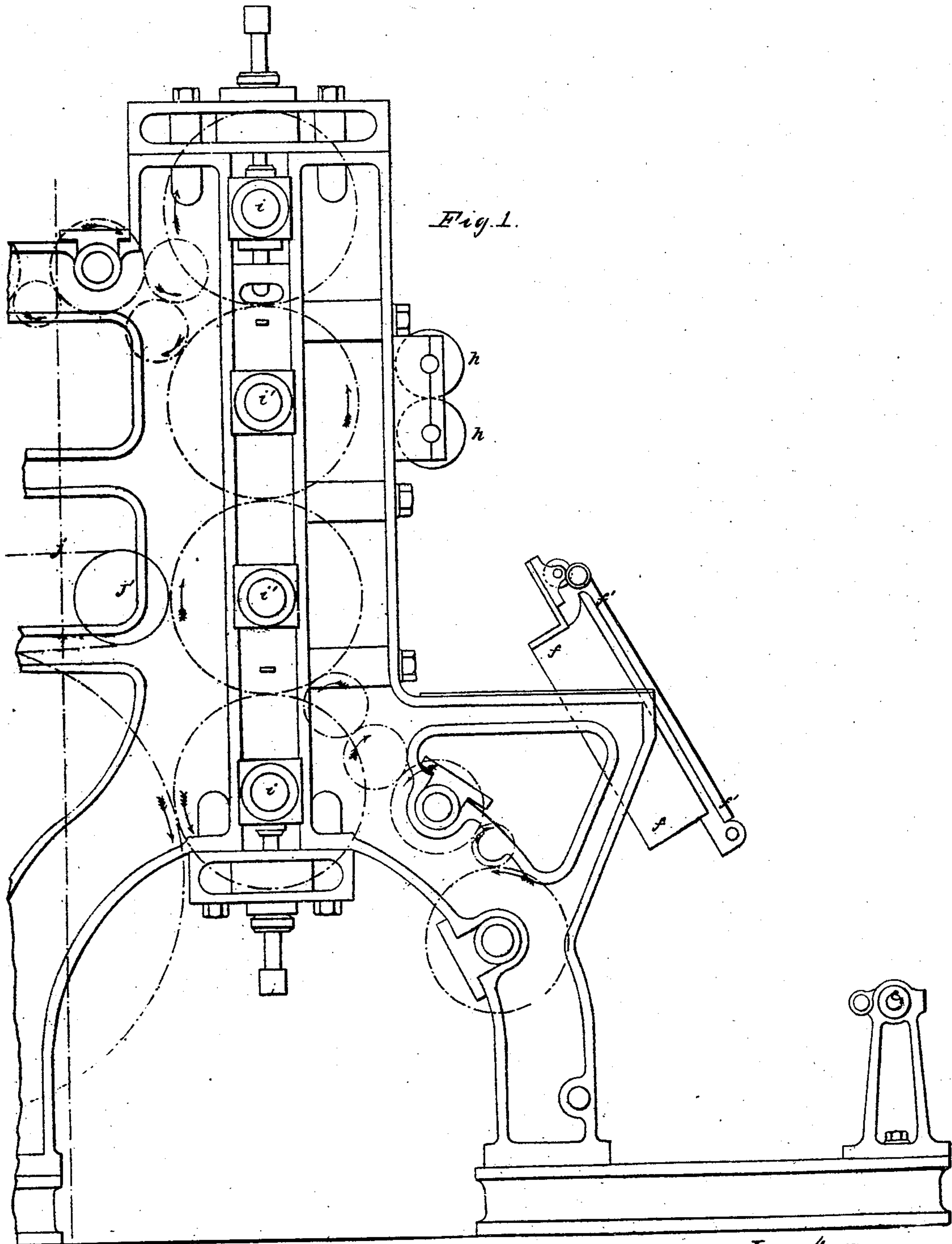


Macdonald & Calverley Sheet 7 of 5
Printing Press.

Nº 90558.

Patented Jun. 1. 1869.

