

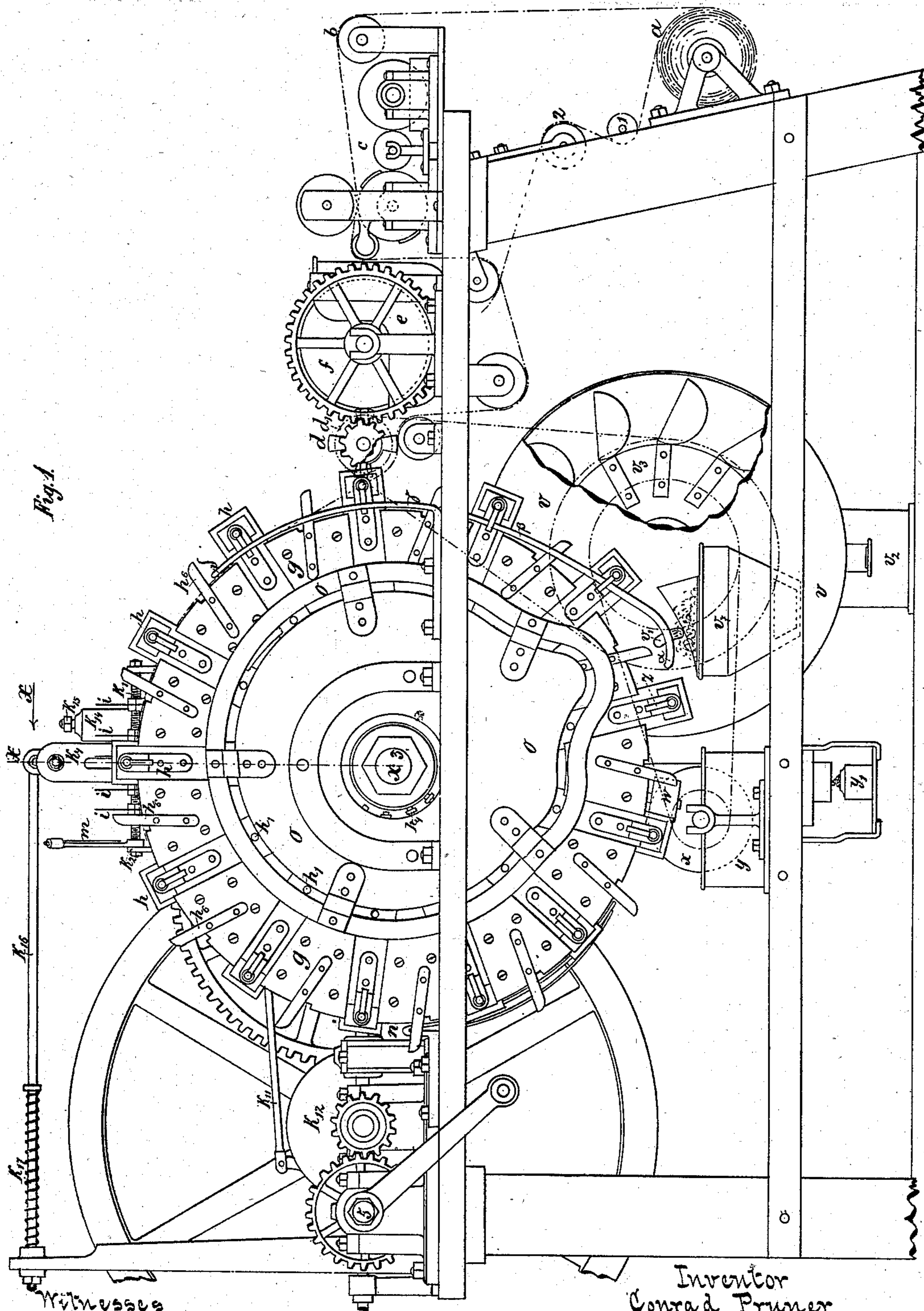
(No Model.)

6 Sheets—Sheet 1.

C. PRUNER.
PAPER BOX MACHINE.

No. 255,018.

Patented Mar. 14, 1882.



Witnesses
Otto Stufelund
William Miller

Inventor
Conrad Pruner
by Van Santvoord & Hauff
his attys.

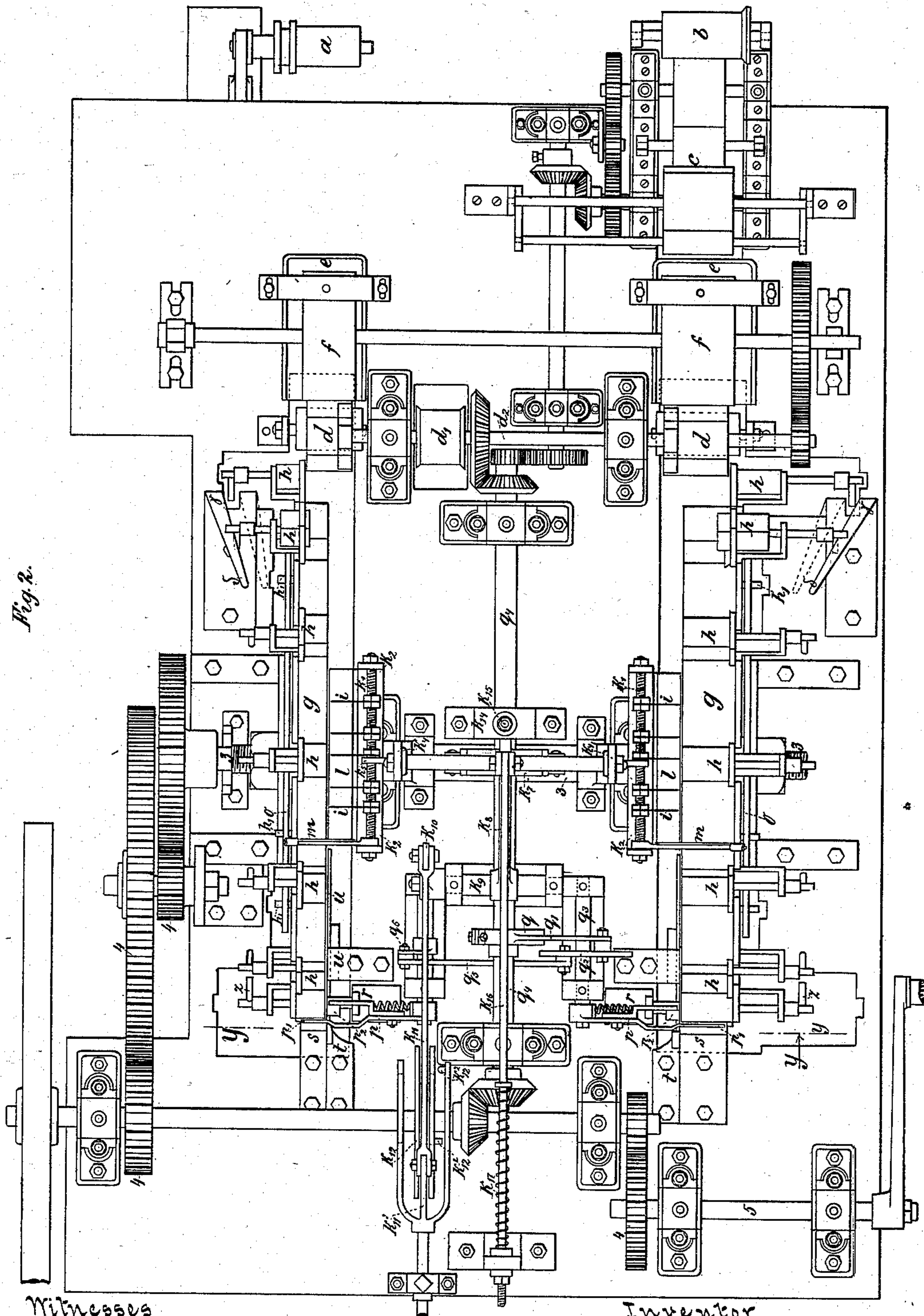
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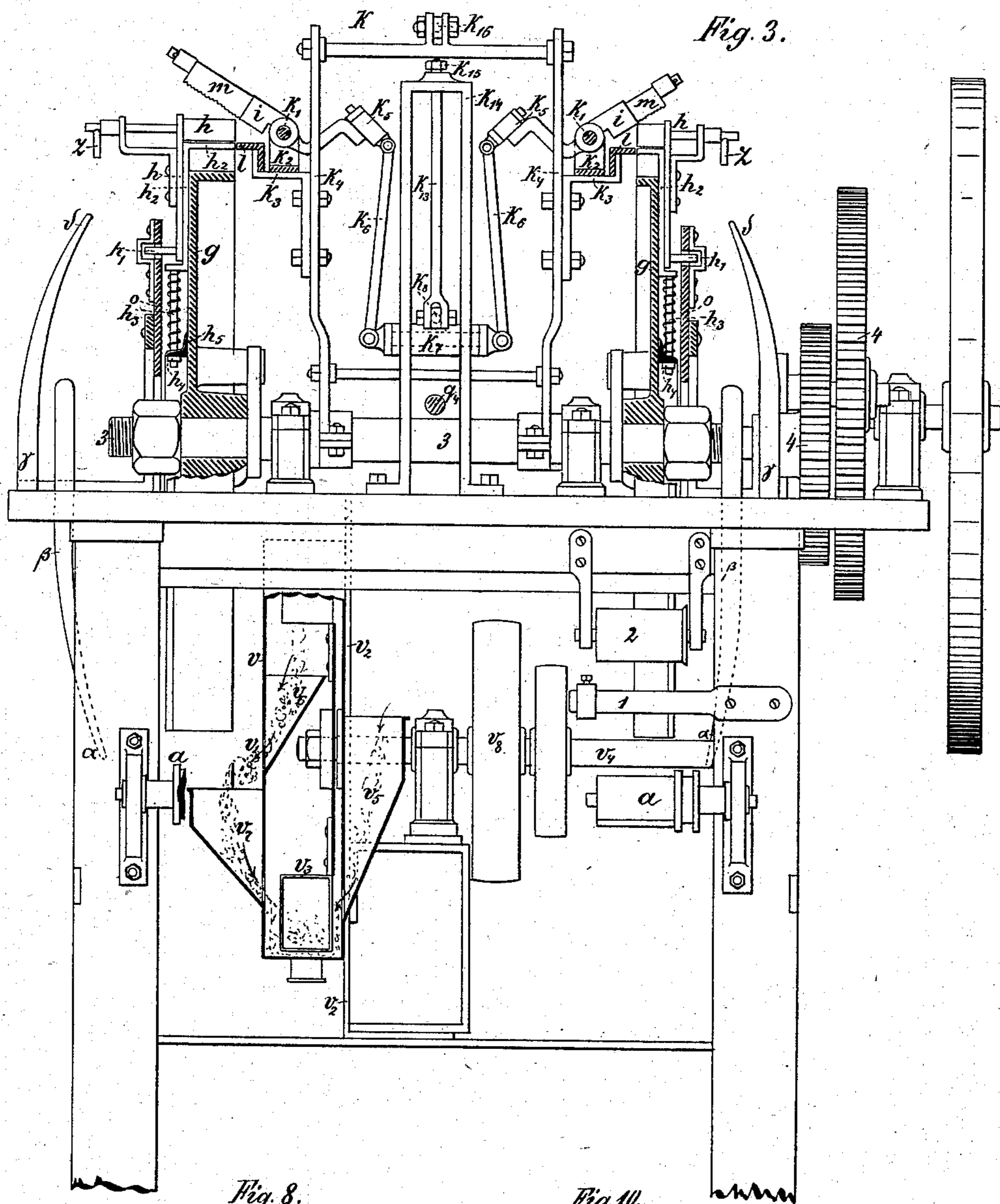


