

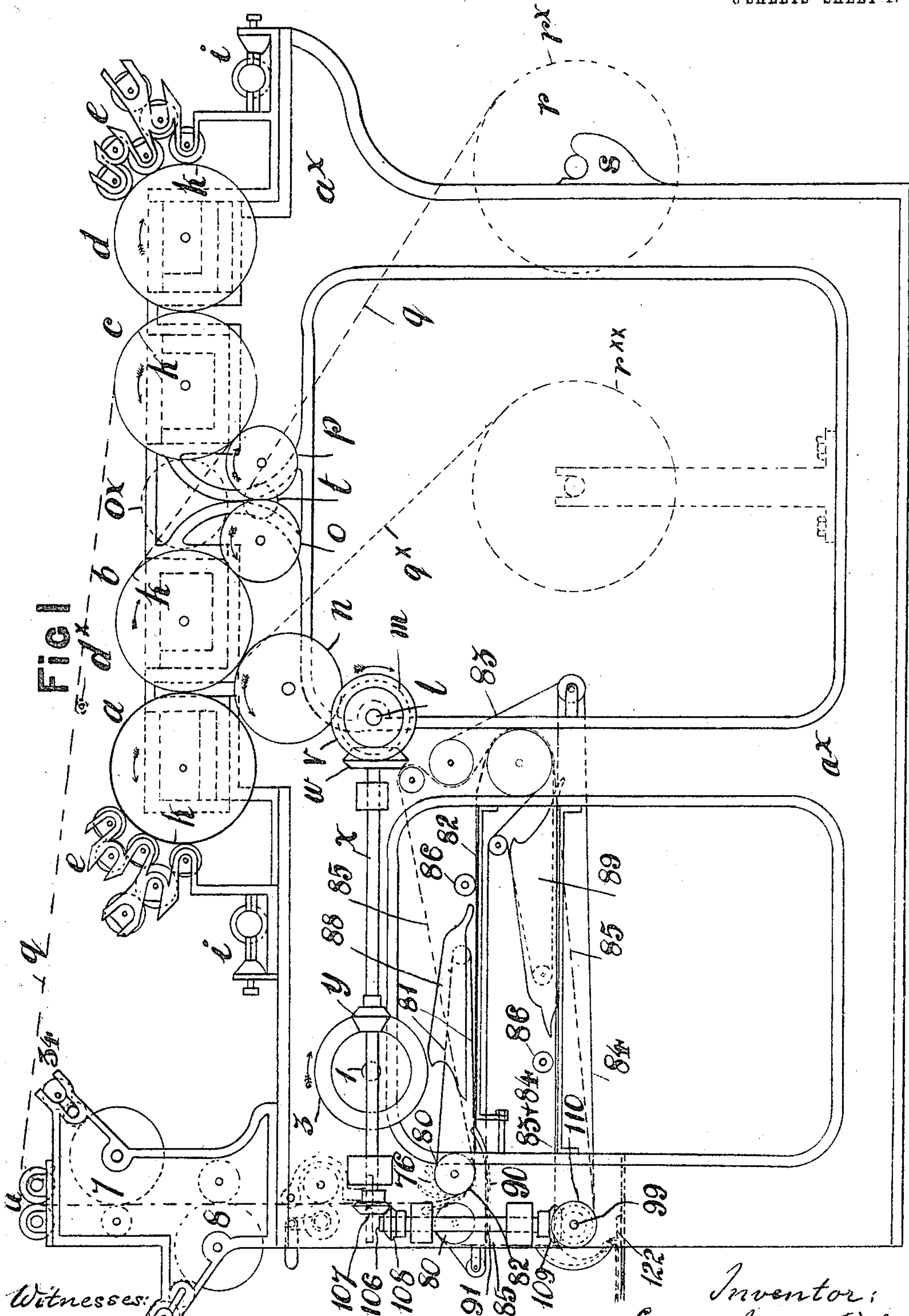
PRINTING MACHINE.

APPLICATION FILED NOV. 25, 1907.

962,542.

Patented June 28, 1910.

8 SHEETS—SHEET 1.



Witnesses:

L. H. Straden.

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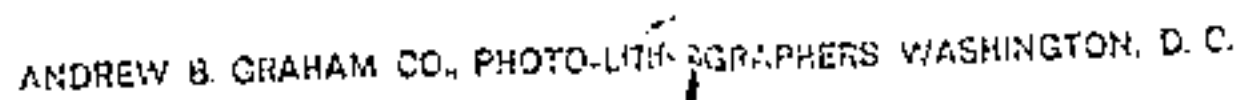
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8 SHEETS--SHEET 2.





962,542.

Patented June 28, 1910.

8 SHEETS—SHEET 3.

Fig 3

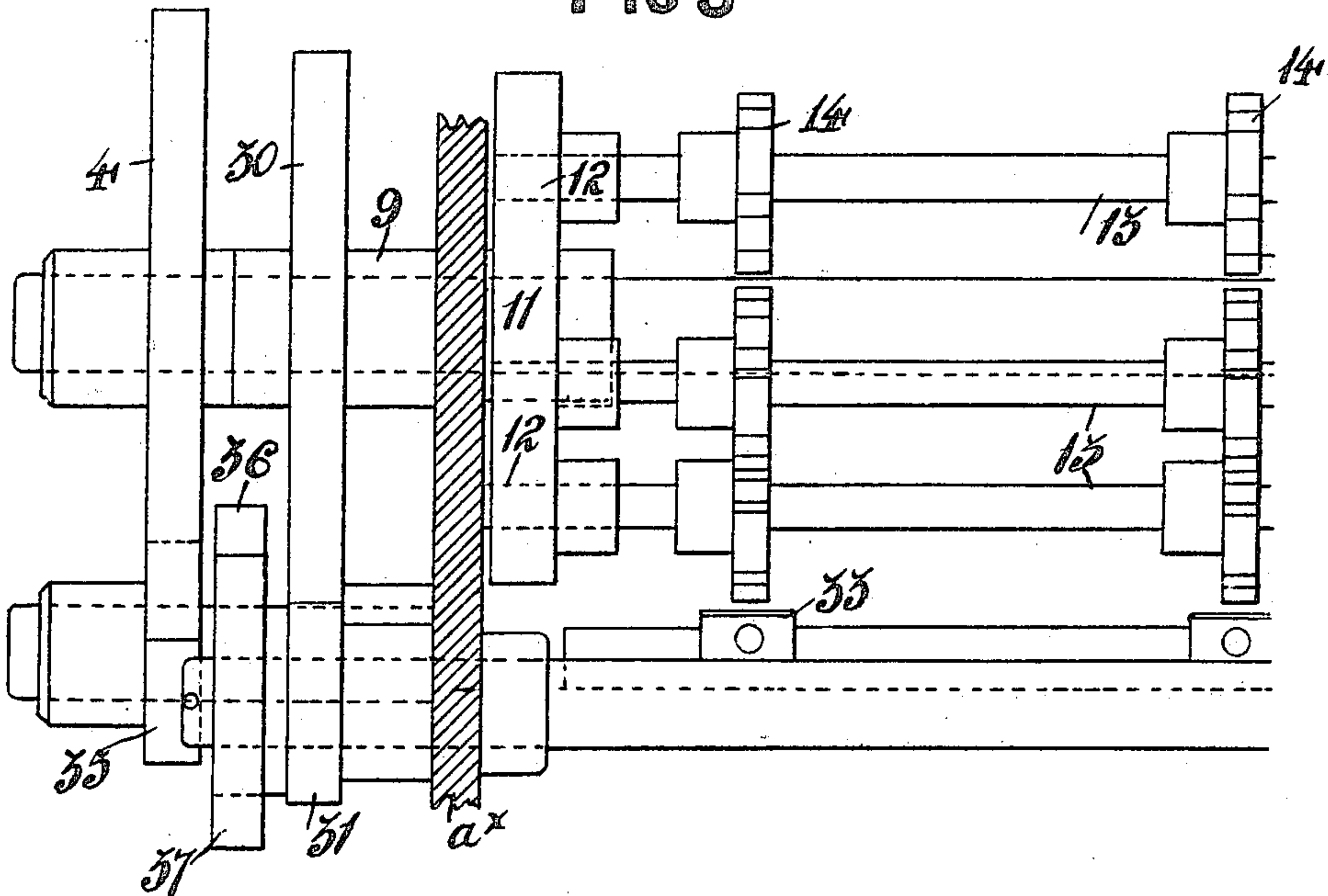
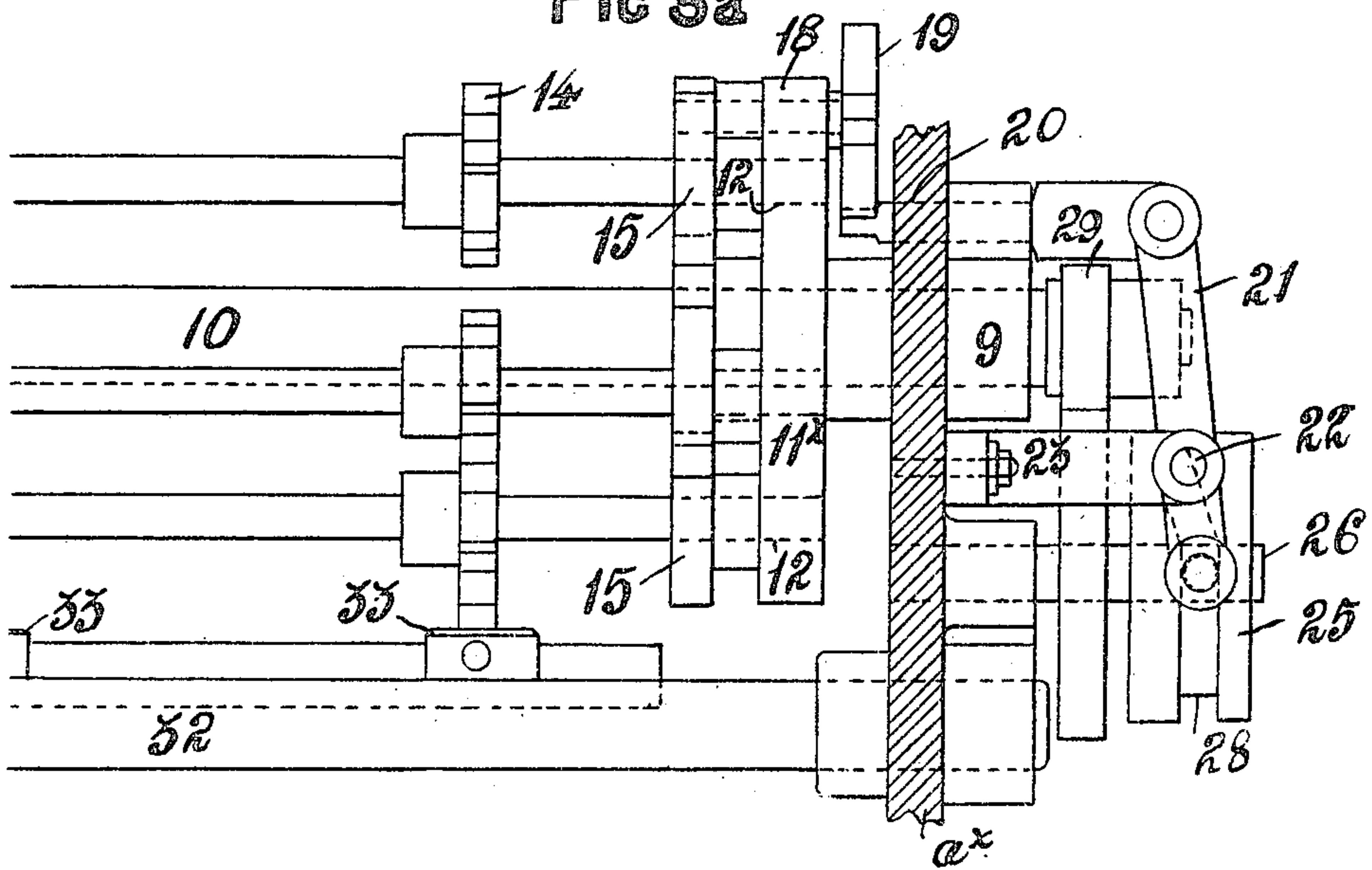