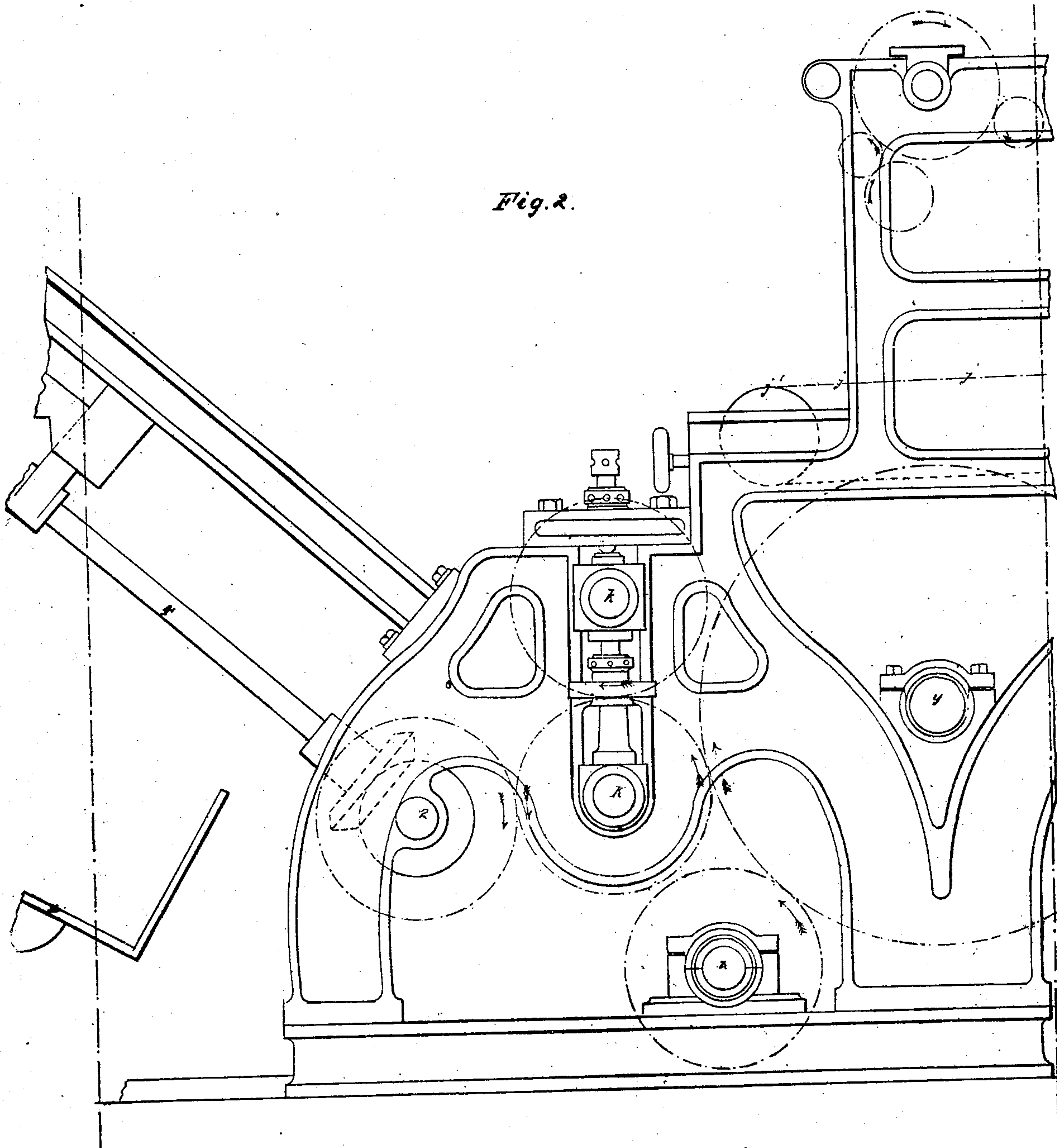


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Macdonald & Calverley Sheet 2.7 Sheets
Printing Press.
No 90858. Patented Jun. 1. 1869.

Fig. 2.

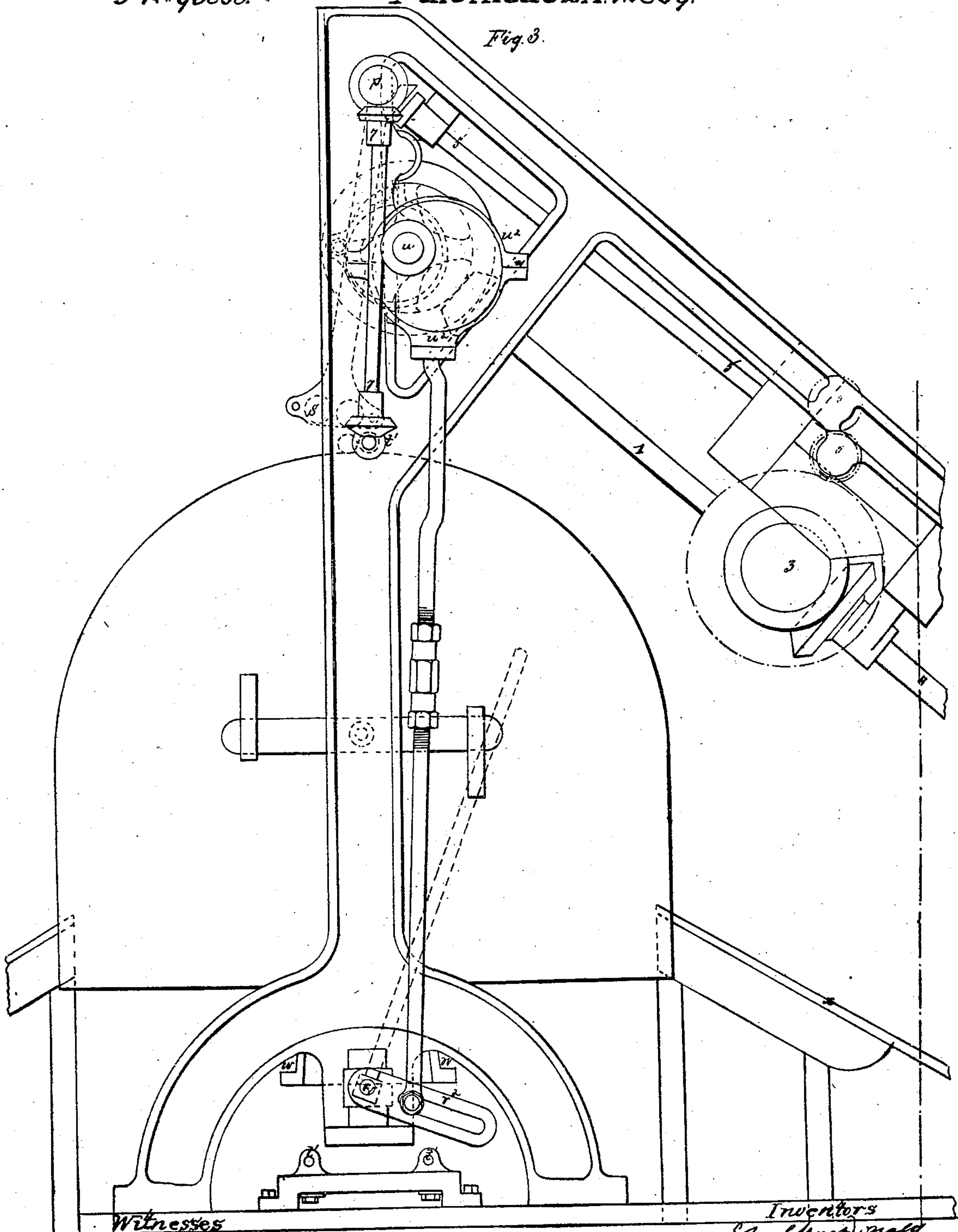


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Fig. 3.