Fig. 8.

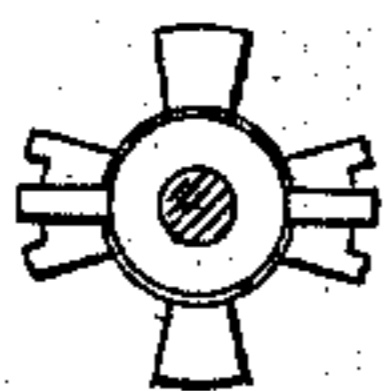


Fig. 9.

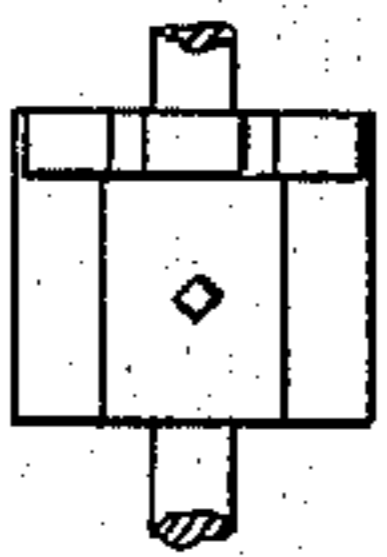


Fig. 10.

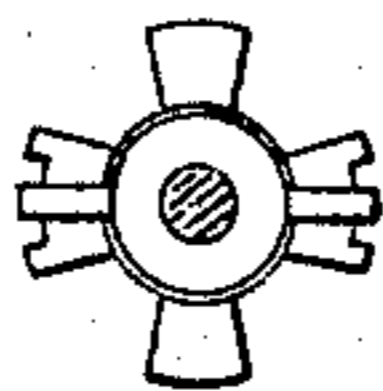
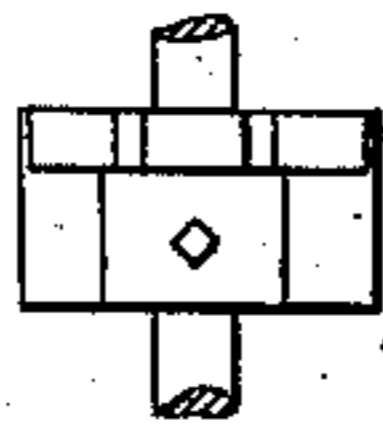


Fig. 11.



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Fig. 4.

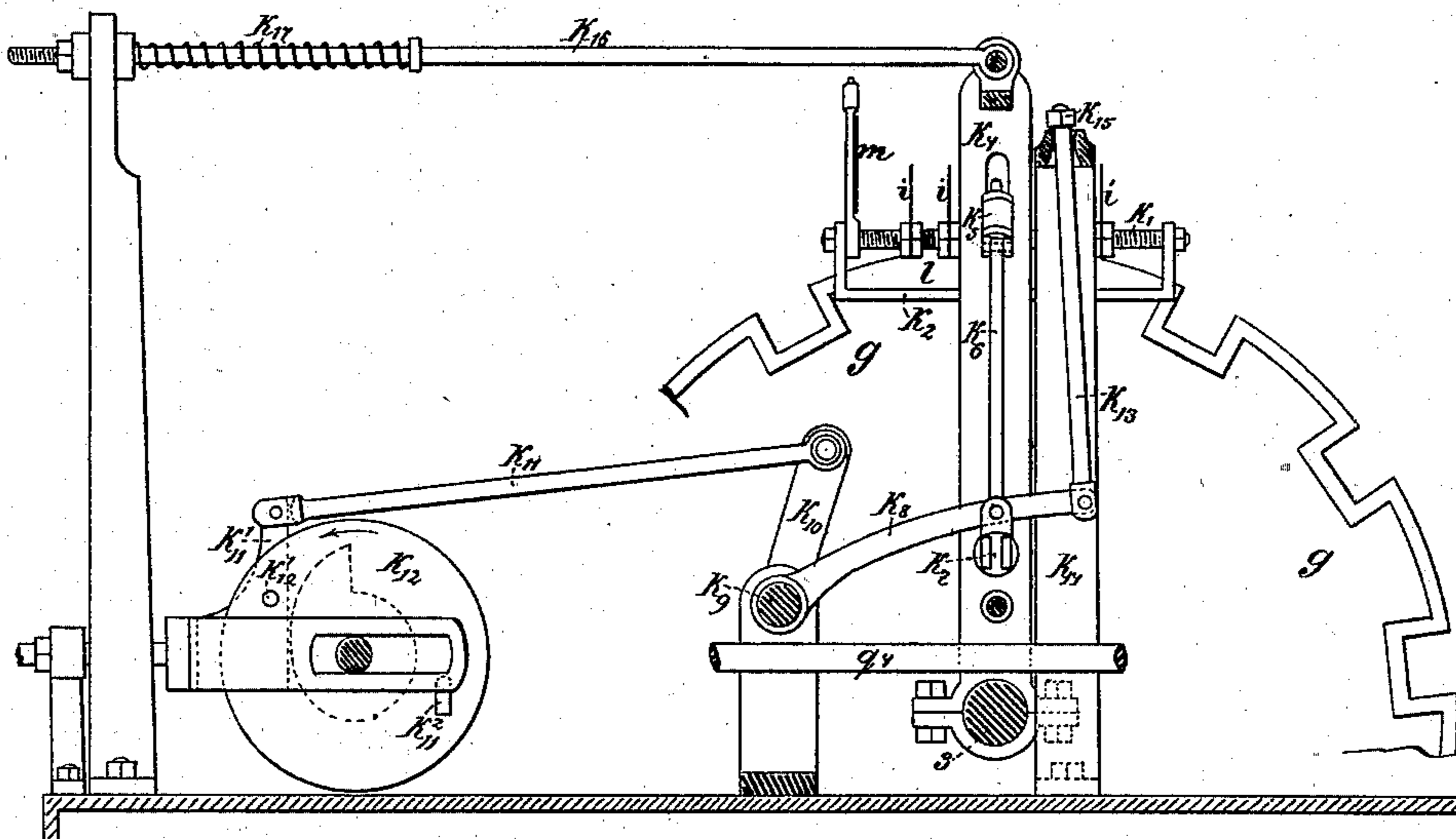


Fig. 5.

