

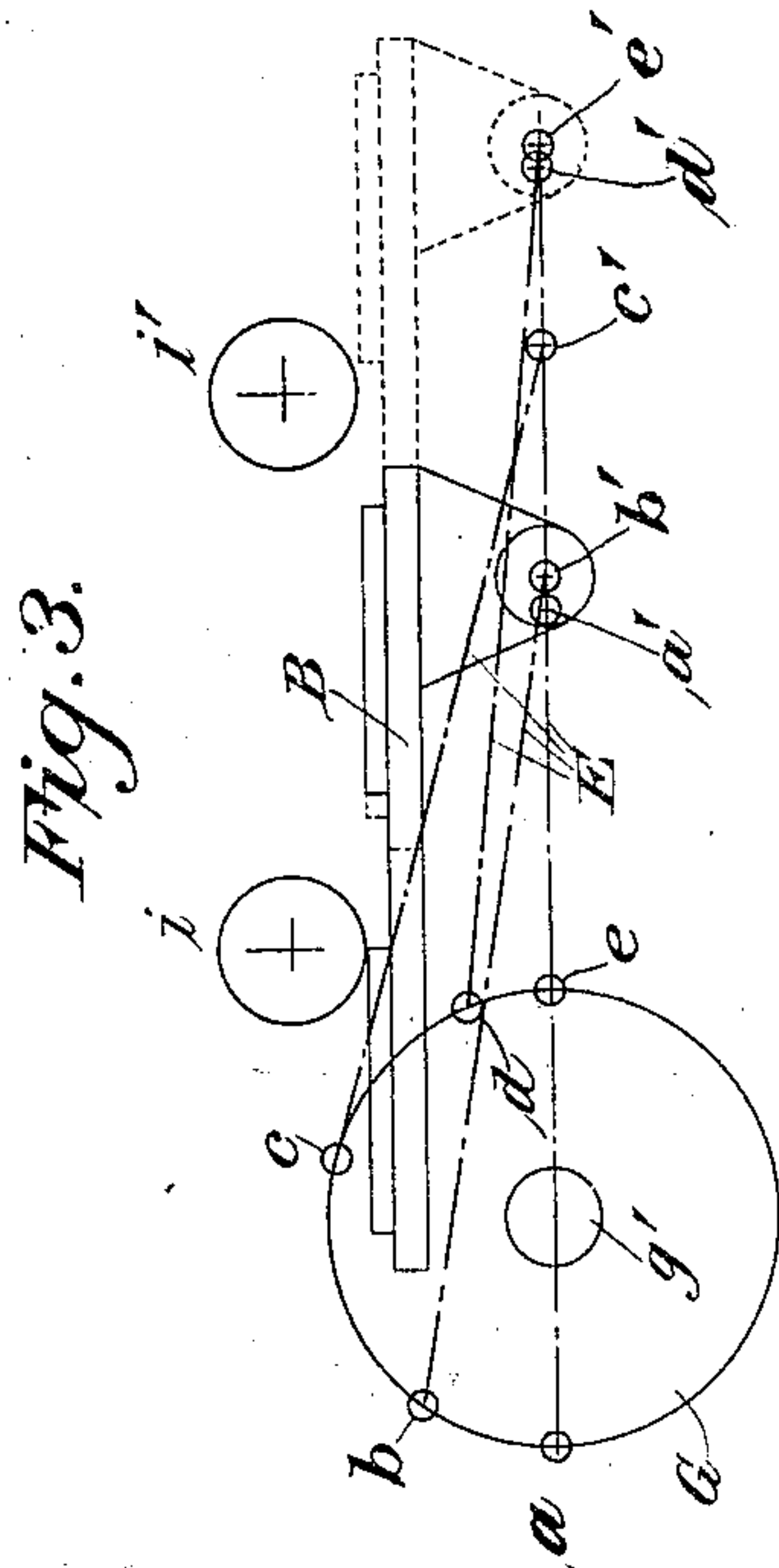
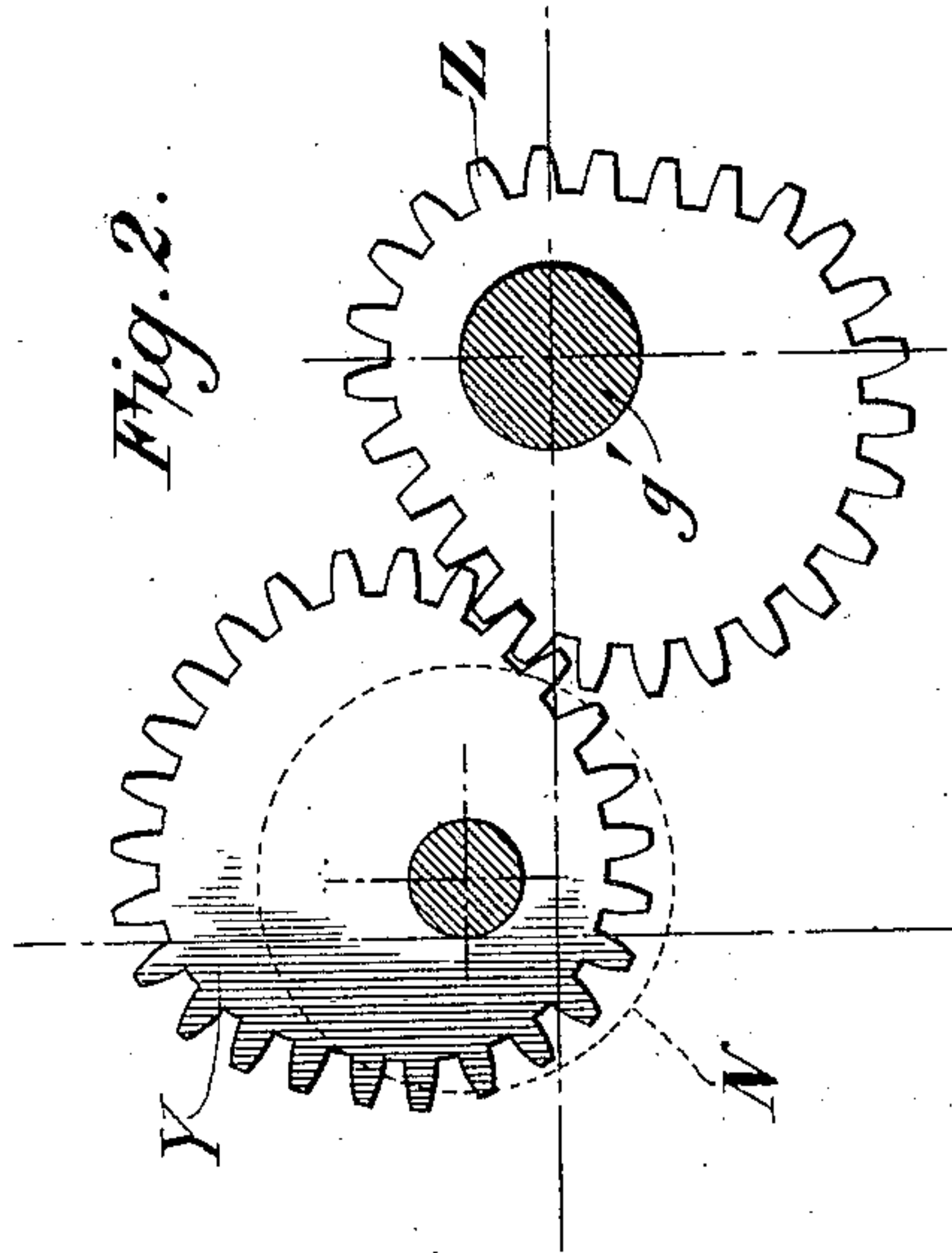