Fig 3a



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8 SHEETS—SHEET 4.

FIG 4

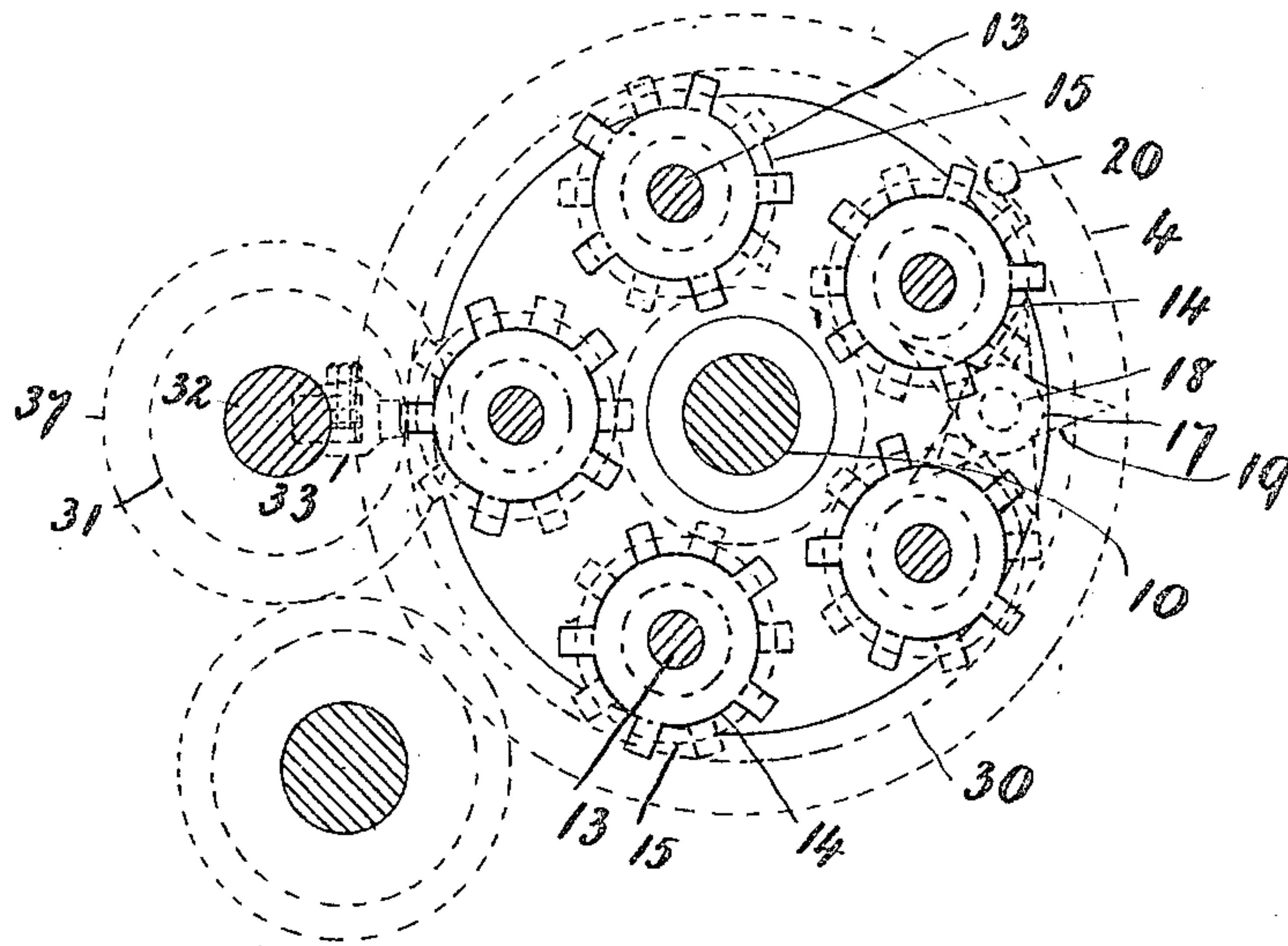
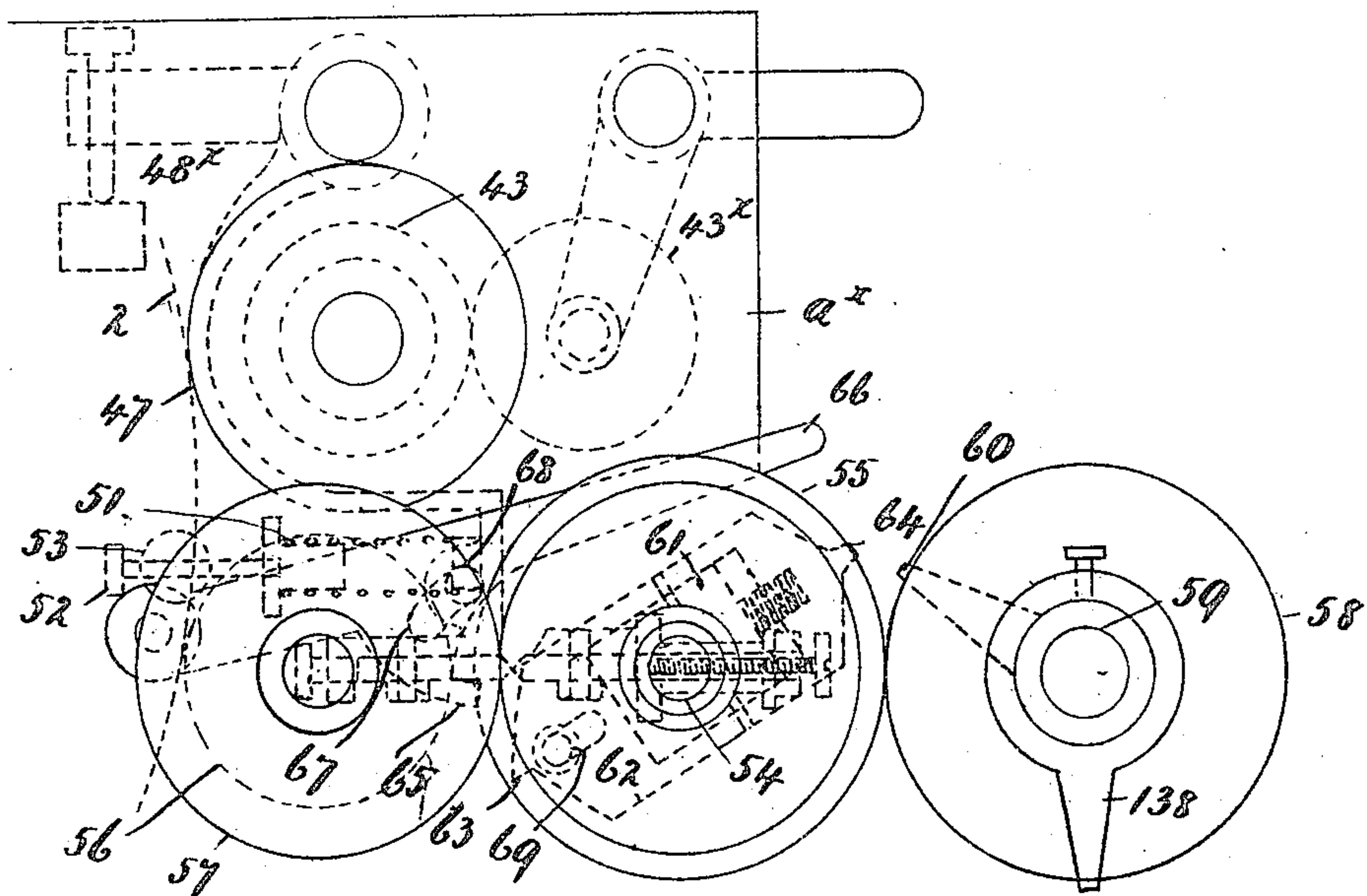