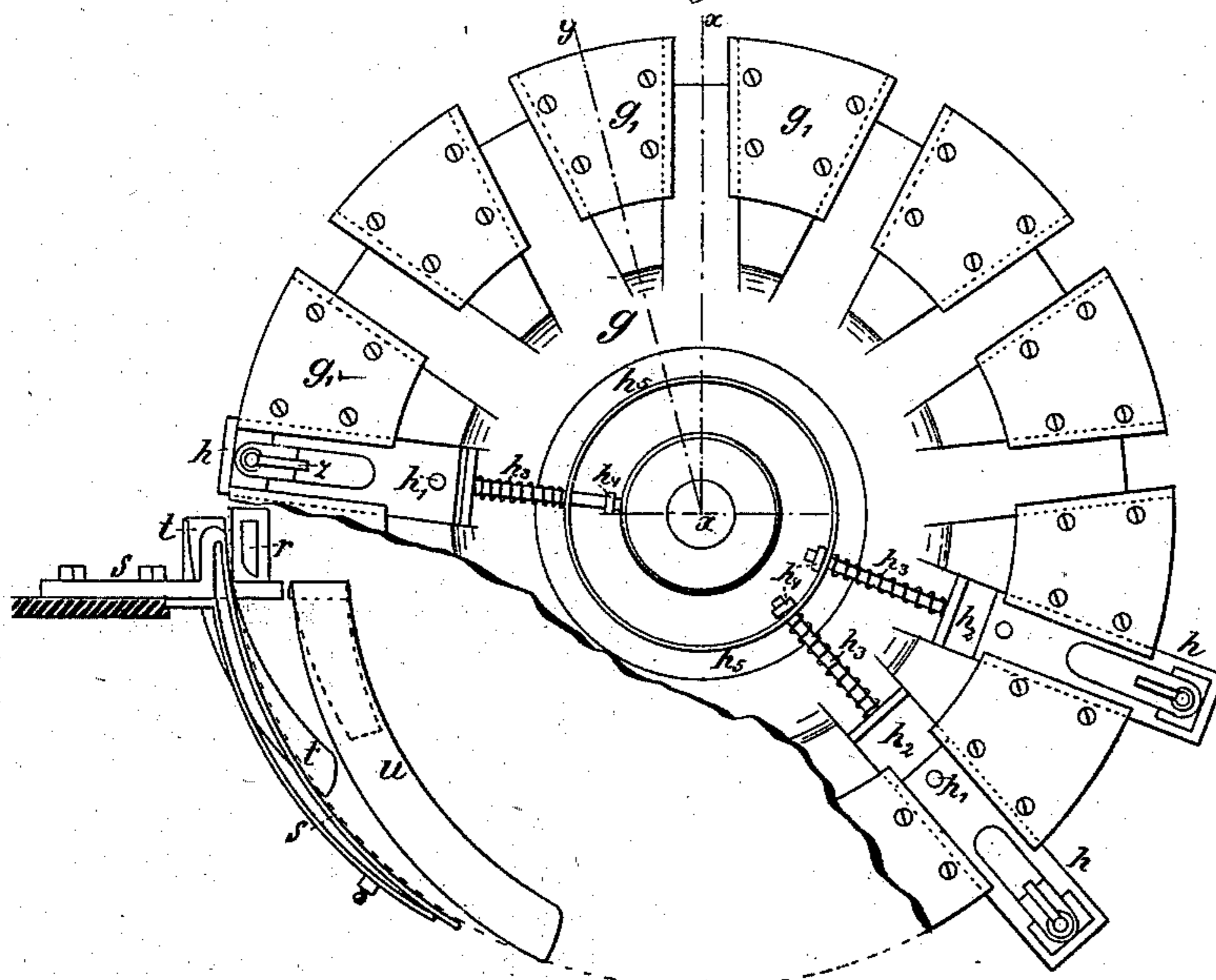


Fig. 7. xx.

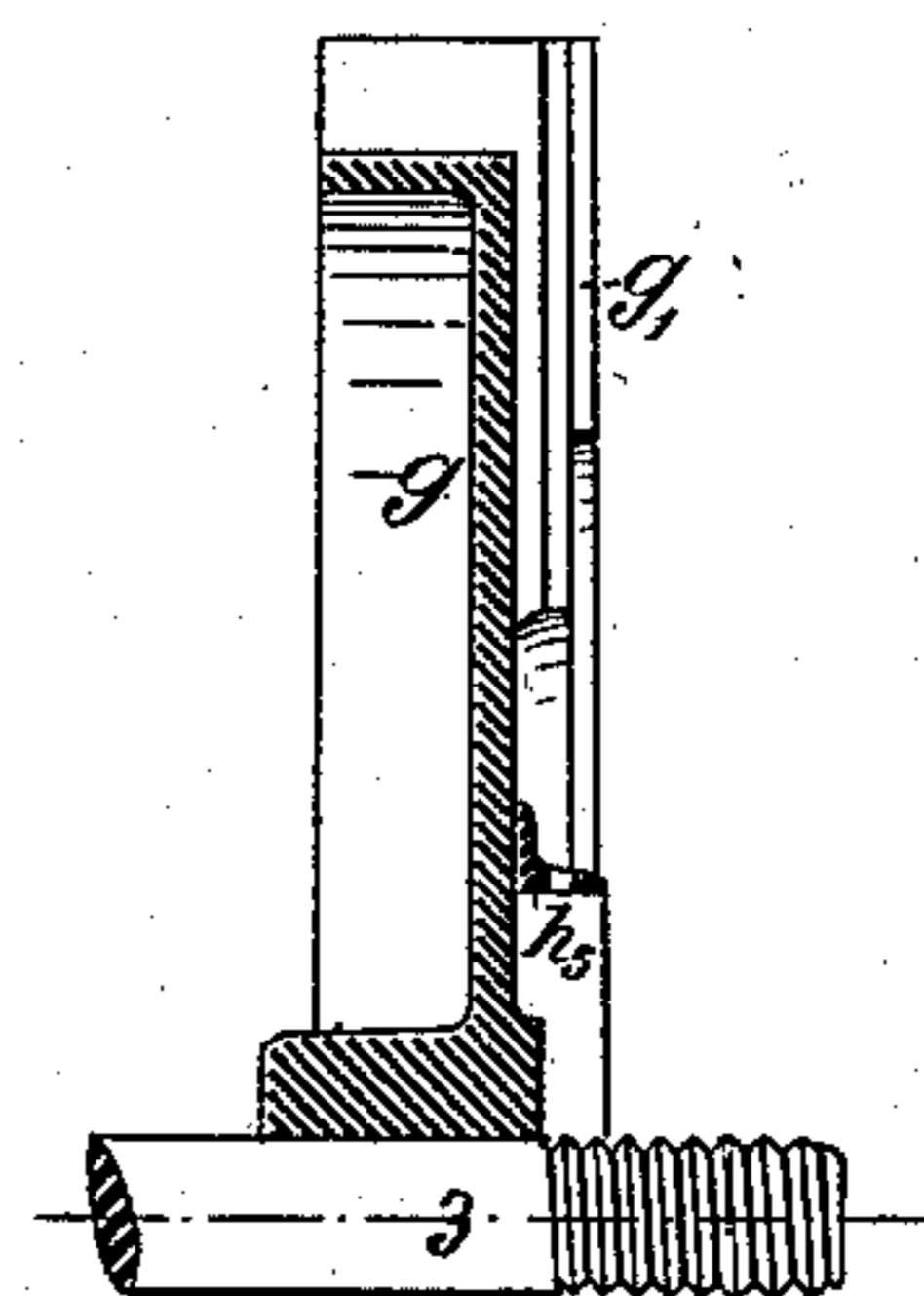


Fig. 7^a. xy.