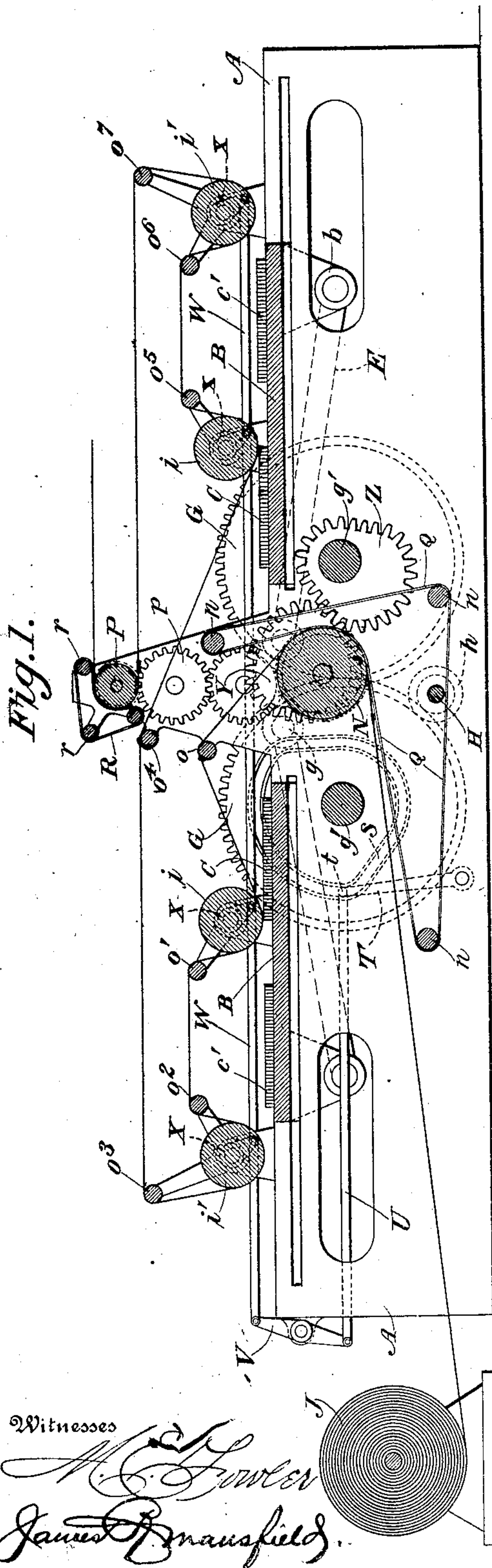
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P. F. COX.