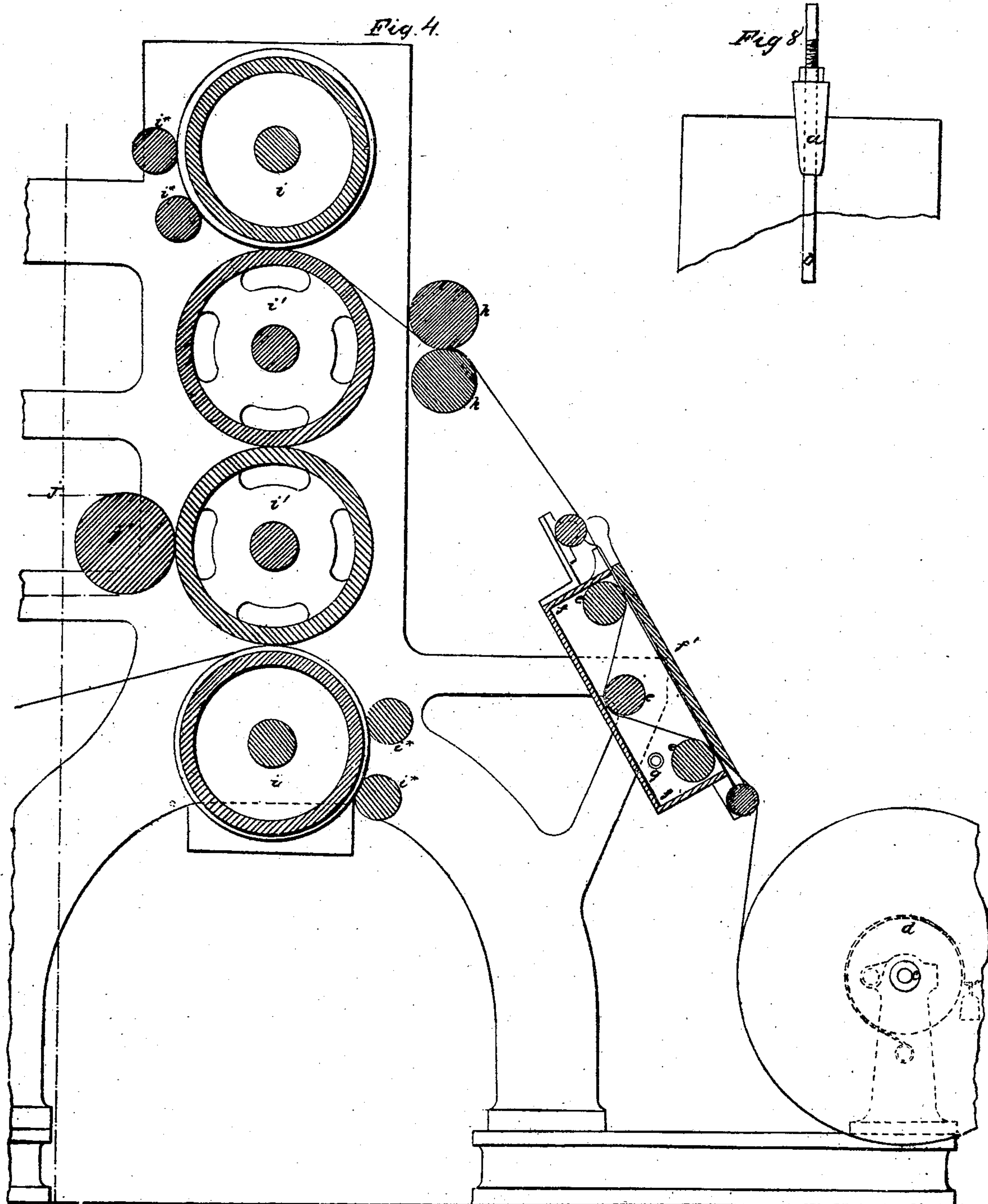
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Macdonald & Calverley Sheet 4. of 5 Sheets.
Printing Press.
Nº 90858. Patented Jun. 1. 1869.