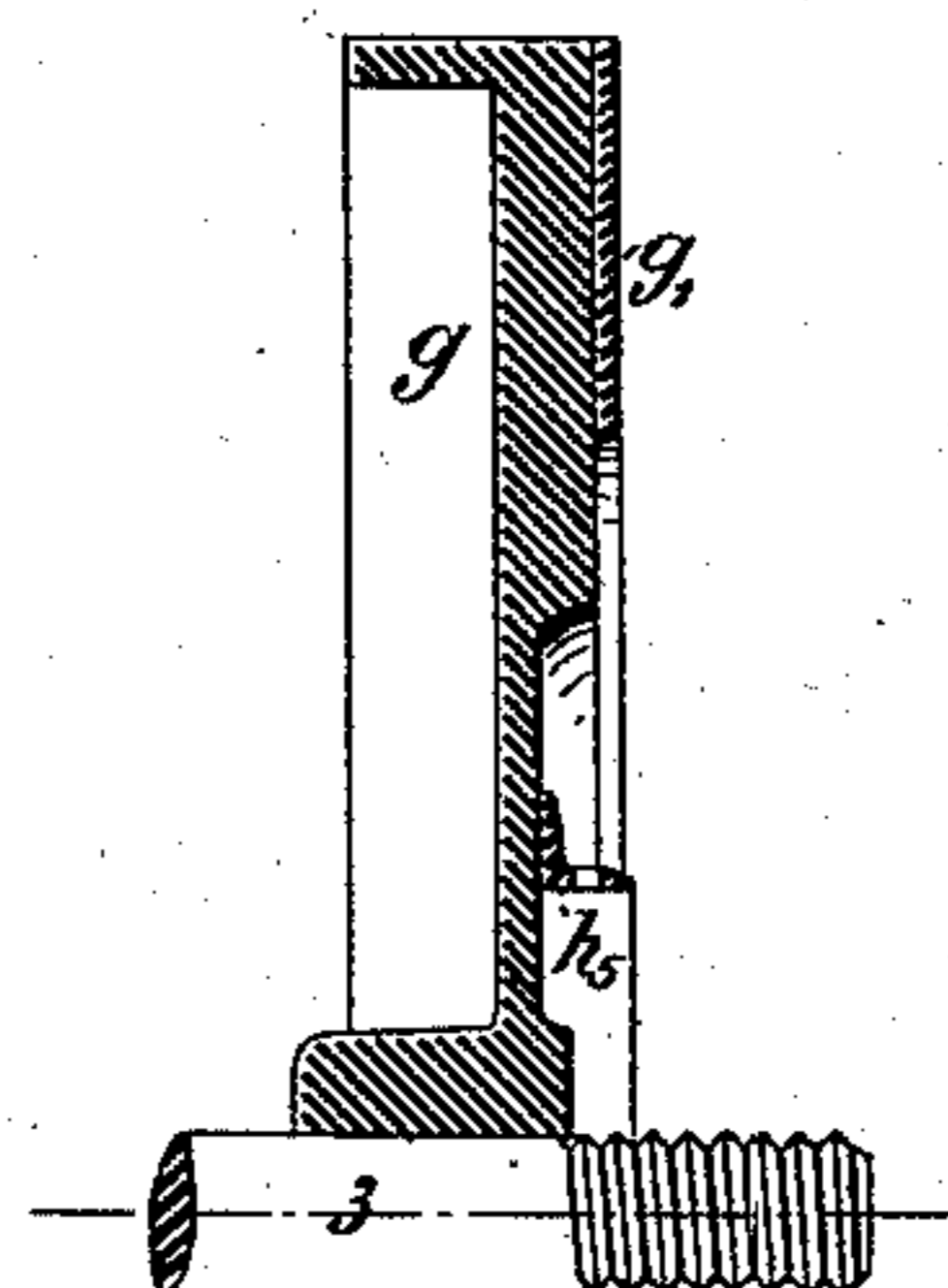
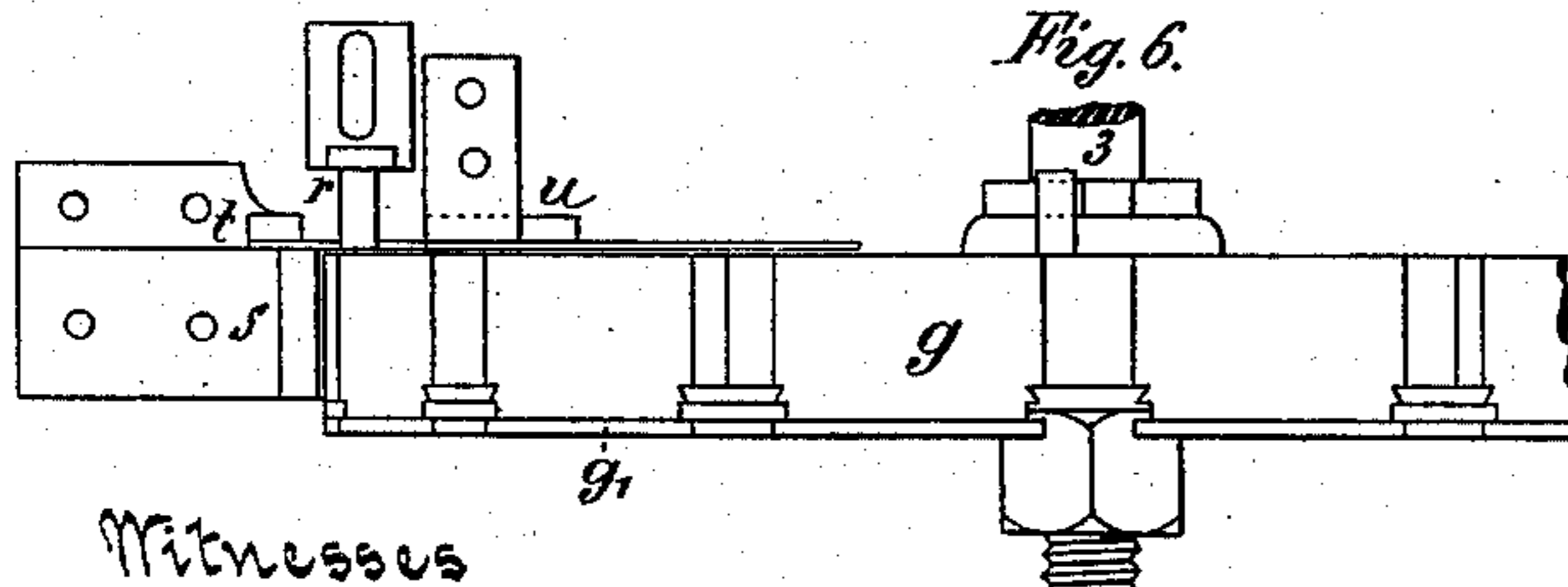


Fig. 6.



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Fig. 12.

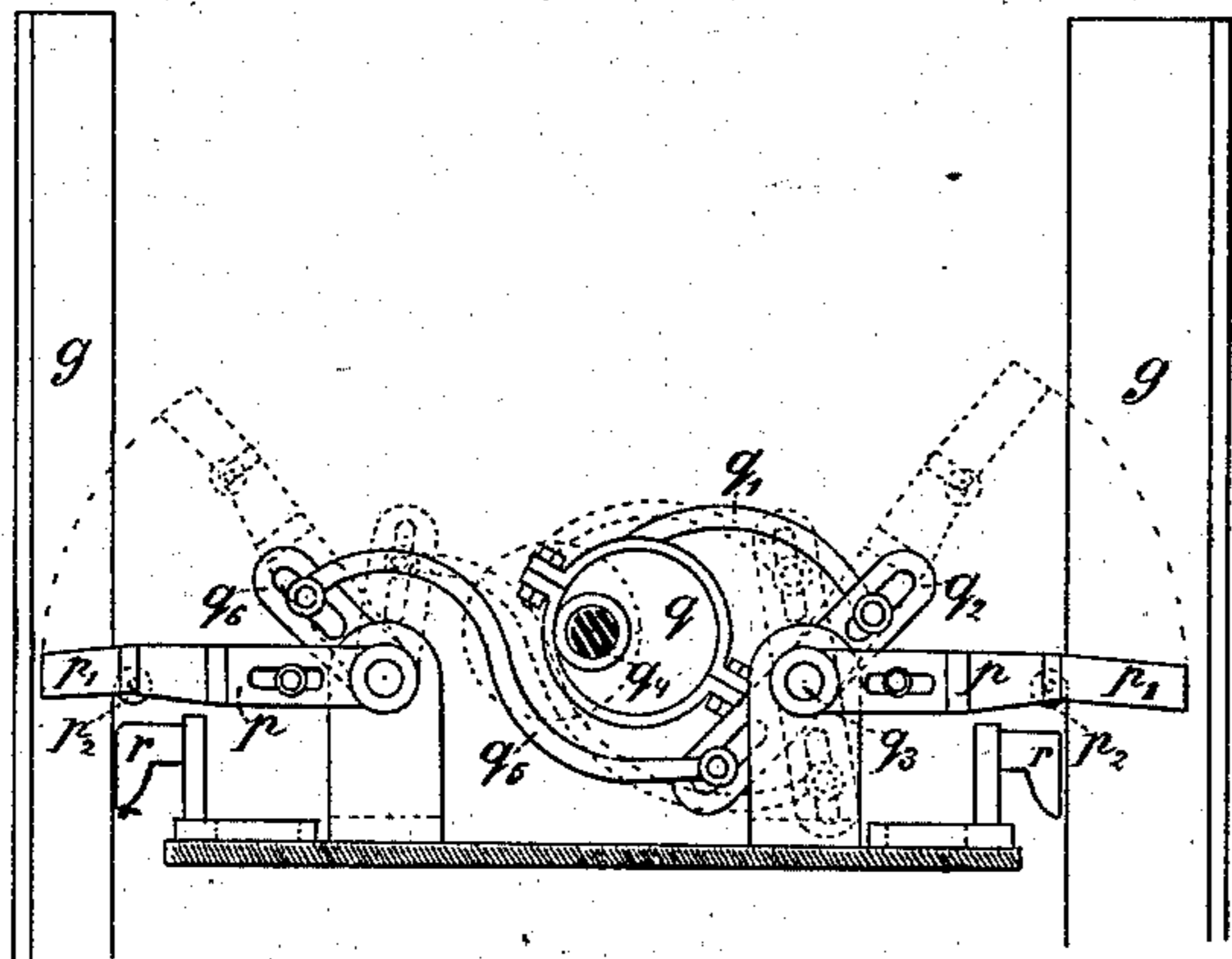


Fig. 29.

