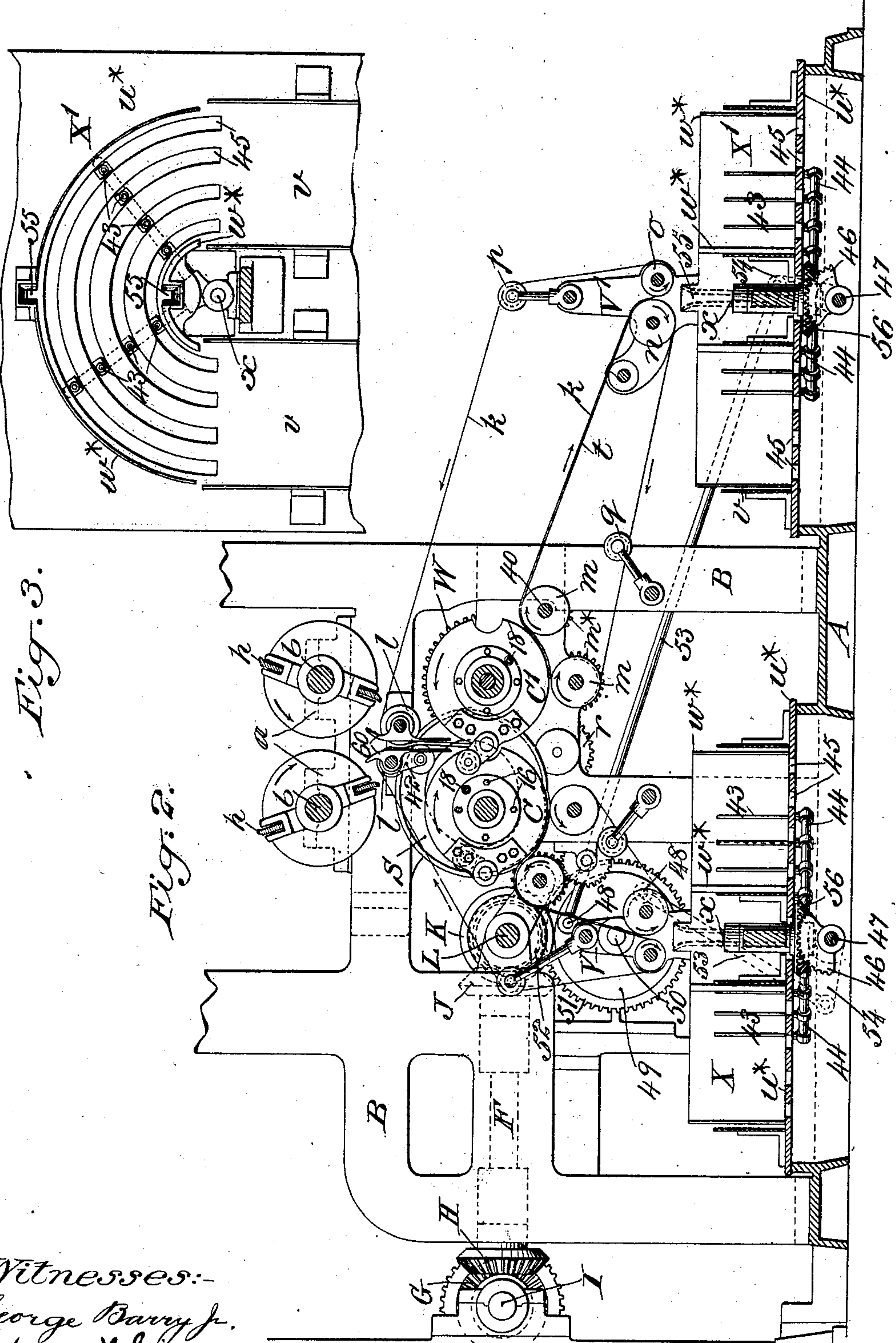


Fig. 3.

Fig. 2.