FIG 7



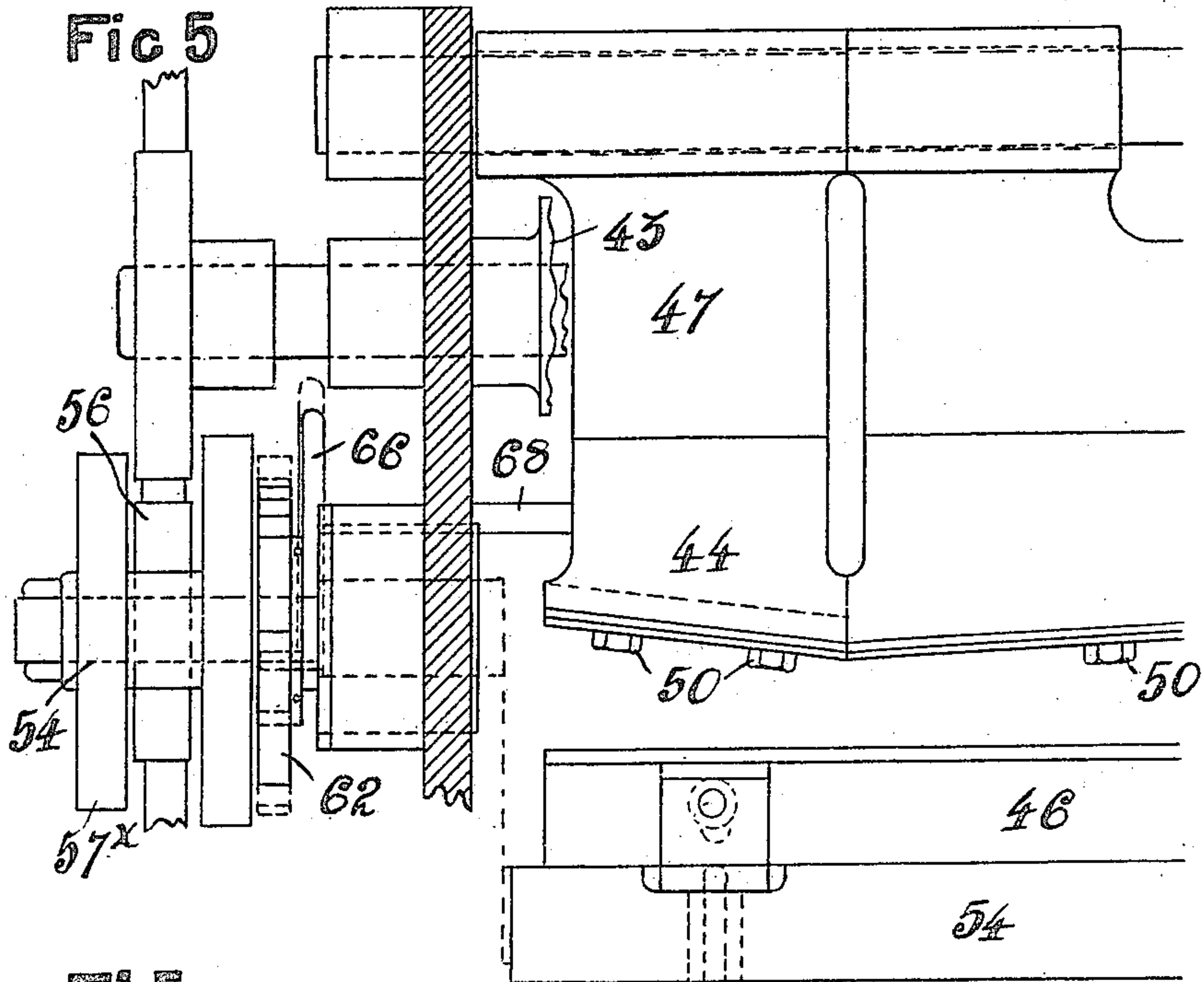
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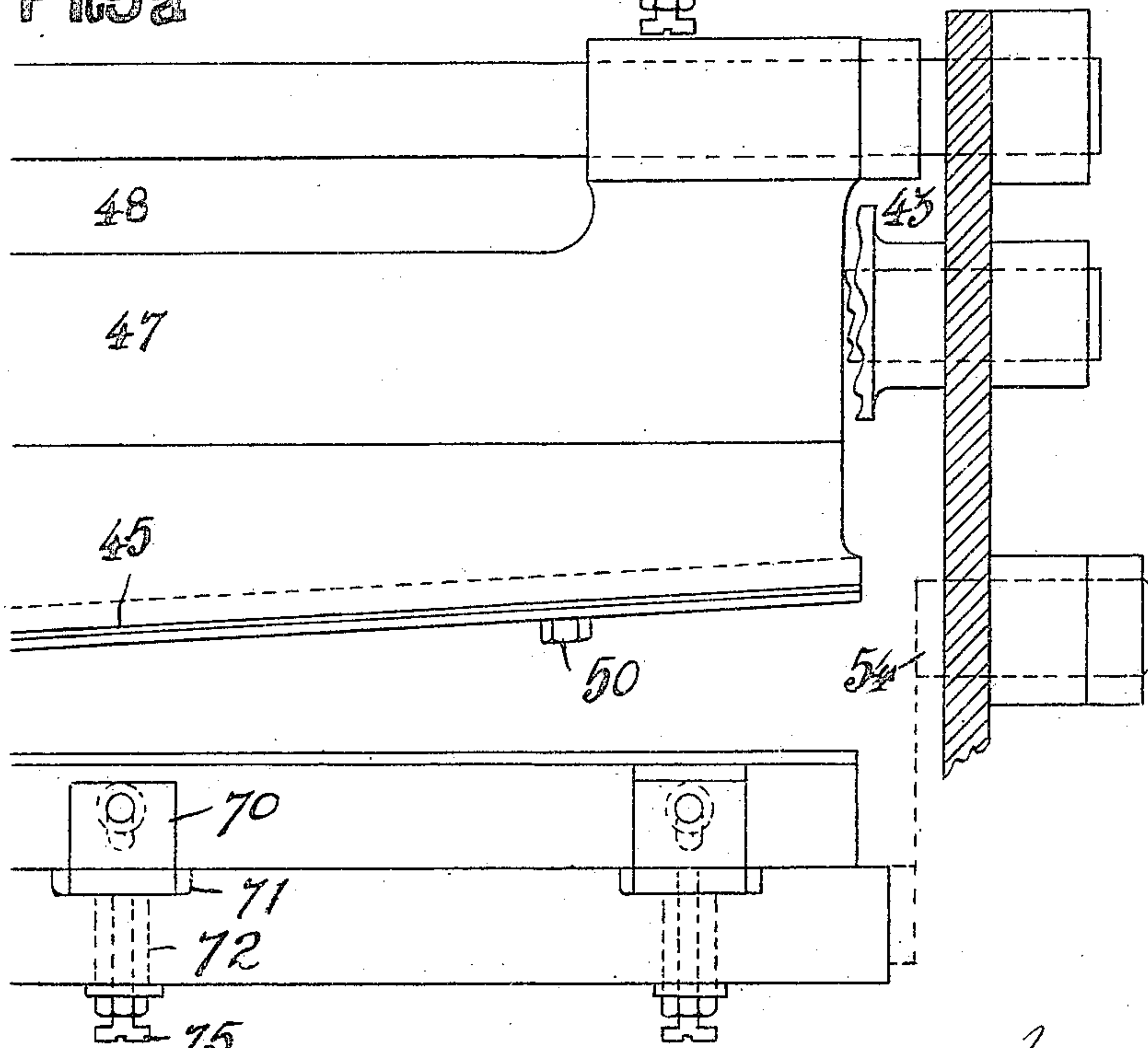
962,542.

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8 SHEETS—SHEET 5.