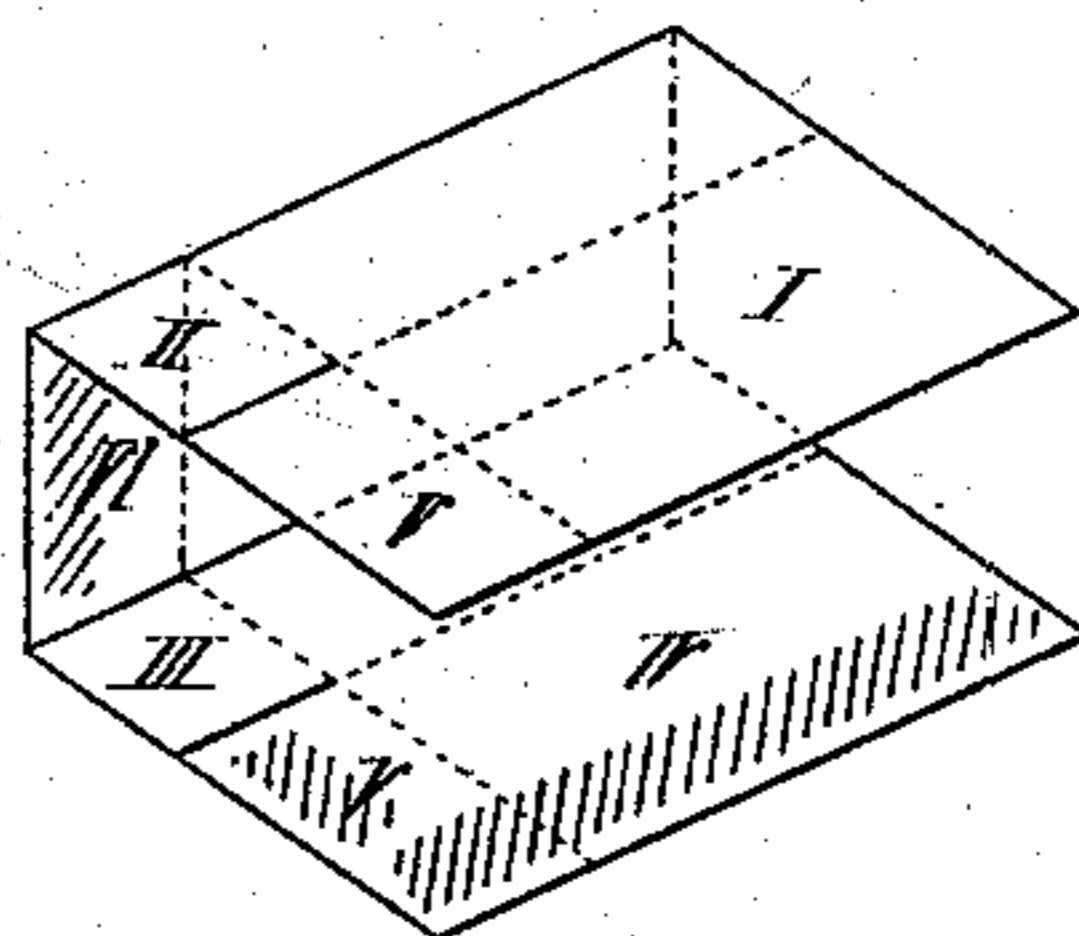


Fig. 30.

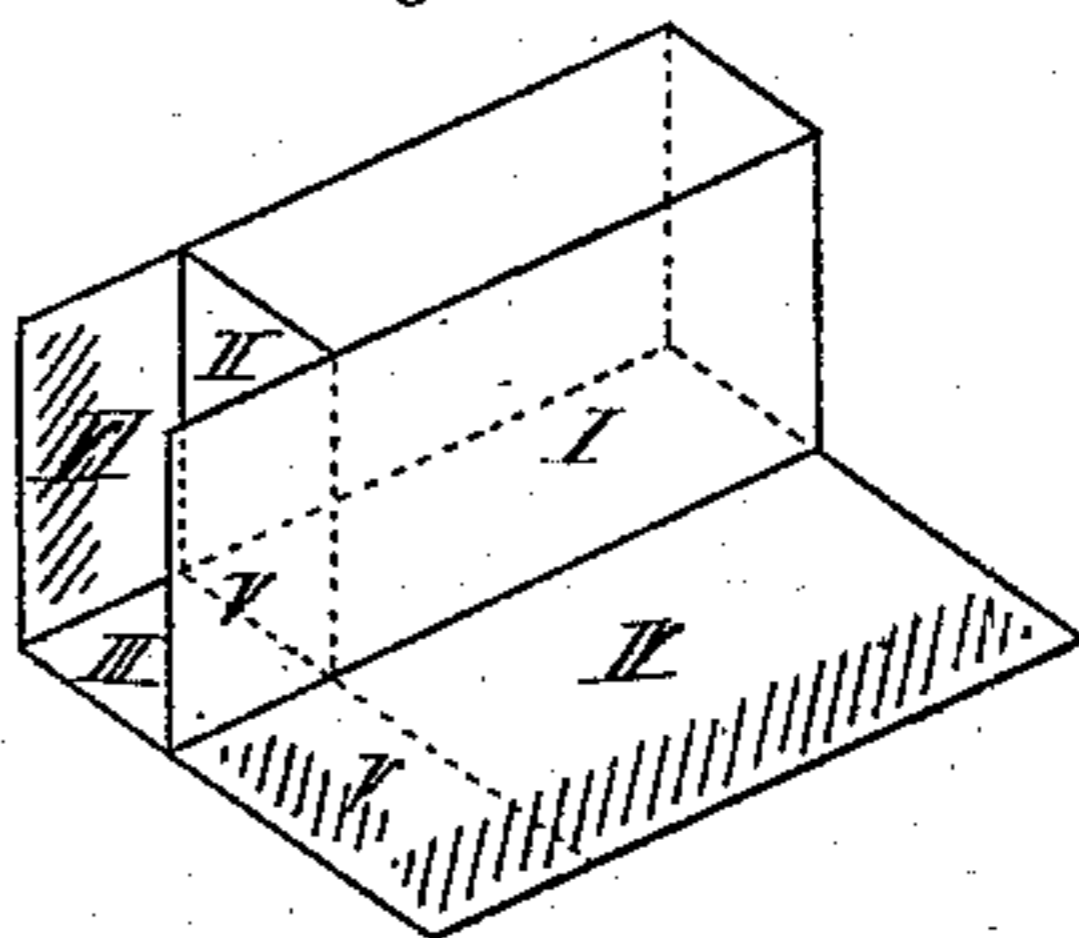


Fig. 31.

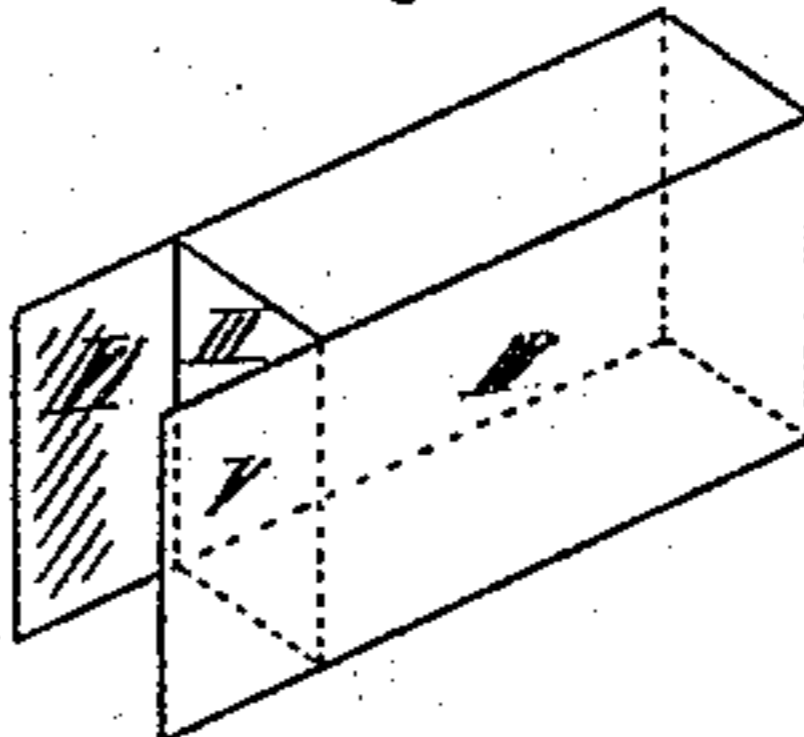


Fig. 32.

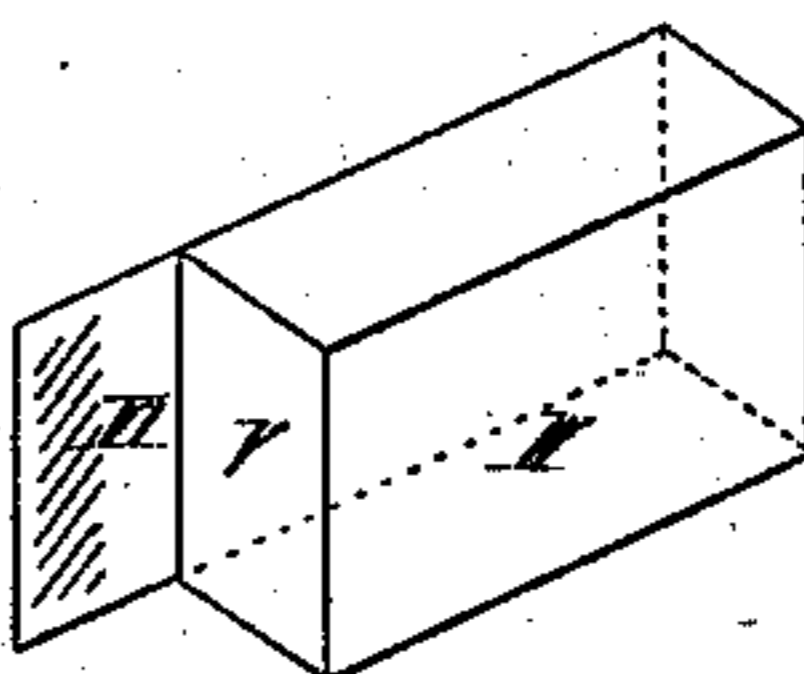


Fig. 33.