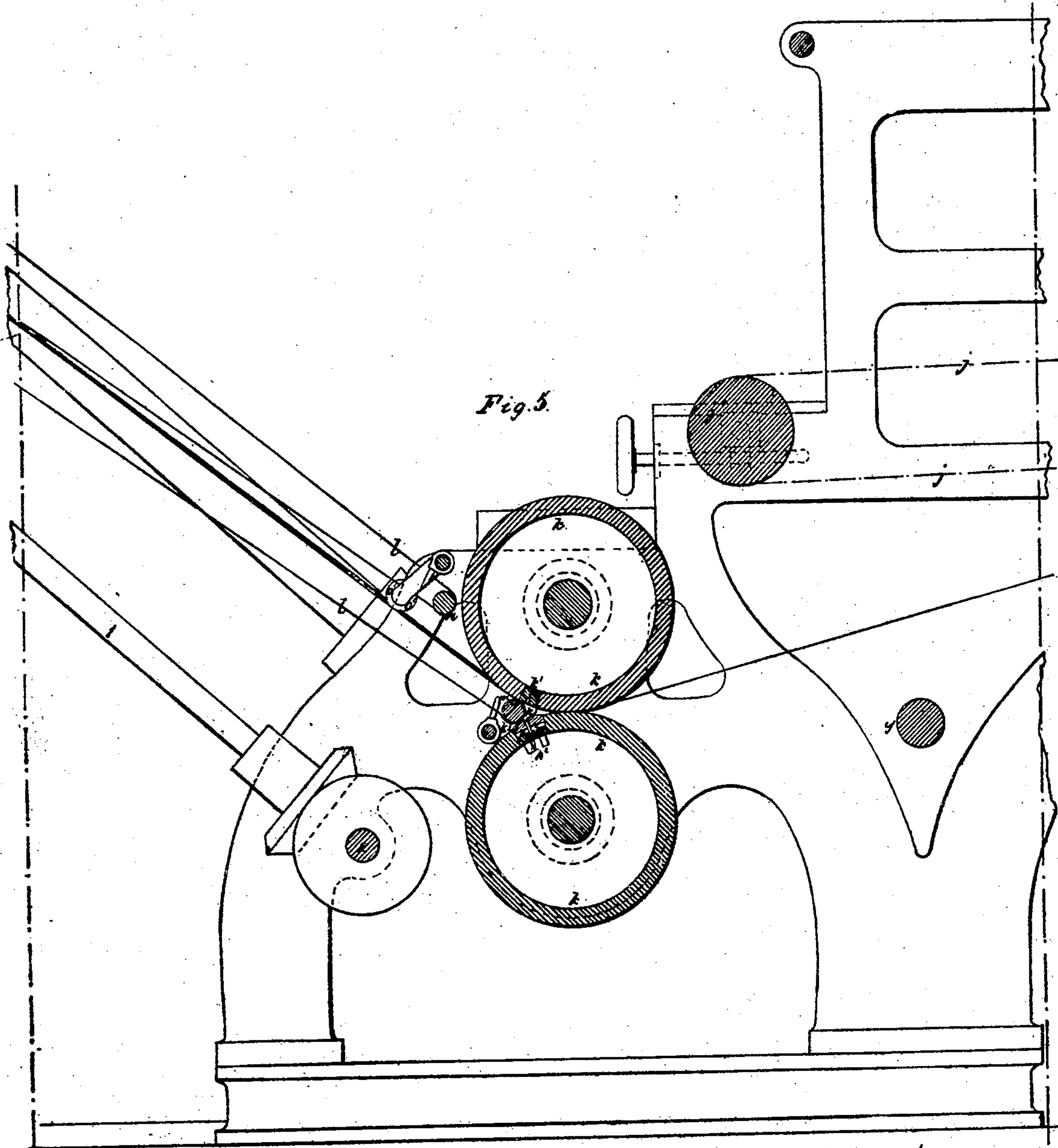
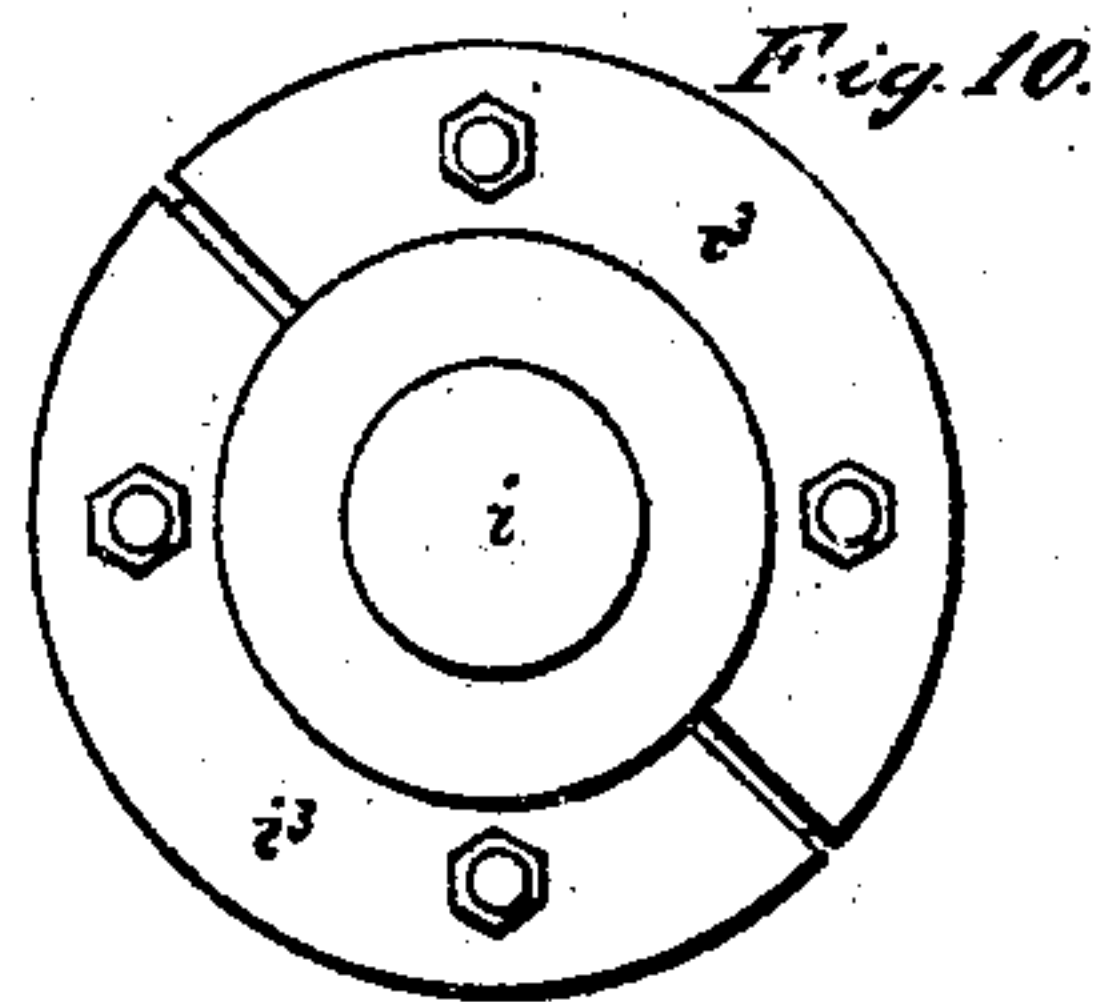
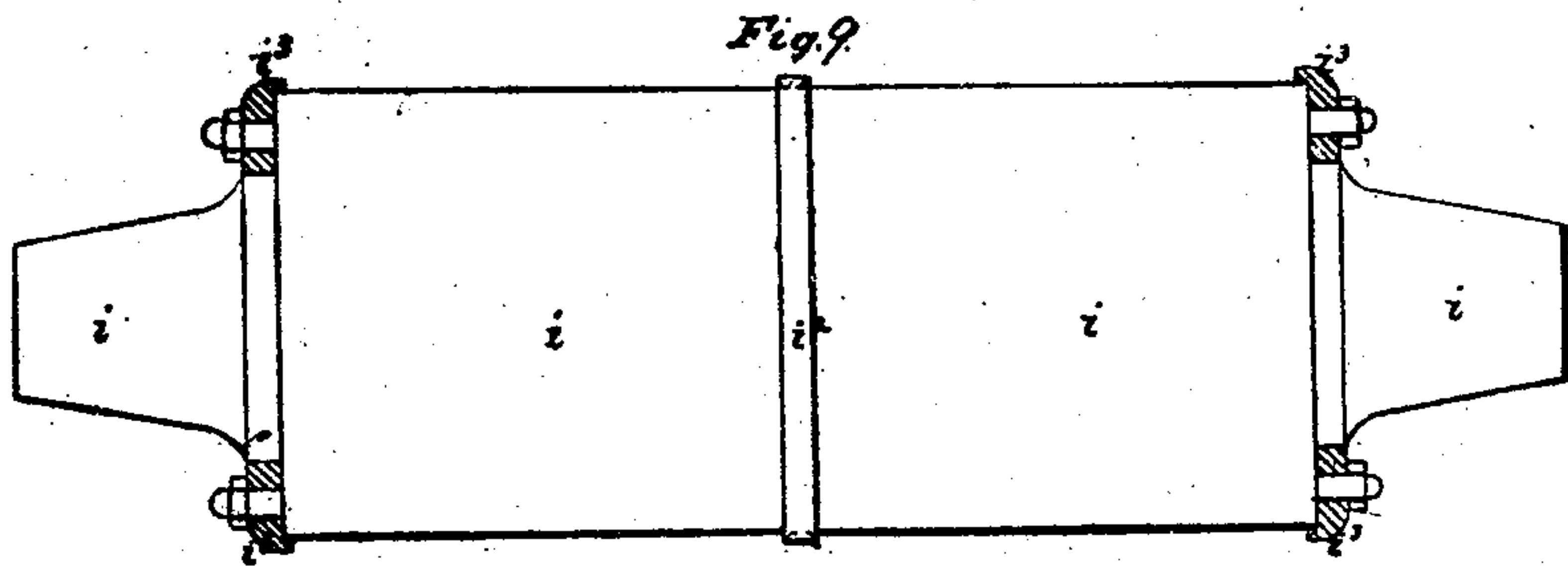
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Printing Press.