**Fig 5a**



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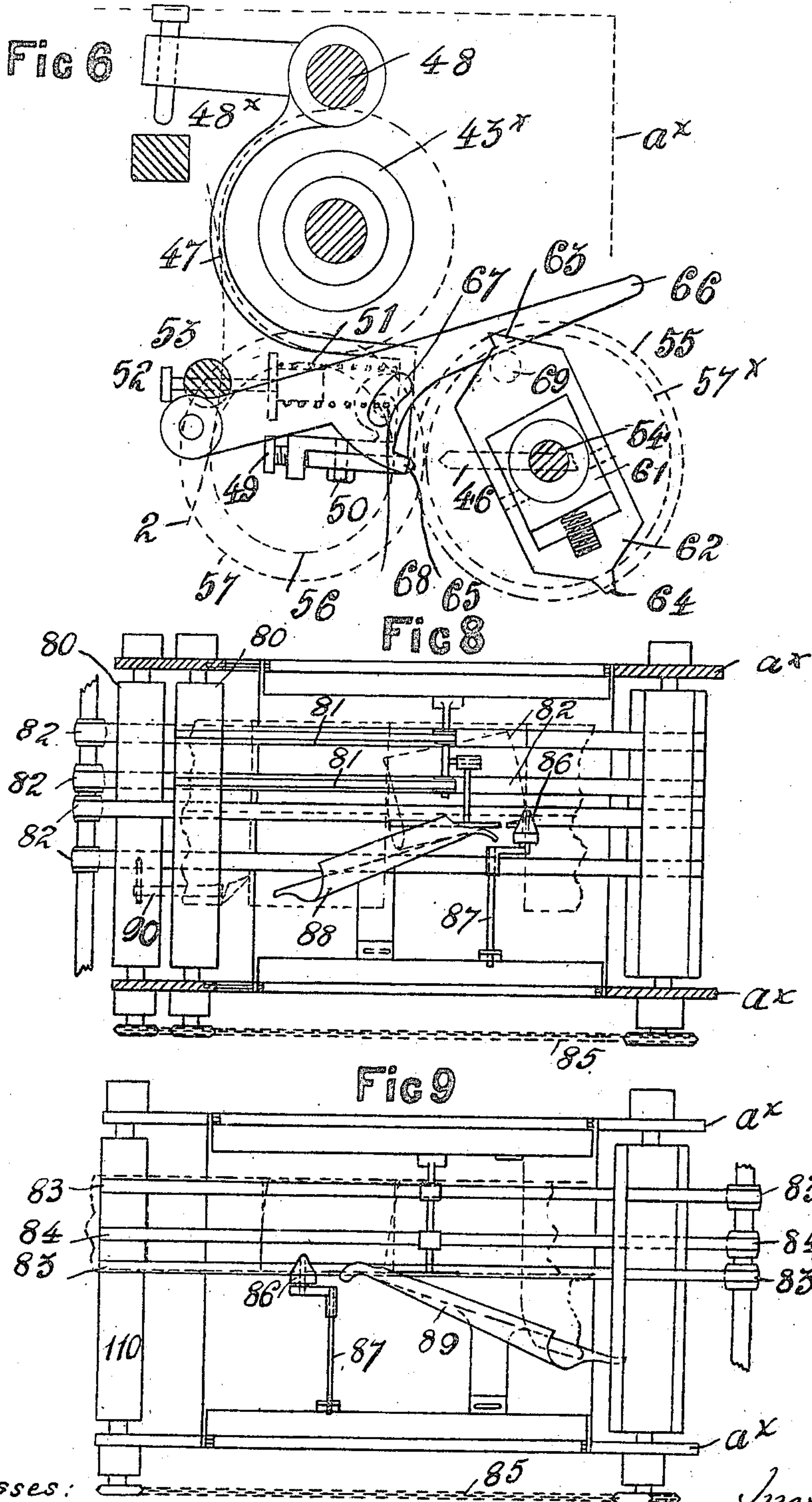


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PRINTING MACHINE.  
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8 SHEETS—SHEET 6.



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Patented June 28, 1910.