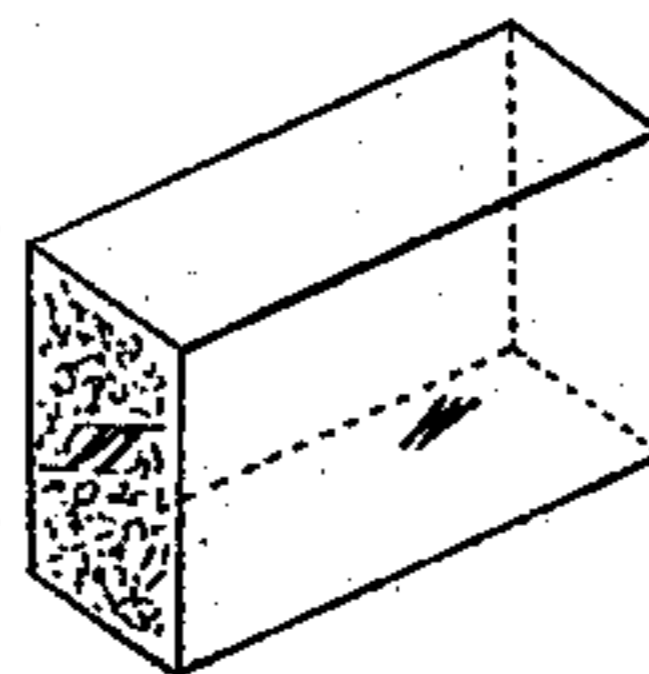


Fig. 34.

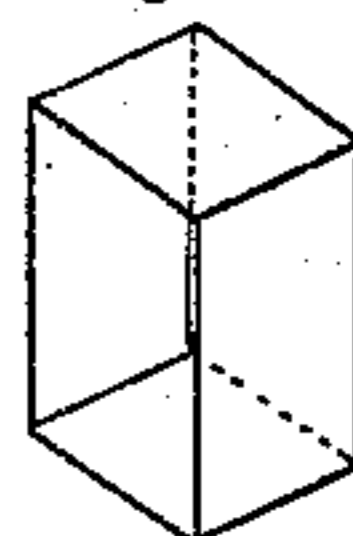


Fig. 13.

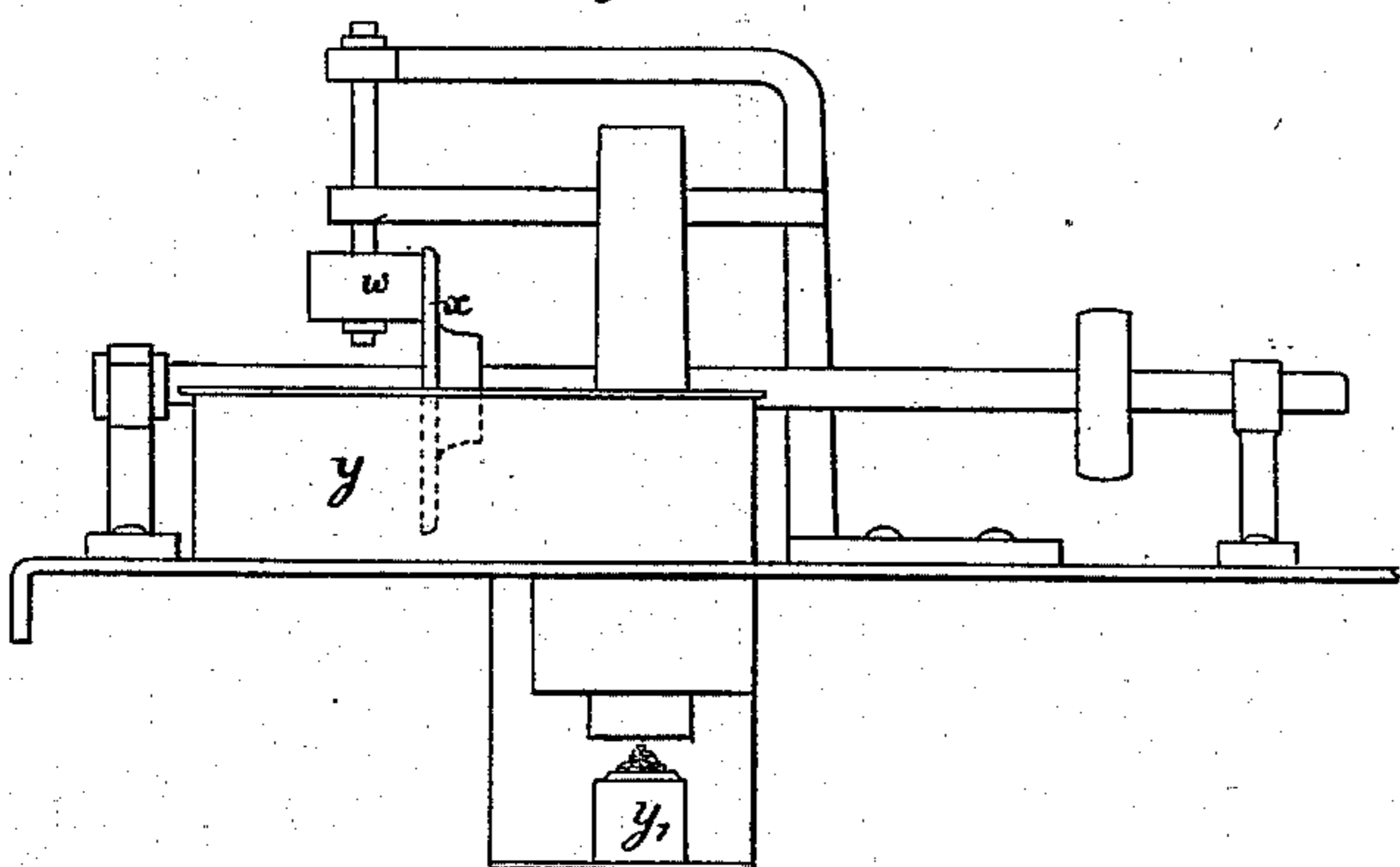


Fig. 14.