N^o 90558.

Patented Jun. 1. 1899.



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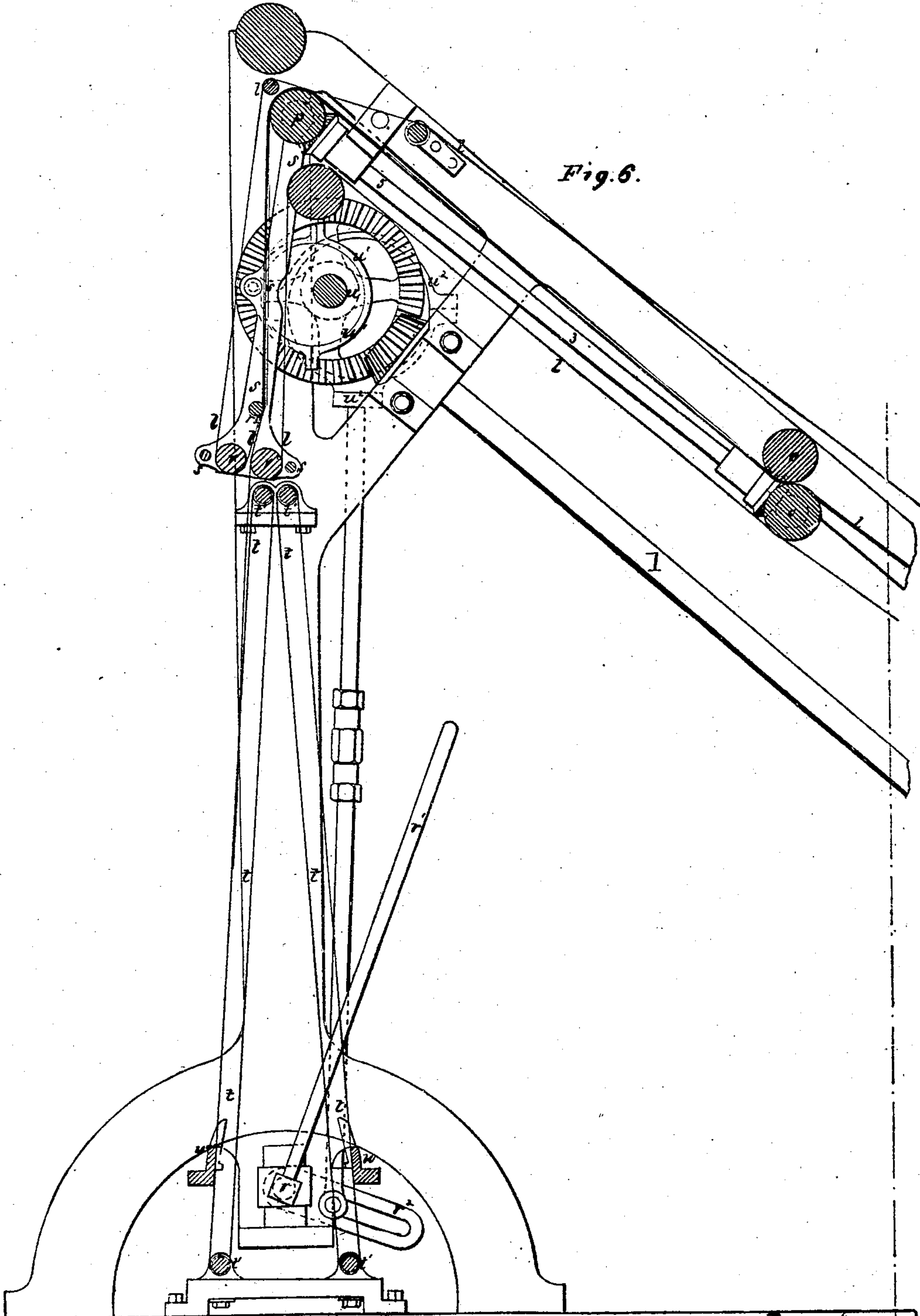
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Fig. 6.