8 SHEETS—SHEET 7.

Fig 10

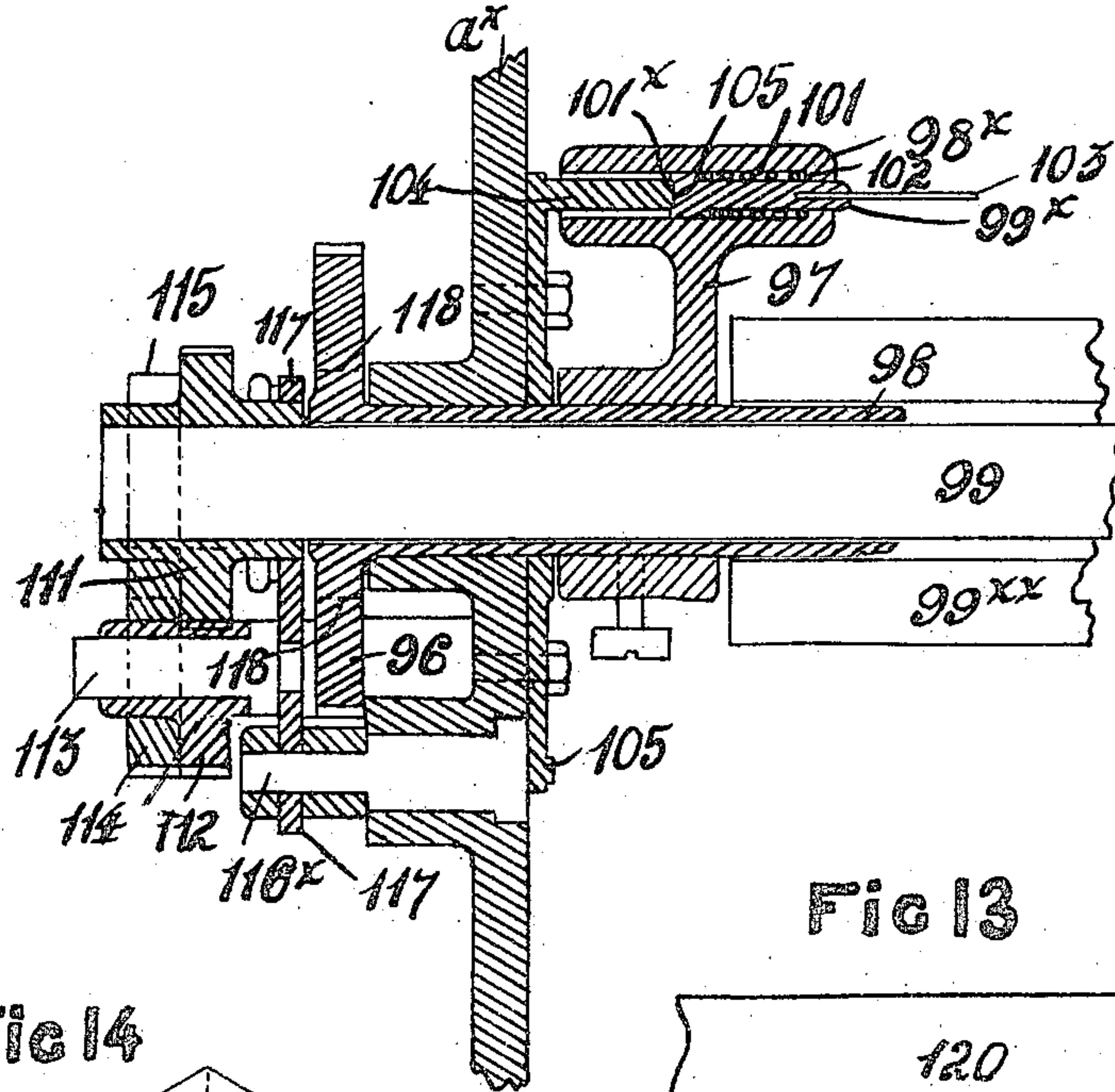


Fig 13

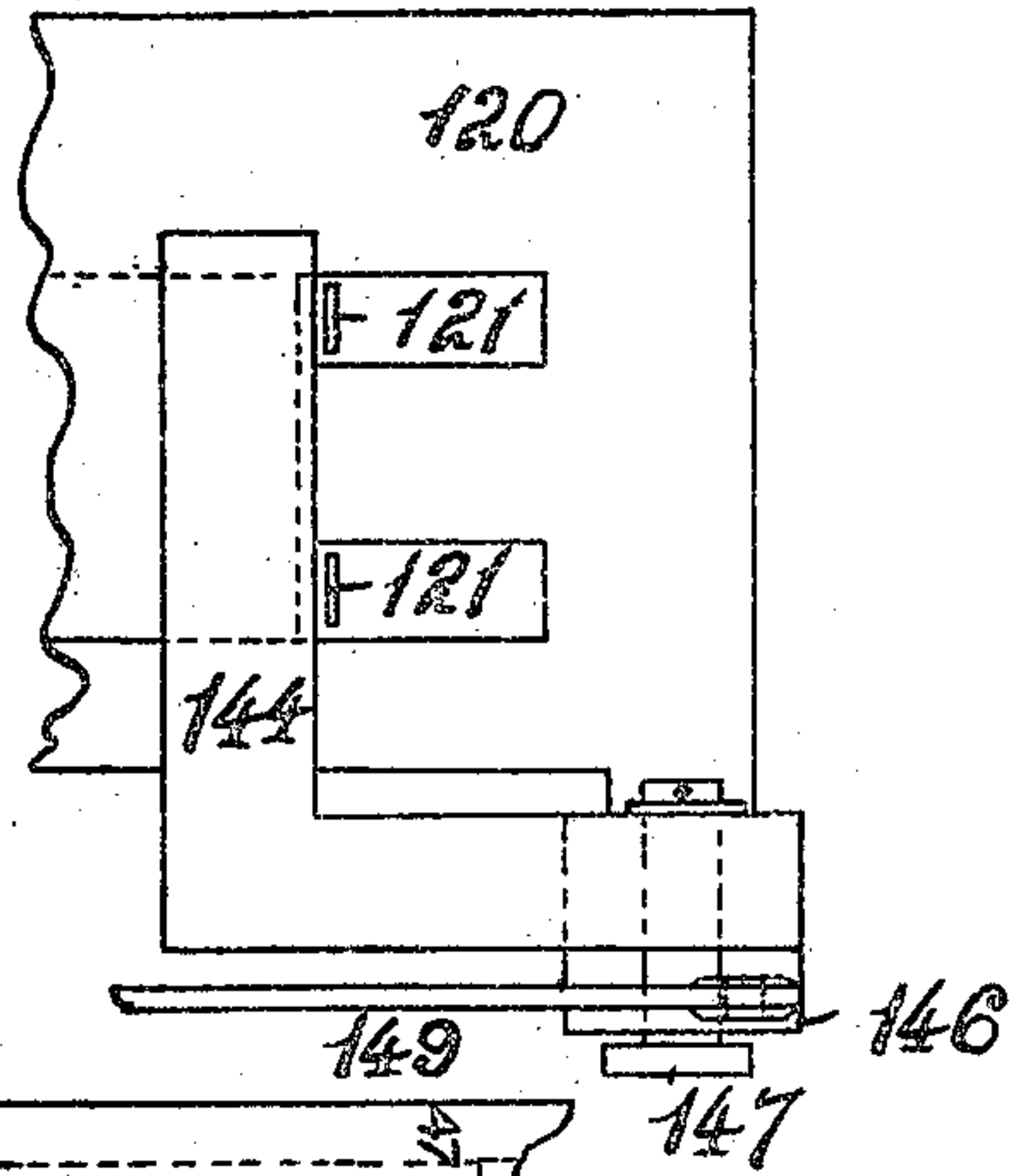


Fig 14

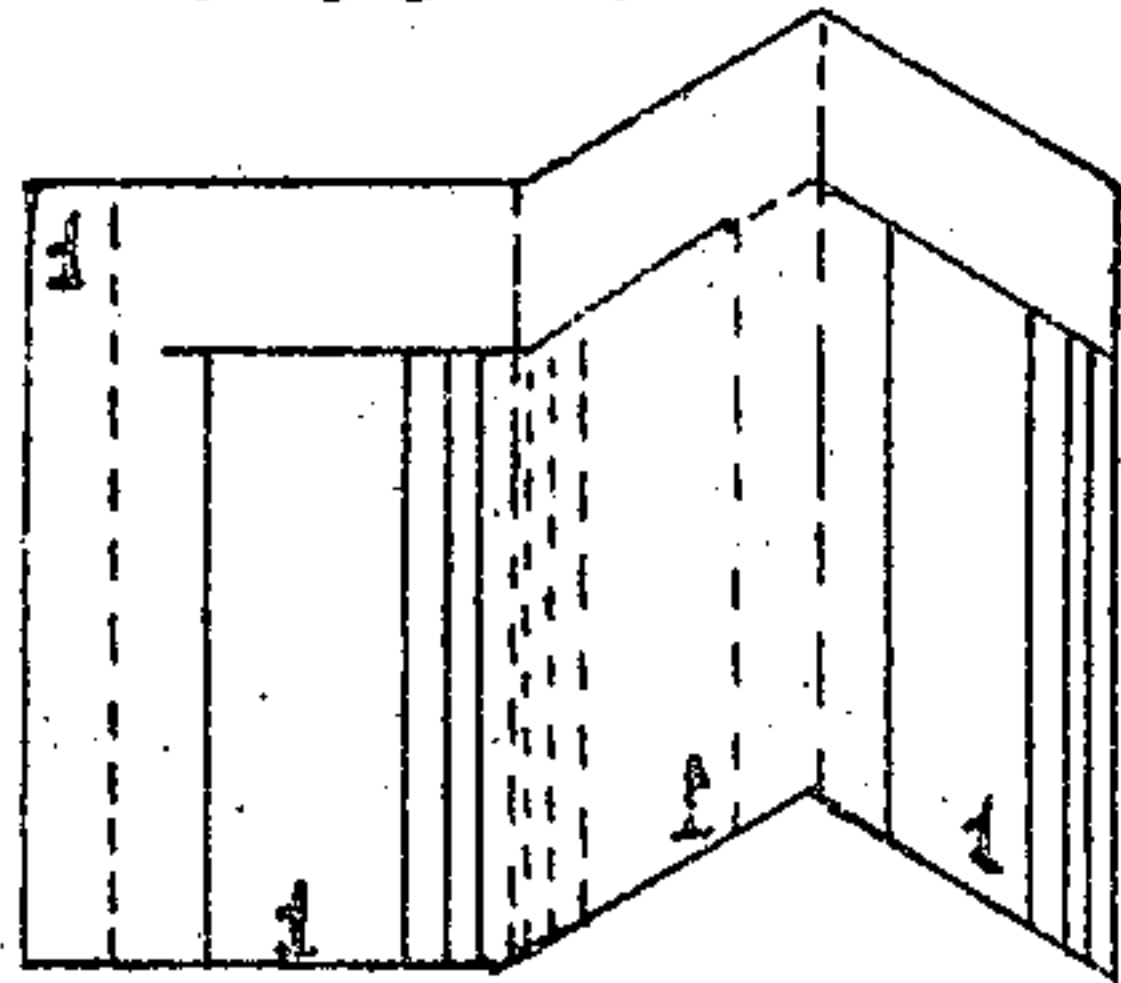
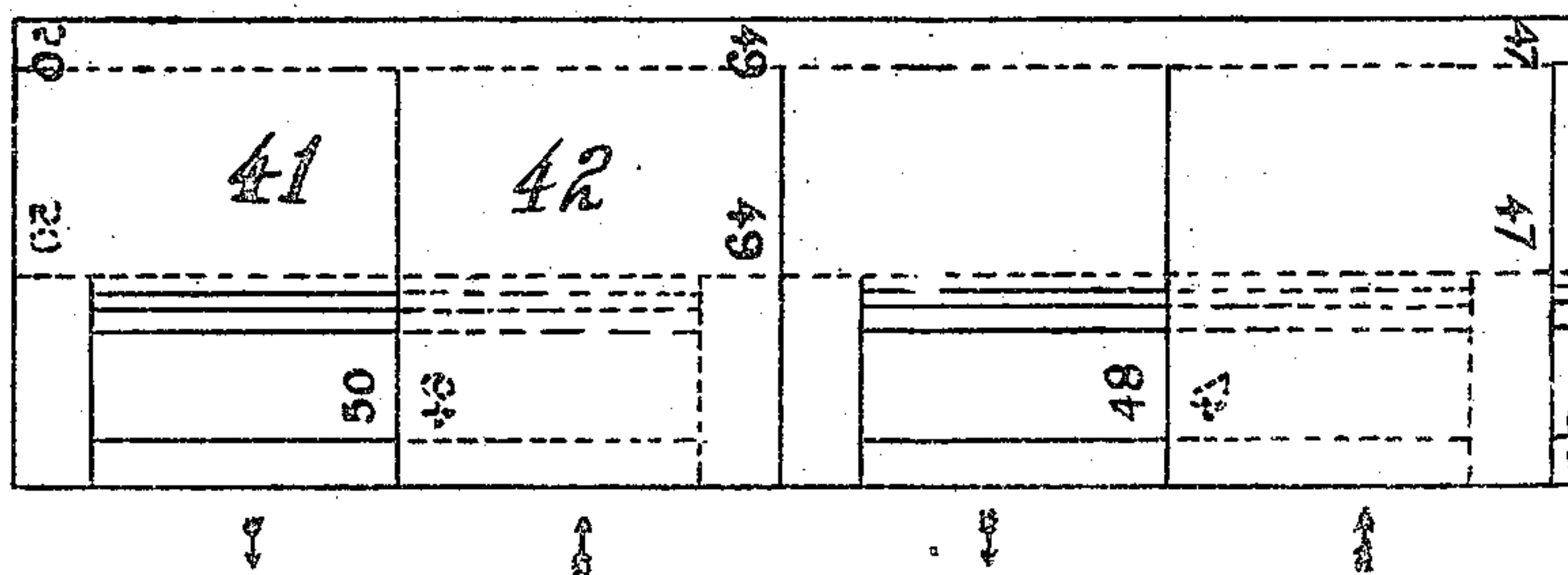