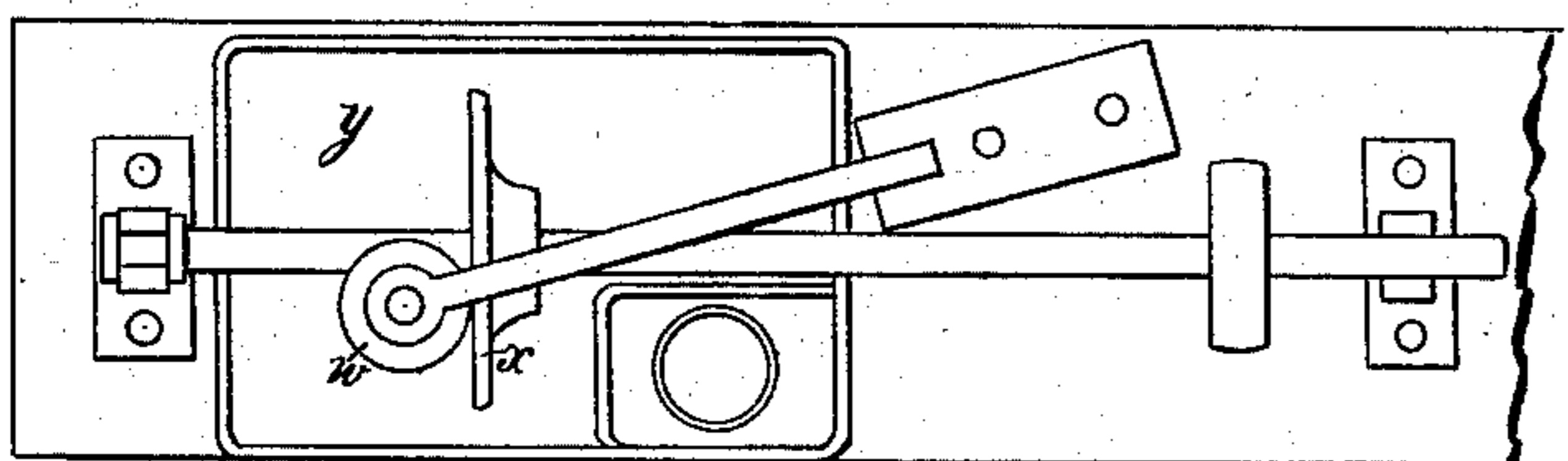
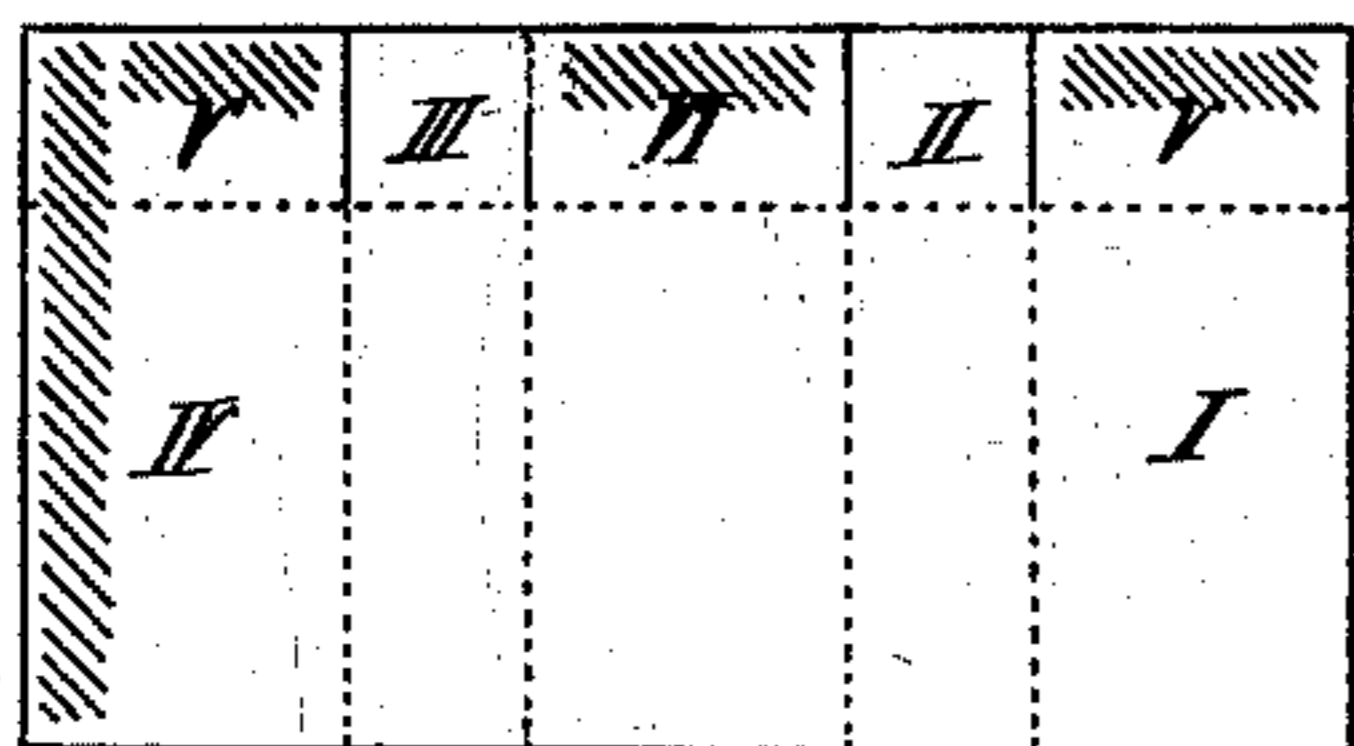


Fig. 28.



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Fig. 15.

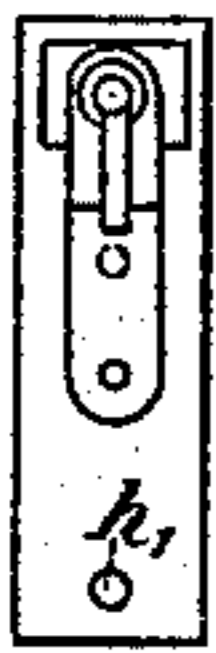


Fig. 16.

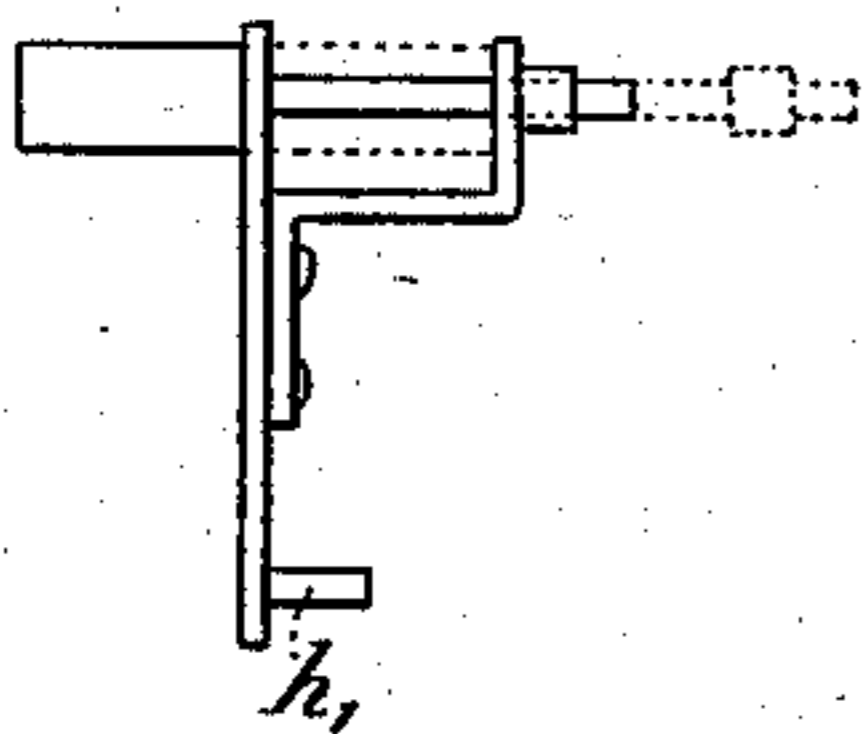


Fig. 17.

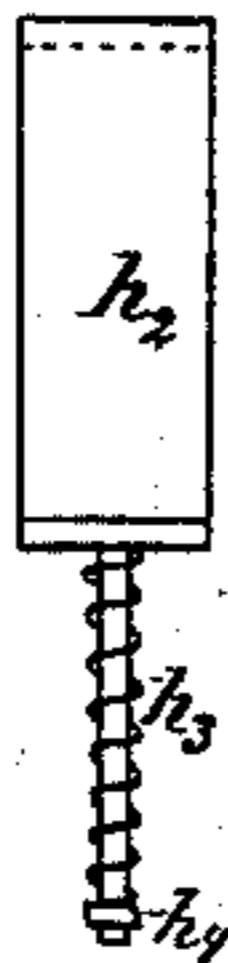


Fig. 18.

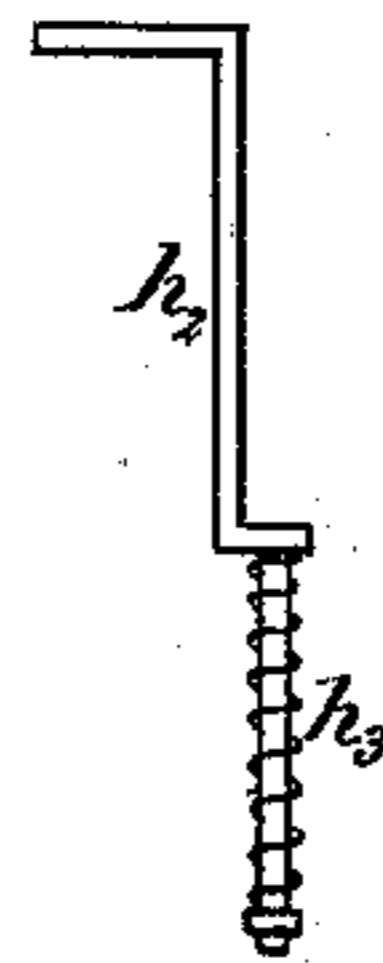


Fig. 19.