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CONTINUOUS VARIABLE WEB FEEDING MECHANISM.

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UNITED STATES PATENT OFFICE.

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CONTINUOUS VARIABLE WEB-FEEDING MECHANISM.

No. 880,290.

Specification of Letters Patent.

Patented Feb. 25, 1908.

Application filed October 4, 1907. Serial No. 395,944.

To all whom it may concern:

Be it known that I, PAUL F. COX, of Jackson, in the county of Jackson and State of Michigan, have invented certain new and useful Improvements in Continuous, Variable Web-Feeding Mechanism; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improvement in web feeding mechanism for printing presses, and is particularly designed and adapted for use in the type of press shown in my Patent No. 847,912, of March 19, 1907, in which the type beds move during the taking of impressions, and the web is fed during such time in unison with the movement of the beds. A peculiar feature of my said patented press is the employment of two cylinders on each bed, each cylinder printing from one-half the forms on such bed, and one cylinder printing parts of the web skipped by the other cylinder, so that the length of web fed through the press may be slightly more than twice the length of the forms. In other words, if each form is seventeen and one-half inches wide (less margins) the length of paper fed through the press for each operation thereof will be thirty-five inches, of which web seventeen and one-half inches (less margins) is fed between the bed and the cylinders during impression, and therefore must be fed at a varying speed exactly conformable to the speed of movement of the bed during impression; and the remaining seventeen and one-half inches of the web (plus margins), can be fed between the beds and cylinders after impressions, and while the impression is thrown off. The unprinted portions of the web which are skipped by the first cylinders are printed at a subsequent printing operation by the second cylinder. As the beds are preferably reciprocated by a crank movement it follows that the web must be fed during the printing operation with an increasing and decreasing speed corresponding with the movement of the bed produced by the cranks. After the printing operation and while the impression is thrown off the remaining length of web can be fed at a uni-

form speed or as desired. In my said patent I employed a uniformly rotating web feeding and delivering device and compensated the web for the irregular movement of the bed during the printing operation by means of movable rollers.

It is an object of the present invention to entirely dispense with looping rollers and to feed and deliver the web continuously, but at an irregular speed during the printing coincident with the speed of travel of the forms during the printing operation; and I accomplish this by driving the web feeding rollers at an irregular peripheral speed, preferably by means of elliptic or irregular gears, by which the uniform speed of the driven shaft is changed into an irregular or varying but continuous peripheral speed of the web feeding rollers.

In the accompanying drawings I have illustrated a very simple web feeding mechanism for the press shown in my patent and embodying the invention, and will describe the same with reference thereto and refer to the claims for summaries of parts and combination of parts for which protection is desired.

In said drawings—Figure 1 is a longitudinal sectional elevation of so much of my said patented machine as is necessary to impart a clear understanding of the present invention, and showing my improved web feeding mechanism applied thereto. Fig. 2 is a detail view of the irregular gears for driving the web feeding rolls. Fig. 3 is a diagram giving the speed of travel of the peripheries of the web feeding rolls.

On the main frame A, are mounted type beds B B, which are adapted to be simultaneously reciprocated in opposite directions by means of pitman E, connected to brackets b, depending from the beds and to crank pins on crank gears G, which intermesh, and which are fast on transverse shafts g', suitably journaled in the main frame A, near the center of the press. Said gears are driven from the driving shaft H, by means of pinion h, meshing with one of the gears G, as shown in Fig. 1.