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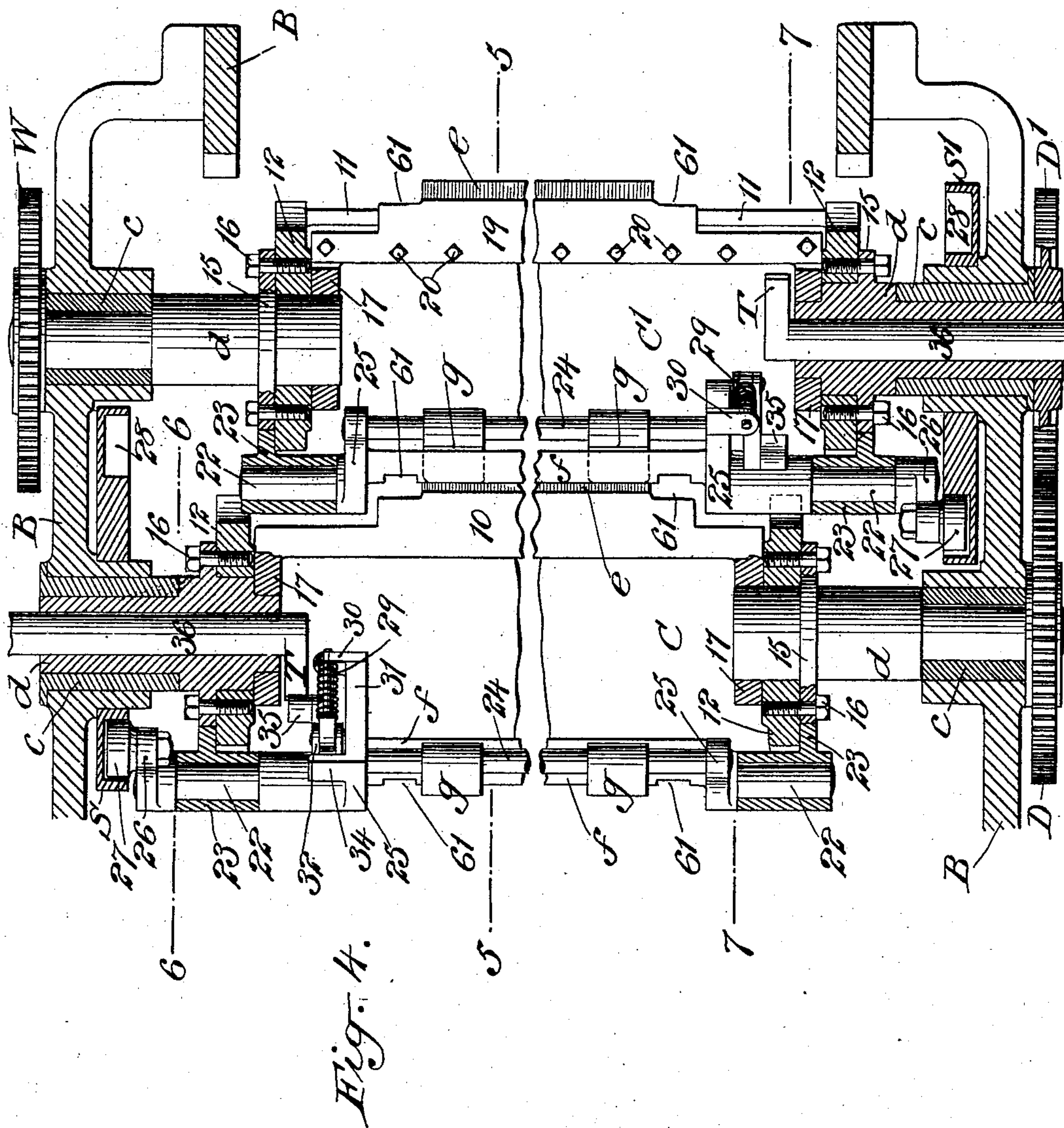


Fig. 4.

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5 Sheets—Sheet 4.

Fig. 5.