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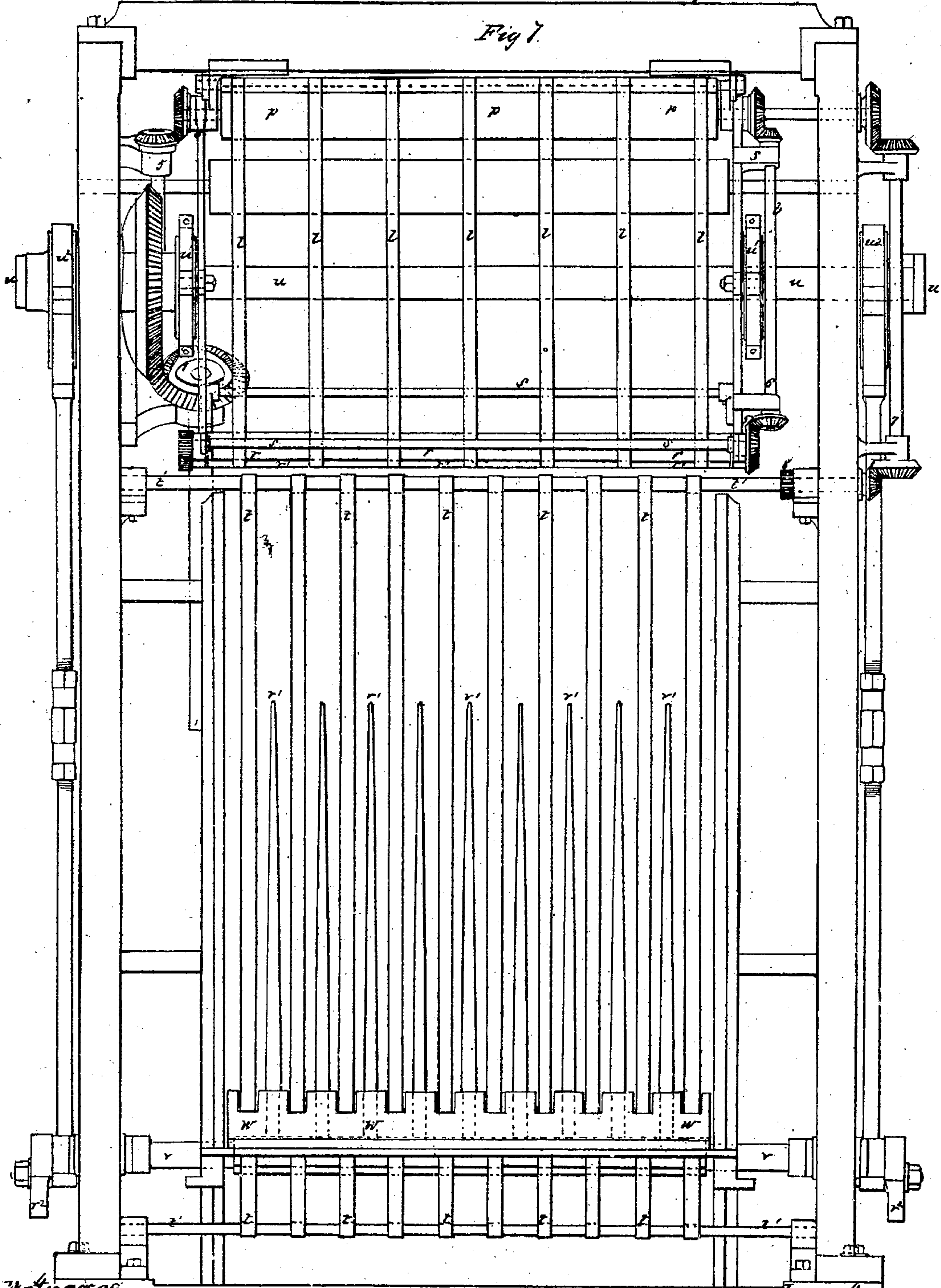
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Fig 1.



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UNITED STATES PATENT OFFICE.

JOHN CAMERON MACDONALD, OF WADDON, AND JOSEPH CALVERLEY, OF
ALBANY ROAD, CAMBERWELL, ENGLAND.

IMPROVEMENT IN PRINTING-PRESSES.

Specification forming part of Letters Patent No. 90,858, dated June 1, 1869; patented in England
December 6, 1866.

To all whom it may concern:

Be it known that we, JOHN CAMERON MACDONALD, of Waddon, near Croydon, in the county of Surrey, England, and JOSEPH CALVERLEY, of the Albany Road, Camberwell, in the same county, subjects of the Queen of Great Britain, have invented or discovered new and useful Improvements in Machinery for Printing, and Cutting into Sheets, Rolls of Paper, and for collecting sheets so cut; and we, the said JOHN CAMERON MACDONALD and JOSEPH CALVERLEY, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof—that is to say:

At Figures 1, 2, 3, 4, 5, 6, and 7 are shown views of a machine for printing, and cutting into sheet, rolls of paper, and for collecting the sheets so cut. These views show clearly our various improvements in this class of machinery.

Figs. 1, 2, 3, on Sheets 1, 2, 3, are side views of the machine. Figs. 4, 5, and 6, Sheets 4, 5, and 6, are longitudinal sections; and Fig. 7 on Sheet 7 is an end view of the machine.

This latter view shows clearly the arrangement of the machinery for collecting or delivering the sheets of paper after they have been printed and cut off from the continuous length of paper that is fed into the machine.

In order to form the rolls of paper used in printing-machines that print on continuous lengths, it is necessary that such rolls should be wound sufficiently hard to prevent their being injured when being transported from place to place; and, to effect this, we wind the paper onto rollers, divided longitudinally into two wedge-shaped pieces, so that after the paper has been wound as tight as may be thereon, the roller may, by circular or other nuts acting on each end, readily be withdrawn. The roller is made of small diameter, in order to leave but a small hole through the roll of paper, and thus the roll may be made sufficiently strong to preserve its form.

The roll of paper is, in the printing-machine,

held between two cones, *a*, Fig. 8, Sheet 4, sliding endwise on a rod or axis, *b*, supported at its two ends in bearings *c*, (shown at Sheets 1, 2, 3, 4,) the cones being pressed inward, into either end of the central hole of the roll of paper, by means of nuts working on screw-threads cut on the rod, as is shown clearly in the view of one end of this rod. (Represented at Fig. 8.) The holding the roll of paper between cones in this manner fixes the roll of paper to the axis, and, in addition, keeps the roll of paper from swerving to one side or the other, and thus an accurate register of the side margins is maintained. On one end of the rod *b* is a pulley, *d*, Fig. 4, Sheet 4, having a friction-strap around it, by which the requisite tension may be placed on the paper, thus obviating all tendency to overrun, when a stoppage takes place, and to crease. The placing tension on the axis carrying the roll of paper also keeps the paper stretched out evenly as it is passing through the machine, and this insures the roll of paper being cut into sheets by the cutting apparatus in what are margin-spaces on the paper; whereas, if the paper were allowed to be slack, as it is passed through the machine, the cutting would be irregular, and would not cut through the center of the margin-space, as it should do.