Above each bed B, but suitably spaced apart, are located two impression cylinders i, i', which are journaled in eccentric boxes

X, mounted in stationary bearings on the sides of the main frame A. The cylinder *i*, is adapted to co-act with a type form or printing surface C on bed B, and cylinder *i'* to co-act with a form *c'* on bed B, as described in my aforesaid patent. The cylinders and beds act only during one stroke of the beds, preferably while the beds move from the center outward; and during the return or inward stroke of the beds the impression is thrown off by partially rotating the eccentric boxes X, which may be pivotally connected to a bar W, which is connected at one end to the upper end of a lever V, pivoted on the main frame. The lower end of the lever V being connected by a rod U, to a lever T, carrying a roller *t*, engaging a race cam *s* on one of the gears G, or its shaft, as shown. This cam is so proportioned and constructed that the cylinders will be thrown on or off impression at the proper time.

The web in-feeding devices preferably comprise a roll N and co-acting tapes Q, which pass over a series of guide rollers *n*, and are driven by frictional contact with the periphery of roll N. The delivery devices comprise a roll P and co-acting tapes R, passing over guide rollers *r*, as shown. The rolls P and N, may be driven at like peripheral speeds by means of a train of gears *p*, as shown in the drawings. The web passes from a roll J, at one end of the machine between roll N and tapes Q, and then up over a fixed guide *o*, between the left-hand cylinder *i*, and left-hand bed B, up over a guide *o'*, back over a guide *o''*, down between the left-hand cylinder *i'* and left-hand bed B, then up over a guide *o'''*, back to and over a guide *o''''*; then down between right-hand cylinder *i* and right-hand bed B, then up over guides *o''''* and *o'''''*, down between right-hand cylinder *i'* and bed B, then up over guide *o''''''*, back to and between the delivery roll P, and tapes R, thence it passes to the folding mechanism, (not shown). It will be seen that the web will be printed on one side by the left-hand bed and cylinders, and then will be printed on the opposite side or perfected by the right hand bed and cylinders, and that during the printing strokes the beds move in the direction that the web travels in passing from the feed to the delivery mechanism.

In order to drive the peripheries of the feed roll N, at a speed conformable to the crank motion of the bed, I preferably employ irregular gears Y and Z, the gear Y being fast to the shaft of roll N, and its complementary gear Z being fast to the shaft of one of the crank gears G. These gears Y and Z have the same number of teeth so that the roll N, makes one revolution for each sheet printed, that is for each thirty-five inches of web fed through the machine.

The pitch lines of the gears Y and Z, have such an outline, however, as to impart a peripheral surface speed to the roll N, equal practically exactly to the speed of the beds at all times when the cylinders *i*, *i'* are on impression and printing. Upon the return or non-printing strokes of the beds, the impression cylinders are lifted off impression and the web is fed forward to bring proper portions thereof into positions to be printed by cylinders *i*, *i'* on the next printing stroke of the beds. The web does not have to stop at any time nor is its motion reversed, because,—assuming that each form is seventeen and one-half inches in length, (including margins),—thirty-five inches of web must be fed forward during each reciprocation of the beds. The beds however, only move during the actual printing operation seventeen and one-half inches, (less margins). And during this time the gears Y, Z, are so proportioned that seventeen and one-half inches of web (less margins), is fed to and between the beds and cylinders. During the time that the cylinders are clear of the type (*i. e.* from the end of one actual printing operation until the beginning of the next),—the remaining seventeen and one-half inches of web (plus margins), is fed forward between the beds and cylinders and obviously this much of the web can be fed at any desired speed; therefore I prefer to feed it at a substantially uniform speed, so shaping the gears Y and Z that there will be no abrupt change either at the beginning or end of a printing operation. Thus I am enabled to keep the web continuously moving through the press; and to have it move in exact uniformity with the exact motion of the type during printing; and to dispense with any looping rollers, or other movable web compensating devices between the web feeding and delivering mechanism; and thus simplifying and improving the construction of the press.