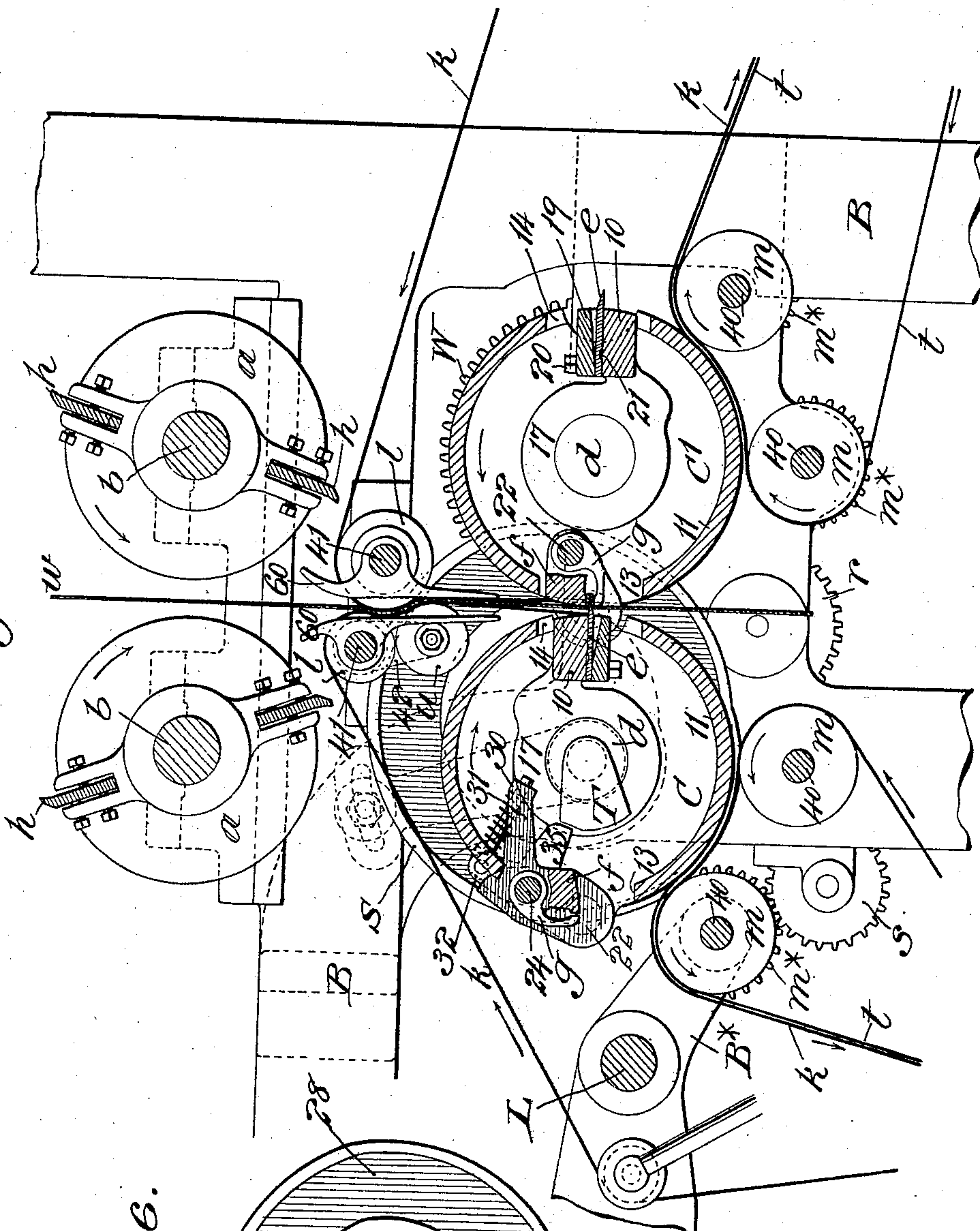