Fig 12



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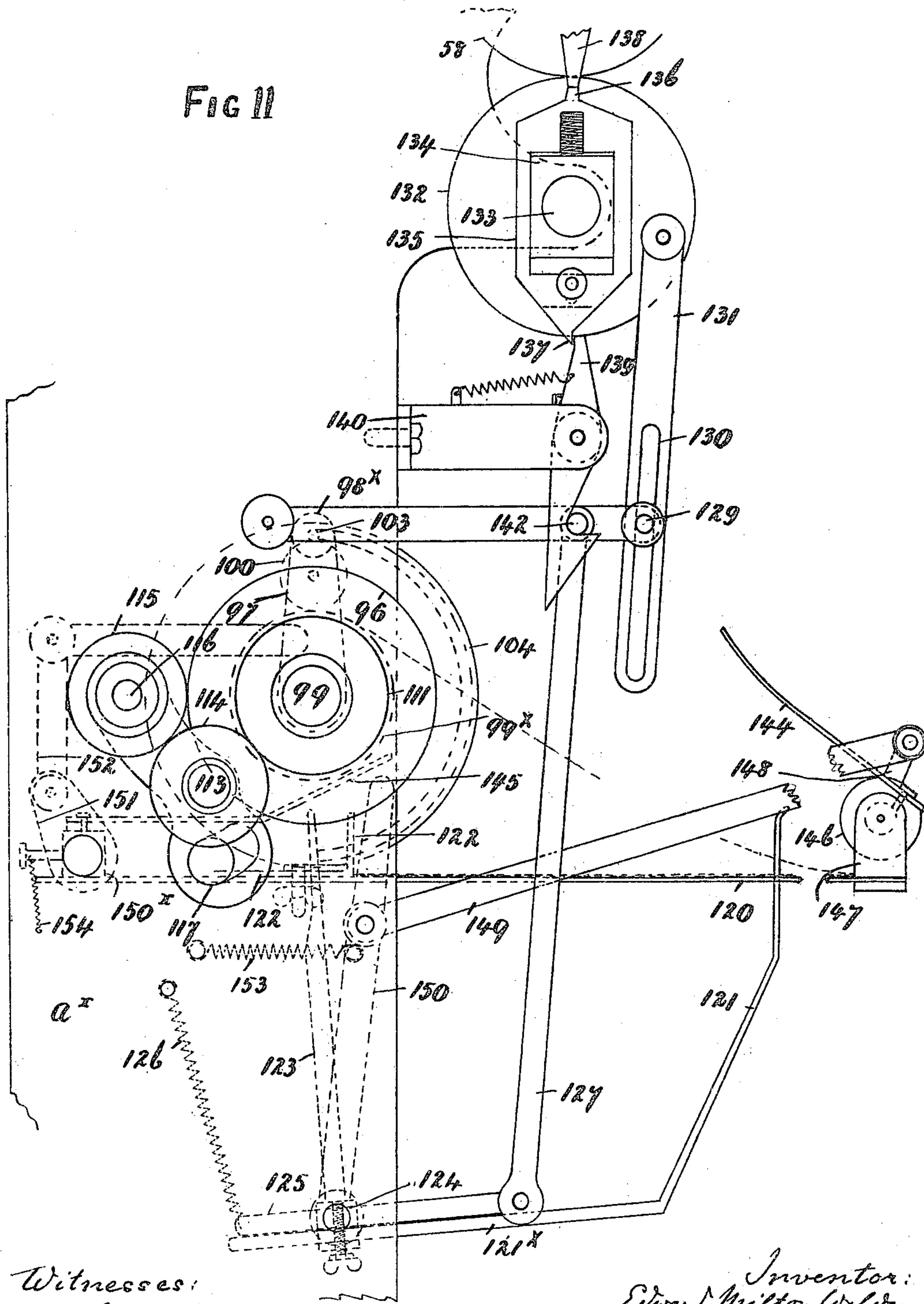


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8 SHEETS—SHEET 8.

FIG 11



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# UNITED STATES PATENT OFFICE.

EDWARD MILTON WILDEY, OF CAVERSHAM, DUNEDIN, NEW ZEALAND.

## PRINTING-MACHINE.

962,542.

Specification of Letters Patent. Patented June 28, 1910.

Application filed November 25, 1907. Serial No. 403,636.

*To all whom it may concern:*

Be it known that I, EDWARD MILTON WILDEY, a subject of His Majesty the King of Great Britain, and resident of Playfair street, Caversham, Dunedin, New Zealand, have invented certain new and useful Improvements in and Relating to Printing-Machines, and of which the following is a specification.

10 This invention relates to a machine for making (automatically) counter sales check books either with duplicate or triplicate leaves from one or more reels of paper.

The machine is so designed that it is 15 adaptable for making various types of check books, for instance, in the manufacture of certain kinds of check books it is necessary to print on both sides of the paper; in other types of check books two kinds of paper are 20 used such as in a triplicate book, while in another type of check book the paper is printed upon one side in one or two colors.

The machine according to this invention can be used for making either of the above 25 mentioned types of books.

In particular the object of the invention is to provide a machine for making a check book as hereinafter described in which the sheets are connected by a continuous strip 30 or butt. In this style of book it is necessary to print on both sides of the paper, and in making such a book the machine performs the following operations: Firstly, the paper is printed on both sides; secondly, it is perforated longitudinally; thirdly, it is num- 35 bered; fourthly, it is partially transversely cut at predetermined intervals over a certain length thereof and then it is completely transversely cut; fifthly, it is folded longitudinally, consecutive printed leaves 40 being folded in opposite directions; sixthly, it is zig-zagged transversely, and is finally delivered in the form of printed, perforated, numbered, folded and continuous single butt 45 books of sheets.

The above cycle of operations it will be obvious hereafter may be modified as to the particular order thereof, that given being one found in practice to answer satisfactorily. 50

In order that the invention may be clearly understood reference will be hereinafter had

to the accompanying sheets of drawings illustrating the machine and parts thereof as arranged for making a check book with a 55 continuous butt, as hereinafter described.

In the drawings, Figure 1 is a left hand side view of the machine; Fig. 2 is a right hand side view of the machine; Figs. 3, 3<sup>a</sup> and 4 are respectively a plan and cross section of the numbering apparatus; Figs. 5 and 5<sup>a</sup> are front views of the cutting knives, the rotary knife being dropped down out of position for clearness of illustration; Fig. 6 is a side view of one of the knives and the 65 mechanism for setting back and releasing the same; Fig. 7 is a similar view to Fig. 6 showing the knife when released and in a position for cutting; Figs. 8 and 9 are plan views of the folding means and traveling 70 bands; Fig. 10 is a sectional view of the zig-zagging mechanism; Fig. 11 is a side view of part of the machine showing the zigzagging device and the book ejecting mechanism; Fig. 12 illustrates a number of the leaves of 75 a book having a single continuous strip or butt; Fig. 13 is a plan of the outer presser hereinafter referred to, and Fig. 14 is a view of a triplicate sheet also hereinafter referred to. 80

In carrying the invention into effect and referring first to the printing mechanism, I mount between suitable side frames *a* two sets of cylinders *a b*, and *c d*, each set comprising one plate cylinder (*a* and *d* respectively) and one impression cylinder (*b* and *c* respectively), together with inking arrangements designated as a whole by *e* which may be of any suitable or approved form. In the arrangement shown the ink supply 90 to the rollers is automatically effected through the medium of cams *f* on the plate cylinders *a d* and pivoted levers *g* carrying supply rollers *h*, the cams *f* operating to raise the rollers *h* from the ink reservoir 95 roller *i* to the inking rollers periodically.

The ink reservoir rollers *i* are operated by the cams *f* through a connecting rod pivoted thereon operating a pawl and ratchet wheel on *i*. 100

The plate and impression cylinders are provided with suitable gears *k* receiving motion from the main driving shaft of the machine as follows: The main shaft *l*, adapted



to be driven from any suitable source of power, has fixed thereon a pinion  $m$  which through an intermediate gear drives the gear  $k$  on the impression cylinder  $b$ , and the gears  $k$  of  $a$  and  $b$  being in mesh, the plate cylinder  $a$  is also rotated. Through intermediate meshing gears  $o$  and  $p$  respectively engaging the gears of the cylinders  $b$  and  $c$ , the impression cylinder  $c$  is rotated and the gear of this being in mesh with the gear of the plate cylinder  $d$ , the latter is also rotated. The direction of rotation of the pinion  $m$  being clockwise as indicated by the arrow, the direction of rotation of the plate and impression cylinders will be as indicated by the arrows, the respective cylinders of each set traveling around in the same direction. The paper  $q$  from the reel  $r^*$  upon the take off roller  $r$ , which is borne by suitable brackets  $s$  secured to the frame, is passed over a guide roller  $t$ , between the set of cylinders  $a$   $b$  where it is printed on one side thereof and then between the other set of cylinders  $c$   $d$  where it is printed on the other side thereof. After leaving the printing cylinders, the paper passes over a roller  $d^*$  and arrives at and is conducted through a perforating apparatus, designated by  $u$  formed of serrated wheels running between plain disks as in known manner. The perforating wheel shafts are driven from the main driving shaft  $l$  as follows: Upon the main shaft  $l$  (Fig. 1) is fixed a bevel wheel  $v$  in gear with a bevel wheel  $w$  fixed on a counter shaft  $x$  revolubly mounted upon the left hand side of the machine. A bevel wheel  $y$  fixed on the counter shaft  $x$  gears with a bevel wheel  $z$  fixed upon a transverse shaft 1 which at the other side of the machine has fixed thereon a gear 2 (Fig. 2) which through the medium of the gears 3, 4, 5 and 6 effect rotation of the perforating wheel shafts in a direction toward each other as shown by the arrows. Any suitable perforating apparatus may of course be employed. From the perforating apparatus the paper now longitudinally perforated as shown in Fig. 12 passes to an improved numbering apparatus which comprises two sets designated generally by 7 and 8, arranged one on one side and one on the other side of the paper. Each set is constructed in or substantially in the following manner.

Referring now more particularly to Figs. 3 and 4, in suitable bearings 9 supported by the frame of the machine  $a^*$  is revolubly mounted a shaft 10 which carries toward each end a disk (11, 11<sup>\*</sup>). In equal spaced relation around these disks 11 and 11<sup>\*</sup> are bearings 12 in which are mounted five small shafts or spindles 13 (hereinafter referred to as number wheel shafts). These number wheel shafts 13 carry (adjustably) a

series of wheels 14, and on projections or teeth in equal spaced relation around the rims of such series of wheels are engraved numbers.

The number wheels of each numbering apparatus collectively have the numbers from one to fifty; each wheel has five numbers and delivers an impression periodically as will hereinafter be made clear. On the upper numbering apparatus the central set of number wheels and the set nearest the disk 11 are numbered alike as these sets print the numbers on both the butt and duplicate of alternate leaves.