The diagram Fig. 3 shows the relative position of the bed when the cranks are in various positions. *a*, *b*, *c*, *d* and *e* represent the positions of the crank pins on the gears G and *a'*, *b'*, *c'*, *d'* and *e'* the position of the lugs *b* on the beds. When the crank pins are at *a* and *e* the beds are at rest but between these points they move at an ever varying velocity, being greatest when the bed is at *C'* and the crank pins are at *c*. Between the points *b'* and *d'* the impression cylinder is in contact with the type forms and the web of paper must travel at each instant with the exact speed of the beds. Part of the periphery of the gears Y and Z are proportioned so as to give the required speed to the circumference of the roll N while the crank pins move from *b* to *d*, and,

what is the same thing, the bed moves from b' to d' . For the remaining part of the revolution of the gears Y and Z their peripheries are so shaped that Y will make one revolution to that of Z.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a printing press, the combination of a reciprocating bed, a pair of cylinders co-acting therewith, a roll for continuously feeding the web successively between the bed and cylinders both during the after impression, one cylinder printing part of the web skipped by the other cylinder, and means for driving said feed roll so as to move the web in exact uniformity with the travel of the bed during the actual printing operations and to feed a like quantity of web on the return stroke of the bed, and means for throwing off impression during the return stroke of the bed.

2. In a printing press, the combination of a reciprocating bed, a pair of stationary cylinders co-acting therewith, means for directing a web between the bed and cylinders, one cylinder printing parts of the web skipped by the other cylinder, a feed roll, and means for operating said feed roll during the printing stroke of the bed to feed a length of web between the bed and cylinders during the printing at a speed conformable to that of the type or printing surface and thereafter to feed a like length of the web between the bed and cylinders at a varying speed during the return stroke of the bed while the impression is thrown off.

3. In a printing press, the combination of a reciprocating bed, a pair of cylinders co-acting therewith, one cylinder printing part of the web skipped by the other cylinder, means for directing a web successively between the bed and cylinders, web feeding mechanism, a web delivery mechanism, and means for operating the feed and delivery mechanisms to pass a length of the web between the bed and cylinders at a speed uniform with that of the travel of the bed during the printing operation and to pass a corresponding length of web between the bed and cylinders after each printing operation.

4. In a printing press, the combination of a reciprocating bed, a pair of cylinders co-acting with forms thereon, means for leading a web successively between the cylinders and the bed, a roll for continuously feeding a web to the press, irregular gears whereby said roll is driven at a variable peripheral speed so as to feed a length of web between the bed and cylinders at a speed uniform with that of the travel of the bed during the printing operations and to feed a like length

of web between the bed and cylinders while the impression is thrown off, one cylinder printing part of the web skipped by the first cylinder.

5. In a printing press, the combination of a pair of beds, means for reciprocating them in opposite directions, a pair of cylinders co-acting with each bed, means for directing a web successively between the cylinders and beds, means for feeding a web to and from the press, and means for operating the feed and delivery devices at an irregular or variable speed so as to feed a length of web through the press during impression at a speed uniform with that of the movement of the type beds and then to feed a like length of web between the bed and cylinders while impression is thrown off.

6. In a printing press, the combination of a pair of beds, means for reciprocating them, pair of cylinders above and co-acting with each of the beds, means for directing a web successively between the one pair of cylinders and their bed, and then between the other pair of cylinders and their bed; means for feeding the web to and from the press, and means for operating the feed and delivery devices at irregular speed so as to feed a length of web through the press during impression at a speed uniform with that of the movement of the type beds and then to feed a like length of web between the beds and cylinders while the impression is thrown off.

7. In a printing press, the combination of a pair of type beds, means for reciprocating the beds in opposite directions, cylinders above and co-acting with the beds, means for directing the web successively between the beds and cylinders, a web feeding mechanism comprising a roll and co-acting tapes, a delivery mechanism, gearing between the feed and delivery mechanism to drive them uniformly, an irregular gear for driving said feed mechanism at a speed corresponding with that of the movement of the beds during the printing operations, whereby a length of web may be fed between the beds and cylinders during the printing operations at a speed conformable to that of the travel of the beds, and a like length of web may be fed between the beds and cylinders between printing operations while the impression is thrown off.

8. In a printing press, the combination of a pair of type beds, means for reciprocating the beds in opposite directions, two cylinders above and co-acting with each bed, means for directing the web successively between one bed and its pair of cylinders, to be printed on one side and then between the other bed and its pair of cylinders to be printed on the opposite side; a web feeding mechanism comprising a roll and co-acting

tapes, a delivery mechanism, gearing between the feed and delivery mechanism, an irregular gear for driving said feed roll at a peripheral speed corresponding with that of
5 the movement of the bed during the printing operation, whereby a length of web may be fed between each bed and its cylinders during the printing operation at a speed conformable to that of the travel of the bed
10 and a like length of web may be fed between

the beds and cylinders between printing operations while the impression is thrown off.

In testimony that I claim the foregoing as my own, I affix my signature in presence of two witnesses.

PAUL FLEMMING COX.

Witnesses:

JAMES R. MANSFIELD,
GEO. M. BOND.