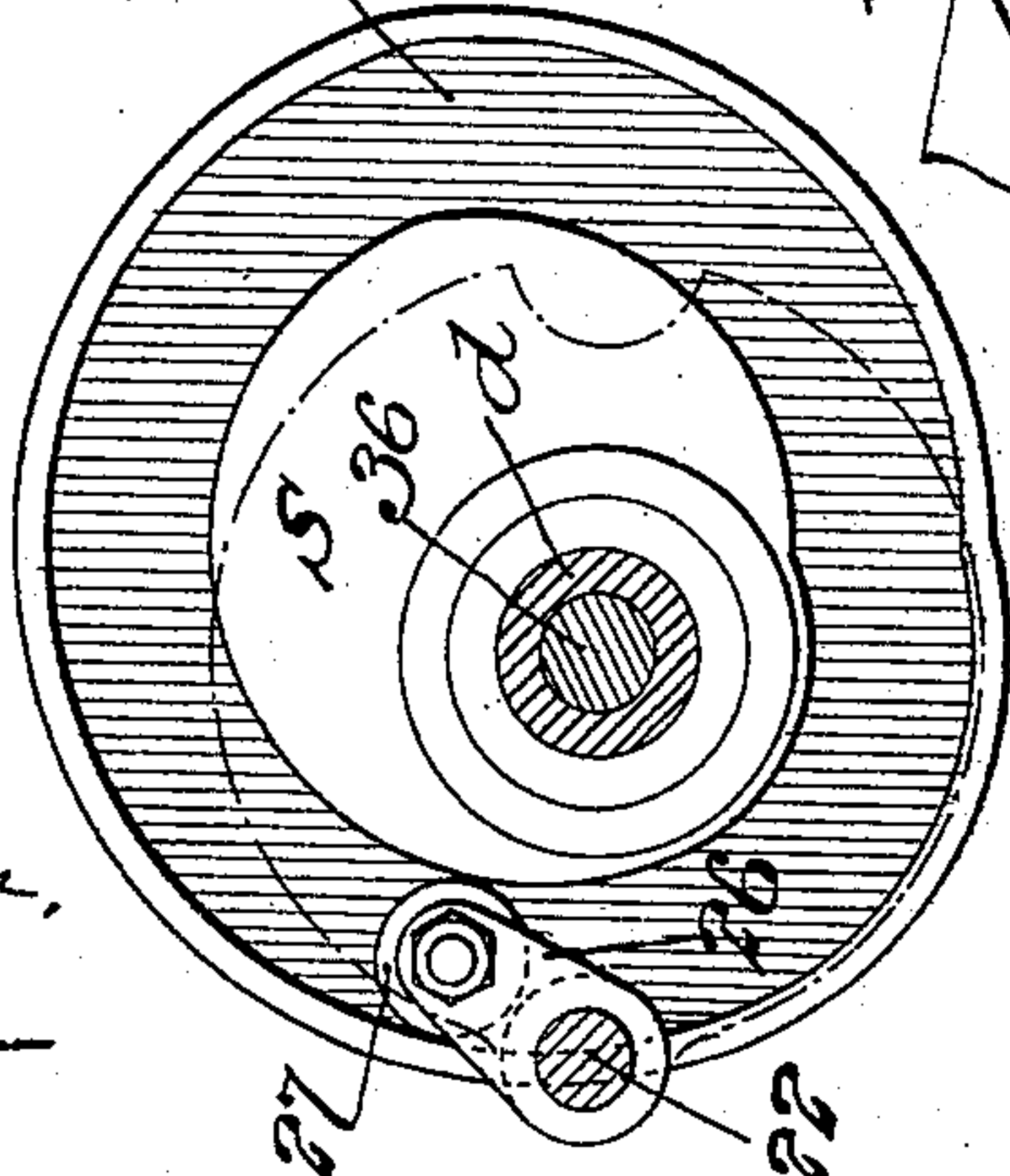