At their one ends the number wheel shafts carry gears 15 meshing with a gear 16 on the central or disk carrying shaft 10. Motion is arranged to be given to these gears 15 and 16 by a pinion 17 fixed on the end of a small shaft 18 which has its bearings in one of the disks (11<sup>\*</sup>). Said shaft 18 has fixed onto its outer end a preferably five toothed star wheel 19.

Projecting from the frame of the machine into the path of the star wheel 19 is a pin 20, so arranged that when the numbering apparatus is revolved the star wheel 19 comes in contact with the pin 20 at each alternate revolution of the numbering apparatus and causes the star wheel 19 to move around one tooth, and through the before mentioned pinion 17, the gears 15 on the number wheel shafts and the central gear 16 are set in movement and thereby cause the number wheels 14 to be partly rotated and the positions of the numbers to be altered. The ratio between the pinions 17 and the gear 15 is such that when the star wheel 19 is moved around one tooth the number wheels move around one number.

The means for introducing the pin 20 into the path of the star-wheel 19 at each alternate revolution of the numbering apparatus may conveniently comprise a double armed lever 21 pivoted at 22 to a bracket 23 fixed to the frame  $a^*$ , such lever 21 being at one end pivoted to the rear of the pin 20 and at the other end being provided with a projecting part engaging in a cam groove 24 of a disk or drum 25. The latter is revolubly mounted upon a stud 26 fixed in one of the side frames  $a^*$  and having fixed thereto a gear 28 meshing with a pinion 29 fixed upon the shaft 10, the ratio between the gear 28 and pinion 29 being arranged to give the alternate motion to pin 20.

The central or disk carrying shaft 10 carries fixed at one end a gear wheel 30 which receives motion through a pinion 31 fixed on the one end of a shaft 32 which carries suitable impression devices 33 for taking the impress of the numbers which are inked in approved manner from suitable inking ar-



rangements 34, Fig. 1, impression being taken at each revolution of the impression shaft 32 (Figs. 3 and 4). The ratio of the last mentioned gear 30 and pinion 31 is two and a half to one, so it will be seen that at each revolution of the impression shaft 32, the number wheel shafts 13 will come into line with the impression devices alternately, and that as there are five shafts all of the numbers will eventually deliver their impressions.

The pinion 31 of the number apparatus 7 is driven off the gear 2 (see Fig. 2) through intermediate gears 3, 4, 35, 36, and 37; the pinion 31 of the number apparatus 8 is driven off the gear 2 through the intermediate gears 3, 38, 39 and 40, the direction of rotation of the respective gears being indicated by the arrows.

In proceeding now to describe the operation of the numbering apparatus, reference to Fig. 12 will render clear how the paper arrives at the numbering apparatus with the printing on opposite sides thereof as indicated respectively by the full and dotted lines. It is therefore necessary for one numbering apparatus to print the numbers on one side, and the other numbering apparatus to print the numbers on the other side of the paper.

Assuming the leaf Fig. 12 marked 41 to be the commencement of a book of 50 leaves this comes between the number wheels 14 of the upper numbering apparatus 7 and the impression shaft 32 with the printing on the leaf 41 toward the impression shaft. Preferably the numbering of the leaves commences at 50 and proceeds downwardly to 1. Taking this to be so, the number wheels of each of the two sets nearest the disk 11 have collectively the even numbers 50, 48, and so on to 2, and the number wheels of the set nearest the disk 11<sup>\*</sup> have collectively the odd numbers 49, 47 and so on to one, the even and odd numbers being out of printing line see Figs. 3 and 4. This being so in commencing to number a book, at one revolution of the impression shaft 32, two like even numbers 50 are delivered on the butt and duplicate of the sheet, and at the next revolution of the impression shaft an odd number 49 is delivered on the printed side of the next sheet, as indicated in Fig. 12. During the next three revolutions of the impression shaft there are respectively delivered two even numbers 48, one odd number 47, and two even numbers 46, in like manner onto the three next following sheets, but at the completion of the next revolution of the impression shaft as there are five numbers on each number wheel, and owing to the ratio between the gears 30 and 31 operating to bring the number wheel shafts 13 into line

alternately with the impression shaft 32, it would follow that the two even numbers 50 and subsequently the numbers 49, 48, 47 and 46 would again be delivered unless the number wheel shafts were rotated by the pin 20 as before described through a tenth of a revolution to bring the number 45, and following required numbers in line for delivering an impression. The numbers on each odd and even wheel rise by ten, for example, the even number wheels which have the numbers 50, also have the numbers 40, 30, 20 and 10, and the odd number wheels which have the number 49, also have the numbers 39, 29, 19 and 9, and so on. Having passed through the first numbering apparatus 7, the paper now arrives at and passes through the second numbering apparatus 8 which is similar to and operates in exactly the same way as the numbering apparatus 7, except that as it has to deliver impressions of the numbers on the other side of the paper not printed upon by the numbering apparatus 7, it will be clear that in this case the two sets of number wheels nearest the disk 11 are engraved to deliver the odd numbers 49, 47, etc., on the butts and duplicates together, and the set of number wheels nearest the disk 11<sup>\*</sup> are engraved to deliver the even numbers 50, 48, etc., singly on to the printed leaves as indicated by the figures shown in full in Fig. 12.

It will be readily understood that if a number wheel having five teeth makes one impression for each alternate revolution of the impression shaft, a number wheel having 10 teeth will make one impression for each revolution of the impression shaft, for example:—if a wheel carrying the odd numbers is slid along the shaft and connected to a wheel carrying the even numbers (the printing relation being kept as shown in Fig. 4), it is obvious that the two five tooth wheels together are the equivalent of one ten tooth wheel. Where it is necessary to use ten tooth wheels as in books not zig-zagged as hereinafter described I prefer to have a series of ten tooth wheels also on shafts 131, these being purposely left out of the drawing to save confusion in illustration. After being numbered the paper passes between a tension roll 43 and friction disks 43<sup>\*</sup> and thence to the cutting knives which consist of two adjustable yielding stationary knives 44 and 45, the cutting edges whereof are in the same vertical plane when cutting and set at an angle to each other as shown, and a straight rotary knife 46 which cuts against the yielding knives 44 and 45.

A convenient arrangement of making the stationary knives adjustably yielding comprises in each case a frame such as 47, loosely threaded at one end upon a transverse shaft



48 and preferably formed U shape at its other end to carry the knife (44, 45) connected thereto by set screws 50, and adjustable by set screws 49, springs 51, the tension of which is adjusted by screws 52 working through a transverse shaft 53, being provided to permit the frame 47 and hence the knife to yield when cutting. The springs 51 abut as shown against the frame 47. To permit the paper to be partially transversely cut so that the leaves are connected by a continuous butt, the knife 44 is kept set back for forty nine revolutions of the rotary knife, but is automatically fed forward by suitable means so that the paper is wholly transversely cut at the fiftieth revolution of the rotary knife 46.

Preferably the automatic retraction and forward feeding of the stationary knife 44 is effected by the following means. Upon the rotary knife shaft 54 is fixed a gear 55 having 49 teeth. This gear is driven by the gear 2 through gears 56 and 57, which drive the knife shaft 54 through gear 57\*. The gear 55 which is on the inner side of gear 57\* drives a gear 58 fixed on a stub shaft 59 and having 50 teeth. The gear 58 has fixed thereto a projection 60, and upon the gear 55 a block 61 having in spring controlled sliding relation thereon a frame 62. This frame has at each end projections 63 and 64, which and the projection 60 are substantially level with the top of the teeth of their respective wheels so that when the projections 60 and 64 come in contact the frame 62 will yield the depth of a tooth. The projection 63 however is out of line with projection 60 and cannot come into contact therewith. At the fiftieth revolution of the shaft 54, the projection 64 contacts with the projection 60 on gear 58, and the projection 63 immediately subsequent to such contact engages a projection 65 upon a lever 66 pivoted to the side frame  $\alpha^*$ , such lever having a curved slot 67 through which passes a pin 68 attached to the frame 47. In this way the lever 66 is depressed and by reason of the shape of the slot 67, the frame carrying the knife 44 is allowed to be pressed forward by the spring 51 into cutting position, such position being regulated by adjustable stop means 48\*, so that the rotary knife next cuts against both the knives 44 and 45 and so wholly transversely cuts the paper. Before however the knife 46 again can arrive to cut against the knives 44 and 45, a projection 69 (see Fig. 7) comes in the path of the lever 66 and raises it and thereby forces the frame 47 and the knife 44 out of cutting position.

The rotary knife is connected to the horizontal revoluble shaft 54 as by a number of supports 70 which are each set into a recess

71 and have a backwardly projecting portion 72 passing through the shaft 54 and tapped to receive a set screw 75 by which latter the knife 46 may be adjusted in a forward direction.

After leaving the knives the paper is guided by guides 76 between rolls 80, 80 onto traveling bands Figs. 1, 2, 10 and 11, first between the bands 81 and 82, then between the bands 82 and 83, and then onto the bands 83 and 84 to the delivery end of the machine, presser wheels 86 carried by adjustable arms 87 being arranged to rest on the folds of the paper to complete the folds. The bands travel around suitable rollers which are driven as shown by a chain 85.

Above the tapes 82 and 83, 84 are arranged suitably shaped longitudinal folding devices 88 and 89, both located at the same side of the machine, each one of which folding devices folds alternate printed leaves, one folder folding the leaves in one direction and the other folder in the reverse direction as indicated by the arrows in Fig. 12, means being provided for lifting alternate leaves onto the first folder which is raised slightly above the tapes 82 to allow the unfolded leaves which are to be reversely folded by the next folder to run underneath. Such last mentioned means may conveniently consist of an arm 90 fixed on one end of a shaft 91 which at the other end has fixed thereon an arm 92 connected by a link 93 to a pivoted lever 94 which is raised by a projection 95 on the gear wheel 96 which drives the zigzagging device to be hereinafter described, and thereby imparts a partial rotation to the shaft 91 to raise the arm 90 to lift alternate leaves onto the folder 88.