In order to damp the paper, before it arrives at the printing-cylinders, it is passed over three rollers, *e e e*, Fig. 4, Sheet 4, arranged in a triangle, thus . . . , and inclosed within a steam-chest, *f*, Fig. 1, Sheet 1, Fig. 4, Sheet 4. By this means increased facilities for giving tension are obtained. The paper is also brought into closer contact with the rollers, so that the damping of the paper is rendered more equal than if the rollers of the damping apparatus were placed in a straight line. Each of the rollers is, by preference, covered over with blanket or other fibrous material, and the steam-chest is covered over with a lid, *f'*, lined with blanket. The paper is led in at one side of the chest, between the chest and its lid, and, after being led around the rollers *e*, as indicated in the sectional view, Fig. 4, Sheet 4, is led out at the opposite side of the case.

Steam is supplied to the chest through the perforated pipe *g*, Sheet 4, which passes through the case, from one end of it to the other, and around this pipe is lapped cotton, wool, or other fibrous fabric or material. The paper, after being passed through the steam-chest, is led between the rollers *h h*, Sheets 1 and 4, between which the paper is nipped. These rollers are, by gearing, caused to travel at the same surface-speed as the printing-cylinders, and they draw the paper through the steam-chest, so that there will be no drag upon the paper as it passes over the printing-cylinders.

The two cylinders *i i*, Sheets 1 and 4, which carry the stereotype-plates, are placed one above and the other below two pressing-rollers, *i' i'*, Sheets 1 and 4, covered with blanket or other soft material.

A side and end view of one of the cylinders *i* is shown at Figs. 9 and 10, Sheet 5. The cylinder is formed to taper from its center toward both of its ends, so as to receive, end to end, two cylindrical stereotype-plates, made with their interior surfaces to fit upon the said cylinder *i*, and with their exterior surfaces cylindrical, and of the proper diameter to travel at the same surface-speed as the paper; and, as each half of each cylindrical plate is suitable for printing one page, there will be four pages printed on one side of the paper for each revolution of a printing cylinder. The side edges of each plate are, as will be seen, held in dovetail-recesses *i''*, Fig. 9, Sheet 5, the dovetail-recess for holding one side of the plate being formed in a projection, *i''*, at the center of the cylinder *i*, and the dovetail-recess for holding the other side of the plate being formed in a movable end plate or collar, *i'''*. Fixed stops are also attached to the cylinder, against which one of the ends of the plates is placed, and the plates are thus held firmly on the cylinder, and prevented from moving.

The paper, after passing between the rollers *h*, Sheets 1 and 4, is led over the upper pressing-roller *i'*, and is by it pressed against the upper printing-roller *i*. The paper is afterward led down, and passed between the two pressing-rollers *i' i'*, and is then passed between the lower pressing-roller *i'* and the lower printing-roller *i*.

The upper and lower printing-rollers *i i*, Sheets 1 and 4, are supplied with ink by ink-rollers *i^x*. The manner in which these rollers are supplied with ink is not shown in the drawing, as it may be effected in any ordinary manner.

As there will be what is called a "set-off" on the blanket of the lower pressing-roller, by reason of the surface of the paper which has just been printed on being pressed against it, we, by preference, employ an endless cleaning-blanket, *j*, Sheets 1, 2, 4, 5, to keep this roller clean. This endless blanket is distended between two rollers, *j'*, Sheets 1, 2, 4, 5, and is,

by one of these rollers, kept in contact with the lower pressing-roller. Should this cleaning-blanket itself become too dirty, its surface can readily be wiped without stopping the machine.

After the paper has thus been printed on both sides by the printing-cylinders, it passes to a cutting apparatus, to be cut into lengths. The cutting apparatus is clearly shown in the sectional view, Fig. 5, Sheet 5, and consists of two cylinders, *k*, Sheets 2 and 5, dished out in the center, so as to be in contact only on what are margin-spaces.

One cylinder, the upper one, around which the paper is curved, has a longitudinal slot, *k'*, Sheet 5, formed in it, and the other cylinder has fixed to it a steel knife, *k''*, entering into the slot as the cylinders rotate. This knife has an edge composed of long angular projections, the edges of each projection being sharpened from both sides; and on each side of the knife are arranged spring-plates, *k'''*, which are to hold the paper firmly against the upper roller, both in front and rear of the knife, at the moment the cutting takes place. The spring-plates *k'''*, on either side of the knife, are capable of moving to or from the center of the roller *k* that carries them, and are constantly pressed outward by spiral springs contained in tubes carried on the interior of the roller, their movement being limited by suitable stops. As the knife is, by the revolution of the rollers, brought round to the point where the rollers meet together, the plates are pressed inward, while the knife enters the groove of the upper roller, and thus the paper is divided at the same time that the cut edge of the paper on either side of the knife is held firmly between the pressing-plates and the upper roller. Small recesses are formed in the knife at either end, in order that the paper may not be completely severed, but so as to leave small connecting-strips undivided, to insure the regular passage of the succeeding sheets into the delivery-tapes.

As the paper passes from between the cylinders *k* of the cutting apparatus, it is carried onward between two sets of endless tapes, *l l*, which are caused to travel at a greater surface-speed than the cylinders *k*. The endless tapes of the lower set pass around a small roller, *m*, placed close up to the cylinders *k*, while the endless tapes of the upper set pass around a small roller, *n*, which is placed a short distance above the roller *m*. As the tapes pass from these rollers, the tapes of both sets are led between two rollers, *o o*, Figs. 5 and 6, Sheets 5 and 6. The tapes thus converge from the rollers *m* and *n* toward the rollers *o*, Sheet 6. The rollers *o* are placed at a somewhat greater distance from the cylinders *k*, Sheets 2, 5, than the length of the sheets of paper which are cut off by the cutting apparatus, so that although the sheet of paper is carried along between the tapes, yet the tapes do not take sufficient hold of the sheet

to tear it off until its forward end has been carried nearly up to the rollers o . The two outer tapes of the upper set, and also the central tape of this set, which comes over a margin-space on the paper, are pressed downward, and brought into contact with the corresponding tapes of the lower set by means of rollers o' , Fig. 5, Sheet 5, so that the side edges and center of the sheets of paper are held between and guided by these tapes.