Fig. 6.



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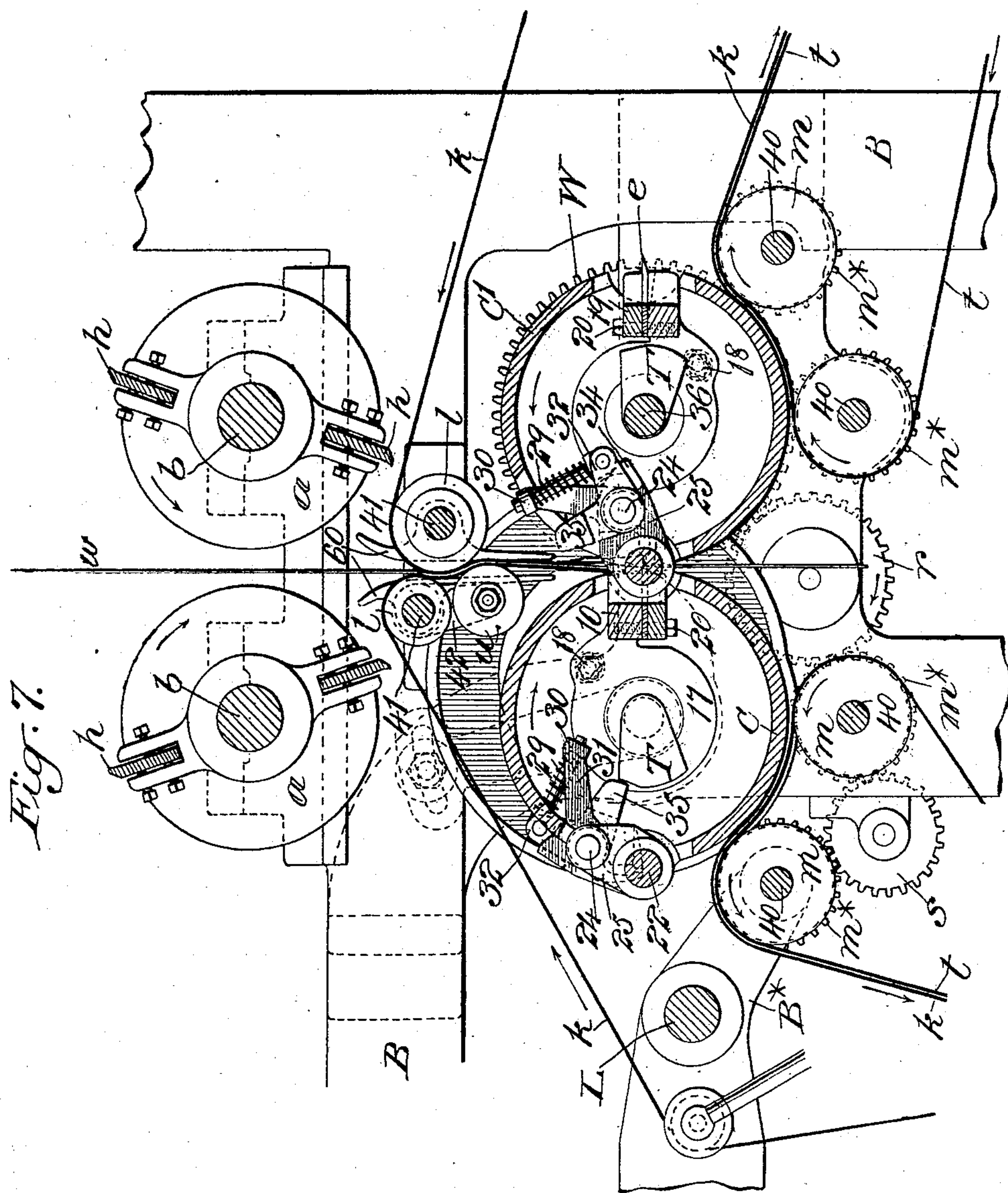
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(No Model.)

5 Sheets—Sheet 5.



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UNITED STATES PATENT OFFICE.

RALPH C. SEYMOUR, OF SOUTH ORANGE, NEW JERSEY, ASSIGNOR TO C. B. COTTRELL & SONS COMPANY, OF NEW YORK, N. Y., AND STONINGTON, CONNECTICUT, A CORPORATION OF NEW JERSEY.

MACHINERY FOR CUTTING AND FOLDING PAPER, &c.

SPECIFICATION forming part of Letters Patent No. 715,517, dated December 9, 1902.

Application filed June 26, 1902. Serial No. 113,353. (No model.)

To all whom it may concern:

Be it known that I, RALPH C. SEYMOUR, a citizen of the United States, and a resident of South Orange, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Machinery for Cutting and Folding Paper and other Fabrics, of which the following is a specification.

In a machine embodying the present invention in its entirety there are employed in connection with cutters for cutting sheets from a web in motion a folding mechanism consisting of two rotary cylinders furnished, respectively, with cooperating folding blades and grippers.

The invention consists in certain new combinations in which said mechanism and the cutters constitute elements, as hereinafter described with reference to the accompanying drawings, and the novelty of which is specifically pointed out in the concluding claims.

In the drawings, Figure 1 is a side elevation of all the parts of a cutting and folding machine necessary to illustrate my invention and of two packers employed in connection with said invention; Fig. 2, a vertical section corresponding with Fig. 1 and taken parallel therewith; Fig. 3, a plan of one of the said packers; Fig. 4, a horizontal section taken centrally through the folding mechanism on a scale larger than that of Figs. 1, 2, 3; Fig. 5, a vertical section on the line 5 5 of Fig. 4; Fig. 6, a vertical section in the line 6 6 of Fig. 4; Fig. 7, a vertical section on the line 7 7 of Fig. 4. Figs. 4, 5, 6, 7 are on a corresponding scale, larger than that of Figs. 1, 2, 3.