As the leaves, as is necessary, are alternately folded as indicated by the arrows in Fig. 12, it will be obvious that to bring the folded leaves into proper relation, it is necessary to bring the folded leaves onto each other in zig-zag fashion.

Referring to Figs. 10 and 11, the zigzagging device, of which there is one on each side of the machine comprises an arm 97 fixed upon each end of a sleeve 98 which is fixed to gear 96. The sleeve is revolubly mounted upon a transverse shaft 99 and extends substantially the whole length thereof. The said sleeve carries tape roller 99\* between which and a friction roller 100 the sheets are delivered. The outer end of each arm 97 carries a hollow boss 98\*, having a plunger 99\* working therein, a spring 101 being interposed between a shoulder 101\* on the plunger and a shoulder 102 of the boss 98\*. The plunger 99\* has transversely projecting toward the center of the machine a pin 103.



Fixed to the frame  $\alpha^x$  is a cam 104, the cam surface 105 of which operates as the arm 97 is rotated to press out or allow the spring 101 to retract the plunger 99 $^x$  and its pin 103.

The sleeve 98 is rotated through the medium of the counter shaft 106 (Fig. 1) as follows:—The counter shaft 106 is driven off the shaft  $\alpha$  by bevel wheels 107 and 108, and by bevel wheels 109, 110 in turn drives the shaft 99. The latter has a gear 111 meshing with a gear 112 which is carried upon a stud 113 fixed on an adjustable bracket 117. The bracket 117 is supported at one end by a stud 116 which is fixed in the frame of the machine, and at the other end by a bolt 116 $^x$ . The gear 112 has a gear 114 connected therewith, which drives a gear 115 connected to a gear 118, the two latter gears being carried by the stud 116. The gear 118 drives the wheel 96 fixed on the sleeve 98 to which is fixed as before stated the arm 97, the relation of the gears being such, that as the arm 97 revolves the cam projected pins 103 engage the forward end of each alternate sheet and guide it to the gage see Fig. 1, which is fixed on table 120 Fig. 11. When the gage is reached, the cam 104 allows the pin 103 to recede so as to clear the leaves, tapes and gages. Upon arriving at the gage 122 the presser 145 is caused to fall and hold the end of the sheet for a sufficient time to enable the other end to fall into position against the movable gage 121. Then the presser 144 is caused to fall and hold the other end of the sheet for a sufficient time to enable the projecting pins 103 to operate on the sheet following and so on until a book of sheets is complete when it is ejected by fingers 123.

A convenient arrangement of operating the ejector fingers consists as follows: The ejector fingers 123, of which there are preferably two, are fixed at their one ends upon a revoluble shaft 124 mounted in the frame  $\alpha^x$  and their other ends project upwardly through slots in the table 120 and gage 122, such fingers being normally positioned behind and clear of the book lying between the gages 122 and 121.

Through the shaft 124 passes a lever 125 which at one end is connected to a spring 126 secured to the frame  $\alpha^x$  and at the other end is pivotally attached to a connecting rod 127. The other end of the rod 127 is pivotally attached to a lever 128 fulcrumed at one end to the frame  $\alpha^x$  and at the other end being provided with a pin 129 which engages in a slotted link 131 pivotally suspended from a gear wheel 132 having 49 teeth. The gear wheel 132 is revolubly mounted upon a stud 133 fixed to the frame and meshes with the 50 toothed gear wheel

58 before mentioned with reference to the cutting knives. On the wheel is a block 134 upon which is mounted in sliding spring controlled relation therewith a frame 135 having projections 136 and 137. The projection 136 is adapted, when 50 sheets have been deposited on the table 120, to come into contact with a projection 138 of the gear wheel 58, the projection 137 being set out of the path of the projection 138.

When the projections 138 and 136 so come into contact, the frame 135 is pressed downward and brings the projection 137 in the path of a spring controlled latch 139 pivoted to a bracket 140 attached to the frame  $\alpha^x$ , a stop 141 being provided to limit movement of the latch under the influence of its spring. The latch is normally holding a pin 142 on the lever 128 and thereby retains the ejector fingers 123 held back against the force of the spring 126. The projection 137 however as it moves around contacts with the latch 139, when the frame is pressed down as shown and operates to deflect the latch and release the pin 142 and thereby the lever 128, rod 127 and lever 125. The spring 126 is now free to operate the lever 125 and so rotate the stud 124 to throw the ejector fingers 123 forward. At the same time, the gage 121, which has a rearwardly extending portion 121 $^x$  adjustably connected to the shaft 124 by a screw 143, is moved down out of the path of the book as it is being ejected. After being thus operated, the various parts constituting the ejecting mechanism are restored to their normal positions, by means of the link 131, as the wheel 132 continues to rotate, operating to raise the lever 128 to bring the pin 142 thereof again into engagement with the latch 139.

In order that the zigzagged deposited sheets upon the table 120 may be in a compact condition, pressing devices 144 and 145 are provided to press down upon the transverse folds of and hold the sheets as they are deposited as before described. As shown the presser 144 is carried by a drum 146 revolubly mounted out of line with the path of the ejected books on a bracket 147. The drum 146 has an arm 148 which is connected by a rod 149 to a lever 150 fulcrumed on the shaft 124. The presser 145 is fixed on a shaft 150 $^x$ . Mounted on one end of the shaft is an arm 151 pivotally attached to one end of a bell crank lever 152, the other end whereof projects, as does also the free end of the lever 150, into the path of the boss 98 $^x$  of the arm 97, which boss 98 $^x$  as it is carried around deflects said levers 150 and 152 and presses the pressers 144 and 145 onto the transverse folds of the sheets as these are deposited on the table 120. The pressers are



retracted respectively by means of the springs 153 and 154. Both the drum 146 and the shaft 150\* are arranged in suitable manner to accommodate the varying number of sheets deposited upon the table 120.

The ejecting mechanism is shown in Fig. 11 in position immediately previous to its operation for ejecting a book.

In using the machine for making triplicate books (Fig. 14) not zigzagged, from one reel of paper, I place the second folding device 89 on the right hand side of the machine; dispense with the alternate lifting arm 90 and zigzagging devices, and use the ten tooth number wheels as before mentioned.

In using the machine for triplicate books, not zigzagged, and from two reels of paper, I support the second reel  $r^{xx}$  preferably under the cylinders as shown in dotted lines Fig. 1. The paper  $q^x$  of the second reel  $r^{xx}$  is approximately one half the width of the paper of the first reel, and passes with the paper of the first reel around the impression cylinders  $b$  and  $c$  and on preferably the right hand side of the machine. When leaving the impression cylinder  $c$ , the paper of the second reel is on the under side of the paper of the first reel, but when the paper of both reels passes through guide rolls 80, the paper of the second reel is then on the upper side and when the leaves of the book formed from the paper of the first reel, are folded by the first folding device 88, the paper of the second reel is between said leaves, and forms the duplicate leaves of the book. In this type of book I dispense with the alternate lifting arm 90, the second folding device, and the zigzagging devices, and use the 10 tooth number wheels before mentioned.

In using the machine for making duplicate books printed in two colors and not zigzagged, it is necessary for the two sets of cylinders to run in the same direction, the one set printing one color and the other set printing the other color. The means for producing the proper rotation of the cylinders for this purpose is achieved by removing the two intermediate wheels  $o$   $p$  and substituting one intermediate wheel  $o^x$  Fig. 1. In this case I preferably support a reel of paper  $r^{xxx}$  above the cylinder as shown in dotted lines Fig. 2, the paper first passing downwardly between cylinders  $c$   $d$ , then upwardly between cylinders  $a$   $b$  over the guide roll  $d^x$  to the perforating and following

mechanism. In this type of book I dispense with the alternate lifting arm, the second folder and the zigzagging devices, and use the 10 tooth number wheels before mentioned.

In the case of the three last mentioned books the paper is wholly transversely cut at each revolution of the rotary knife. This can be simply provided for by arranging the paper to pass only between the knife 45 and the rotary knife 46.

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

1. In a counter sales check-book machine the combination with guide means for the paper web, of two sets of printing elements for printing the paper web on both sides, means for longitudinally perforating the paper web to form a number of leaves, a numbering mechanism comprising two sets for numbering the leaves on both sides, cutters, so arranged as to partially transversely cut the paper web at predetermined intervals, leaving the leaves connected by a continuous butt, means for periodically severing said butt, and folding devices for alternately folding the leaves in opposite directions and then transversely folding them zig-zag fashion to bring them into proper sequence.

2. In a counter sales check book machine the combination with guide means for the paper web of two sets of printing elements for printing the paper web on both sides, means for longitudinally perforating the paper web to form a number of leaves, a numbering mechanism comprising two sets for numbering the leaves on both sides, cutters, so arranged as to partially transversely cut the paper web at predetermined intervals, leaving the leaves connected by a continuous butt, means for periodically severing said butt, and folding devices for alternately folding the leaves in opposite directions and then transversely folding them zig-zag fashion to bring them into proper sequence, and means whereby the forward end of each alternate sheet, as the sheets are delivered onto a table, is engaged and guided rearwardly to a gage.

In witness whereof I have hereunto set my hand in presence of two witnesses.

EDWARD MILTON WILDEY.

Witnesses:

HENY. COND. HEIDE,  
LEONARD COULSON.