When the forward edge of a sheet of paper has, by the tapes, been brought nearly up to the roller o , the cutting apparatus will have partially, or almost entirely, cut off the sheet from the continuous length of paper in the machine. The tapes of the upper and lower set will then, as they converge together to pass between these rollers, take sufficient hold of the sheet of paper to complete the severance. The sheet will then be carried forward at the quicker speed of the tapes, and thus a space will be formed between the succeeding sheets. The tapes of the upper and lower set, after passing between the rollers o , are both led over a roller, p , Sheets 3 and 5, and are then led, respectively, over rollers r and r^1 , carried, at a short distance apart from one another, at the bottom of a pendulous frame, s , Sheets 3 and 6, which is capable of swinging freely on the axis of the roller p . The tapes of the upper set are passed over a small guide-roller, r^2 , before being passed over the roller r , so as to keep the two sets of tapes in contact with one another until they arrive nearly up to the rollers r and r^1 . The tapes, after passing over these rollers, are led back over guide-rollers to the rollers n and m . Immediately below the bottom of the swing-frame are two sets of endless tapes, t t , Sheet 6, which are each supported between rollers t' t' . The two upper rollers, t' , are close together, while the two lower rollers are at a short distance apart from one another. The pendulous frame has an oscillatory motion imparted to it by eccentrics u^1 on the axis u , so as to bring the rollers r and r^1 , at the lower end of the frame, first to one side and then to the other of the upper rollers, t ; and this swinging motion is so timed as to cause the frame first to deliver the end of one sheet onto the inclined traveling surface presented by one set of the tapes t , and, while this sheet is being carried downward on the tapes, the pendulous frame swings over to the opposite side of the rollers t' , so as to be ready to present the end of the succeeding sheet to the inclined traveling surface formed by the other set of tapes. Between the axes of the lower rollers, t' , is an axis, v , Sheets 6 and 7, carrying a number of light fingers, v^1 , formed, by preference, of thin strips of lancewood, set edgewise on the shaft, as shown. On the axis v are also lever-arms v^2 , Sheets 6 and 7, which, by connecting-rods, are connected with strips working on eccentrics u^2 on the axis u , and thus an oscillatory motion is imparted to the axis v , and the fingers upon it are so caused to beat

to and fro between the tapes of both sets of tapes t , and, at each beat in either direction, the fingers, as they pass between the tapes, strike off the sheet of paper that was being carried downward by them, the downward motion of the sheets being at the same time arrested by fixed stops w , Sheets 6 and 7. As the fingers throw the sheets off from the tapes, they deliver them onto tables x x , Sheet 3, one such table being placed in front of each set of tapes. The sheets accumulate in flat piles on these tables, the piling, if necessary, being assisted by a boy seated at the back of each table; or, in place of employing tables for receiving the sheets, the vibrating fingers may be caused to deliver the sheets onto bars or rollers; but we prefer to collect the sheets on tables, as above described. The arrangement of the framing for carrying the axes of the several rollers of the machine is clearly shown by the drawings, and the drawings also show the manner of giving continuous motion to these axes from the main axis y , Sheets 2, 5. This axis itself receives motion by a toothed wheel upon it gearing with a toothed wheel on a short axis, z , Sheet 2, which is driven by a strap working with a fast-and-loose pulley. The toothed wheel on the driving-shaft transmits motion, by a train of wheels, to the printing and inking rollers, as is clearly seen in the side view of the machine, shown at Sheets 1, 2, and 3. The toothed wheel on the driving-shaft also, by another train of wheels, gives motion to the cylinders k , Sheets 2 and 5, to the axis u , Sheets 3, 6, and also to the axes of the rollers which give motion to the endless tapes. The way in which motion is transmitted to the axis u is clearly seen in the sectional view of the machine, Figs. 5 and 6, Sheets 5, 6. The axis u has upon it a beveled-toothed wheel, gearing with a wheel on the upper end of an inclined shaft, 1, driven, at its lower end, by bevel-gear from an axis, 2, Sheet 5, which receives motion from the axis of the lower cylinder k , Sheet 5. The axis of the lower roller of the pair of rollers o , Fig. 6, Sheet 6, is driven by bevel-gear from a short shaft, 3, Fig. 3, Sheet 3, which is itself driven by bevel-gear from an inclined shaft, 4, gearing, by bevel-gear, with the axis 2, Sheet 2. The two rollers o , Sheet 6, are, at their opposite ends, geared together by toothed wheels. The roller p , Sheets 3, 6, 7, is driven at one end by an inclined shaft, 5, Sheets 3, 6, 7, which is itself driven from the axis of the lower roller o . At the opposite end of the axes of the roller p are two bevel-wheels. One of these gives motion to a shaft, 6, Fig. 7, Sheet 7, carried by the pendulous frame, and this shaft, by bevel-wheels, gives motion to one end of the roller r , Sheets 6, 7, at the lower end of the frame. The roller r , at its opposite end, is geared with the roller r' , as shown in the end view of the machine, Fig. 7, Sheet 7. The other bevel-wheel, at the end of the axis of the roller p , gives motion to a

shaft, 7, Sheets 3 and 7, and by this shaft transmits motion to the axis of one of the two upper rollers, *t'*, carrying the tapes *t*, and the axis of this roller is geared with the axis of the other roller *t'* by toothed wheels 8, as shown in the end view, Fig. 7, Sheet 7.

What we claim as our invention is—

1. The combination of the dampening-rollers, their box, and steam-pipe, with the printing mechanism, substantially as described.

2. The combination of the driving-cam, swing-frame, tapes, and vibrating fingers, substantially as described.

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