A designates the bed-plate, on which is erected the side framing B, on which are the bearings *a* for the shafts *b* of the rotary-cutter carriers and the bearings *c* for the journals *d* of the rotary folding-cylinders, one of which is designated as a whole by the letter C and the other by the letter C'. Each of these cylinders, which are of the same size, is furnished with a folding-blade *e* and with grippers *f g*, the said folding-blade and grippers on each cylinder being diametrically opposite each other and the two cylinders being geared together by spur-gears D D' of the

same size in such manner that the folding-blade on each cylinder may in the rotation of the cylinders enter between and cooperate with the grippers of the other cylinder. The rotary-cutter carriers, the shafts of which are geared together by spur-gears E E' of equal size, are represented as furnished with two sets of cutters, the blades *h* of which are set diametrically opposite each other for cutting from a web *w* during each rotation two sheets to be folded at the middle of their length by each revolution of the cylinders C C', the edges of said cutters being at proper distances from the axes of their carrier-shafts *b* to cut the sheets of the proper length. The cylinders have a circumference equal to twice the length of the cut sheets, and they and the cutters are driven at the same speed. This driving may be effected by any suitable means. I have represented it as effected through a horizontal shaft F, (see Fig. 2,) which itself derives motion through bevel-gears G H from the shaft I of a printing-machine, the cutting and folding machinery in the example represented being supposed to be the adjuncts of such a machine. The said shaft F carries a bevel-gear J, which gears with and drives a bevel-gear K on a horizontal shaft L, which carries also a spur-gear M, (see Fig. 1,) which gears with the spur-gear D on the shaft of the cylinder C, and so drives the cylinders C C'. The said shaft L also carries another spur-gear O, which gears with a spur-gear P, turning on a fixed stud *i* on the framing. This gear P gears with and drives a spur-gear Q, which turns on a fixed stud *j* on the framing and which engages with and drives a spur-gear R on one of the shafts *b*, and so drives the cutters.

The cutter-carriers and cutters which I prefer to use in carrying out this invention are those which are the subject of United States Patent No. 391,949. The folding-grippers *f g* are such as constitute part of the subject-matter of my United States Patent No. 629,928; but the folding-blades *e*, though serving the same purpose as the folding-blade which constitutes part of the subject-matter of that patent, are differently applied to the

cylinders in that instead of being pivoted thereinto to provide for their turning to and fro between a radial and tangential position, as in that patent, they are fastened to bars 10, which are rigidly fixed within the cylinders. For the purpose of conveniently applying the said bars 10, the blades, and the grippers to the cylinders the latter are constructed as represented in Figs. 4, 5, and 7, as will now be described with reference to those figures. This description being given for one cylinder, will be understood as applying to both. The body of the cylinder is composed of a shell 11, having integral heads 12 and having diametrically opposite openings 13 14, (see Figs. 5 and 7,) one for the folding-blade and the other for the grippers. The journals *d* are represented as made separate and provided with flanges 15, through which (see Fig. 4) they are bolted to the cylinder-heads 12 by bolts 16. The bar 10 has its ends bent at right angles to form eyes 17, which receive the inner ends of the journals *d* and which for the purpose of keeping the blade in the proper position with reference to the circumference of the cylinder are secured to the cylinder-heads 12 by screw-bolts 18. The blade *e* is secured to its carrying-bar 10 by a clamping-bar 19 and clamping-screws 20. For the purpose of permitting to the blade a slight flexibility to accommodate itself to the grippers and facilitate its withdrawal from between the latter after the tucking of the fold between them there is formed along the blade, on one side thereof, as shown best in Fig. 5, a groove 21, and the inner face of the clamping-bar is chamfered or beveled outward.

The grippers *f g* of each cylinder are composed substantially as shown in my Patent No. 629,928, hereinbefore referred to, of a jaw *f*, forming part of a cranked bar having at its ends journals 22, which work in bearings in brackets 23, affixed to the cylinder-heads 12, and a jaw or fingers *g*, carried by a shaft 24, which is journaled into the cranked portions 25 of said bar, and the said bar is furnished at one end with an arm 26, carrying a roller 27, which runs in the groove 28 of one of two stationary cams *S S'*, which surround the cylinder-journals and are secured to the framing *B*. Fig. 6 is a face view of one of these cams and of the arm 26 and roller 27 and shows one of the journals 22 of the bar *f* in section. By the rotation of the cylinder and the consequent travel of its roller 27 in the groove of its respective cam the grippers are caused to turn at the proper times between positions radial to the cylinder for receiving the fold-line of the sheet and a position tangential to the cylinder for delivering the folded sheet, as described in my United States Patent No. 629,928, part of the subject-matter of which is a folding-cylinder similar to those *C C'* in that it carries similar folding-grippers which operate in combination with a folding-blade on another cylinder and which are turned by a cam like those *S S'*. For the purpose of

closing the grippers a spring 29 is applied, as described in my said Patent No. 629,928, between a lug 30 on an arm 31, which projects, as shown in Figs. 4, 5, and 7, from one of the cranked portions 25 of the gripper-bar *f*, and an arm 32, which is provided on the shaft 24 of the jaw *g*. It is not, however, intended that the jaws *f* and *g* shall ever come quite close together, and to prevent that there is provided on one of the cranked portions 25 of the bar *f* a stop 34 for arresting the arm 32 of the shaft 24 of the jaw *g*, as shown in Fig. 7, in such position as to leave a just sufficient opening between *f* and *g* to permit the fold-line of a sheet to be tucked between them tightly by the folding-blade *e*. Thus it will be understood that the grippers do not have any positive opening movement to receive the tuck. They are only opened positively to liberate the folded sheet. This latter operation is produced by a stationary cam *T*, (see Figs. 4, 5, and 7,) located within the cylinder and against which at the proper period in each revolution of the cylinder there runs an arm 35 on the shaft 24 of the jaw *g*. This cam is carried by a short shaft 36, which passes through one of the cylinder-journals *d*. For the purpose of adjusting the said cam *T* to liberate the folded sheet at exactly the proper time and securing said adjustment the shaft 36 has an attachment outside of the cylinder. This attachment is represented in Fig. 1 as consisting of an arm *U*, fastened on the end of the shaft 36, which projects through the end of the cylinder-journal outside of the framing *B*, the said arm having in it an arc-formed slot 37, through which passes a screw 38, which is screwed into the framing and by which the said arm may be clamped to the framing when the proper adjustment of the cam has been made by placing said arm at the proper height.

In order that the grippers *f g* of each of the cylinders *C C'* shall properly cooperate with the folding-blade *e* of the other of said cylinders, the cams *S S'* are offset in opposite directions from the axes of their respective cylinders, as will be understood by reference to Fig. 4, and to prevent interference with each other of said cams and the engagements of the grippers with them said cams are arranged one at one end of its respective cylinder and the other at the opposite end of its respective cylinder, as shown in the same figure. The axes of the two cylinders *C C'* and the axes of the cutter-shafts *b b* are arranged in two horizontal or parallel planes the distance between which is somewhat greater than the length of the sheets to be cut and folded in order that the sheets may be cut from the web before they are taken at the middle of their length between the folding blades and grippers of the two cylinders.

For the purpose of presenting the cut sheets positively to the two cylinders there are provided two sets of carrying-tapes *k*, running at a speed corresponding with the surface

speed of the cylinders. Each of these sets of tapes runs over one of two rollers *l*, located between the cutter-carriers and cylinders and both run together between said rollers and
 5 between the two cylinders. Each also runs partly around one of the cylinders and between it and rollers *m*, located below it on two shafts 40, arranged in suitable fixed bearings, and also runs around rollers *n o p*, carried by standards *V V'*, thence, as may be traced by reference to Figs. 2, 5, and 7, back to and over the rollers *l*, between the cutters and cylinders. There need be but two tapes
 15 *k* in each set to take the sheets at or near their margins. To permit the passage of said tapes to and from the cylinders without interfering with or being interfered with by the folding-blades and grippers, recesses 61 are provided for such passage, as shown in Fig.
 20 4, in the folding-blade bars 10 and in the gripper-jaw *f*. The tapes *k* have their motion given to them between their respective cylinders and said rollers *m*, said rollers also having a positive motion given to them at a
 25 surface speed corresponding with that of the cylinders through a spur-gear *W* (see Figs. 2, 4, 5, and 7) on one of the journals of the cylinder *C'*, the said gear *W* gearing with gears *m**, one on each of the two shafts 40 of the
 30 rollers *m* belonging to the cylinder *C'* and also gearing through an idler-gear *r* with a gear *m** on one of the shafts 40 of the rollers *m* belonging to the cylinder *C*. The latter gear *m** is also geared through an idler-gear
 35 *s* with the other gear *m**, belonging to the same cylinder *C*. All of the shafts 40 except that one to the extreme left in Fig. 7 are represented as having bearings in the side frames *B*, and that one as having its bearings in
 40 brackets *B**, which are secured to the side frames and in which are the bearings for the shaft *L*, hereinbefore described. The rollers *l* run loosely on two fixed shafts 41, which are supported in the side framing.

45 The two sets of tapes *k* constitute not only an endless feeding-carrier for presenting the cut sheets to the folding-cylinders, but constitute members of delivery-carriers, which carry away the folded sheets either to packers *X X'*
 50 or to any other receptacle or place of deposit. As a feeding-carrier the two sets simply cooperate with each other between the rollers *l*, there taking the sheets between them. As a member of one of two endless delivery-carriers each set coöperates with one of two sets
 55 of tapes *t*, which constitutes its fellow member. The said tapes *t* run between the cylinders and the rollers *m* outside of the tapes *k*, and also run over and around the pulleys
 60 *n*, before mentioned, and they get their motion with the tapes *k*, between the cylinders and the rollers *m*. In Fig. 2 the rollers *p* are represented as tightening-rollers for the tapes *k*, and tightening-rollers *q* are
 65 shown for the tapes *t*. Under one set of the tape-rollers *l* and opposite the corresponding set there are tape-rollers *u*, carried by arms

42 on one of the shafts 41. The two sets of rollers *l u* on one side of the tapes *k* assist each other in coöperation with the roller *l* on
 70 the opposite side to give the tapes a sufficient bite upon the sheet. The stationary tape-roller shafts 41 are represented as carrying stationary guide-fingers 60, between which
 75 the terminal portion of the web before the sheet is cut from it is conducted between the two tapes *k*. When packers are employed in connection with this folding machinery, they
 80 may be of any known or suitable kind, one for each folding-cylinder. To illustrate such employment, those represented in Figs. 1, 2, and 3, which are of a well-known kind, serve
 85 as well as any others. These have been herein previously mentioned and each designated as a whole by one of the letters *X X'* and will
 90 now be described in only sufficient detail to illustrate their coöperation with the delivery-carriers. A description of one of them will, except as to the provision for driving them
 95 from the shaft *L*, apply to both. Each consists of a bed-plate *u**, on which are two parallel troughs *v*, communicating with opposite ends of a semicircular passage, which is
 100 formed by upright walls *w* w** and in which work packing-fingers 43, carried by the two arms 44 of an upright shaft *x*, (see Fig. 3,) which has a reciprocating rotary motion to
 105 the extent of half a revolution, the said arms 44 being under the bed-plate *u** and the fingers 43 projecting upward through curved slots 45 in the bed-plate. In the walls *w* w** of
 110 the semicircular passage are upright grooved guides 55 for the reception of the edges of the folded sheets which are dropped into the said passage from the delivery-carriers, the pack-
 115 ers being suitably arranged relatively to the rollers *n o* of the delivery-carriers for such reception. By the reciprocating rotary motion of the shaft *x* the sheets dropped into the passage *w* w** are packed one at a time
 120 into one and the other of the troughs *v* alternately. The movement of the shaft *x* is obtained from a bevel-toothed sector 46 on a horizontal rock-shaft 47, arranged under the
 125 bed-plate, the said sector gearing with a bevel-wheel 56 on the shaft *x*. The rock-shafts 47 for operating the two packers derive their motion from two crank-wrists 48 on a disk 49,
 130 carried by a shaft 50, which works in bearings in a standard *V* and which carries a spur-gear 51, through which it receives rotary motion from a spur-gear 52 on the shaft *L*, hereinbefore described. One of the crank-wrists
 48 is connected by a rod 53 with an arm 54 on one of the rock-shafts 47, and the other of
 125 said crank-wrists is connected by a similar rod 53 with a similar arm 54 on the other of said rock-shafts.

The construction and the separate operations of the several parts of the machinery
 130 having now been sufficiently described, it remains to briefly describe the consecutive operations of cutting the sheets from the web and folding and delivering them. The web

cam passing through one of the journals of said cylinder, and an attachment to said shaft outside of the cylinder for turning said cam to and securing it in proper operative position, substantially as herein described.

12. In a folding-machine, the combination of two rotary cylinders in each of which there is a folding-blade and folding-grippers, a continuously-moving carrier for presenting sheets between said cylinders to be alternately folded by one and the other of the blades and the grippers coöperating therewith, continuously-moving carriers one for each cylinder

for taking from each alternately the sheets folded by its own grippers, and packers one for each cylinder for separately packing the folded products from the two cylinders, substantially as herein described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 25th day of June, 1902.

RALPH C. SEYMOUR.

Witnesses:

FREDK. HAYNES,
GEORGE BARRY, Jr.