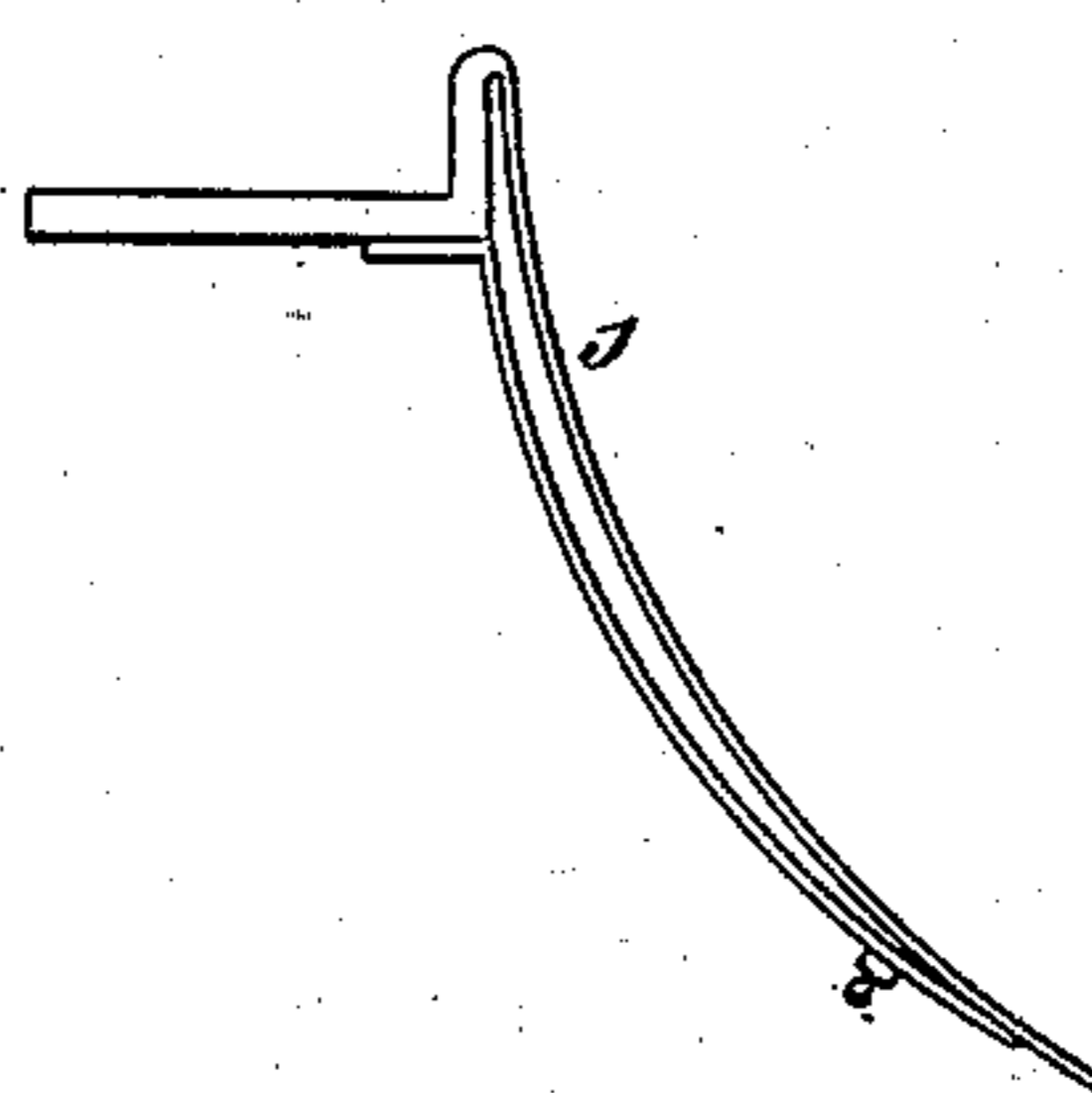


Fig. 23.

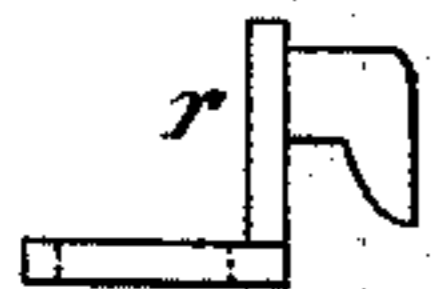


Fig. 24.



Fig. 25.



Fig. 20.

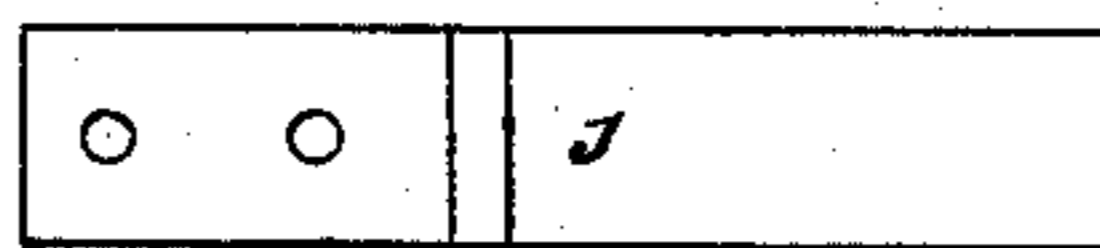


Fig. 21.

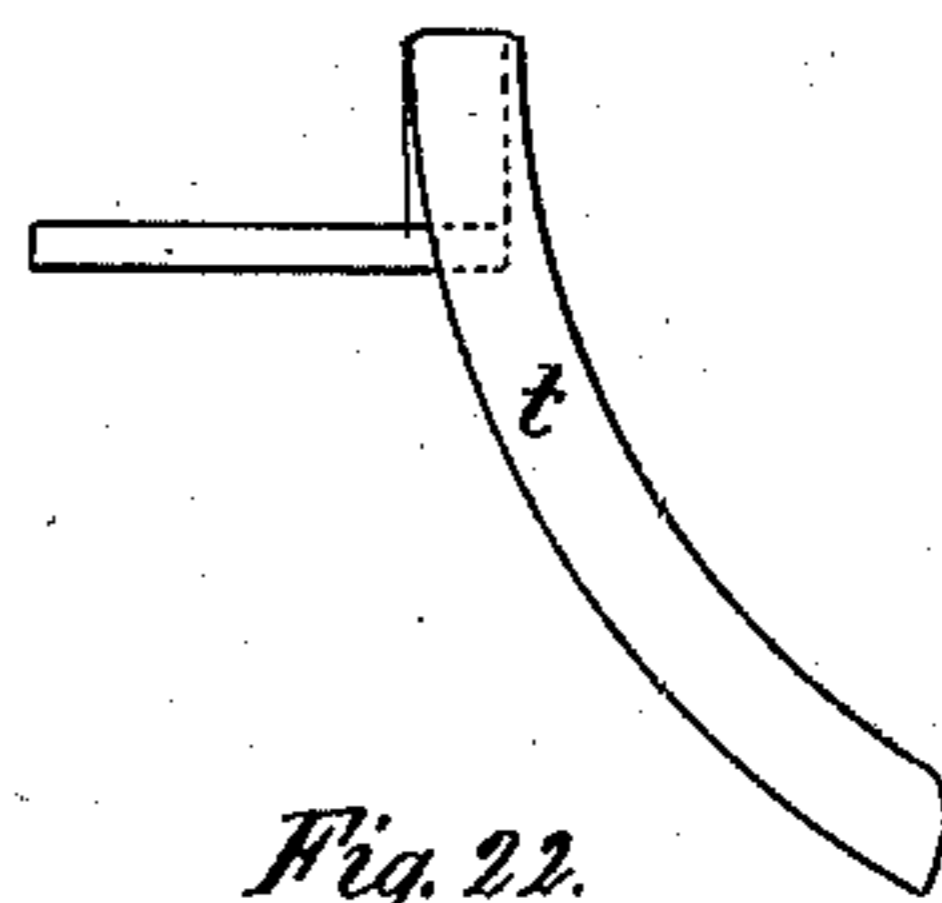


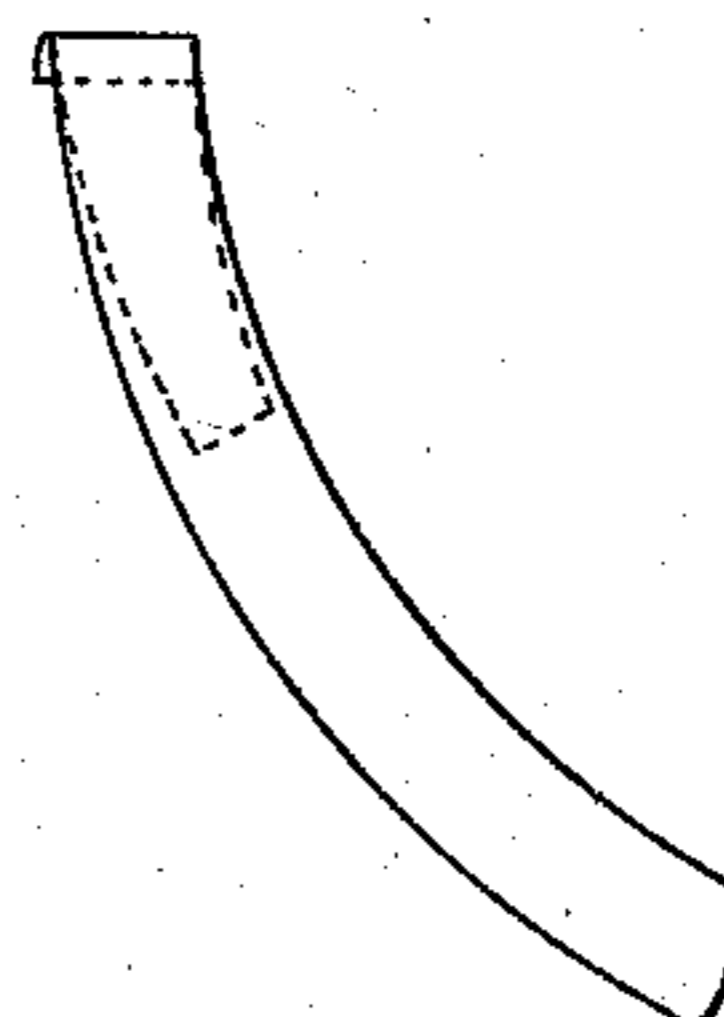
Fig. 22.



Fig. 26.



Fig. 27.



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UNITED STATES PATENT OFFICE.

CONRAD PRUNER, OF WIENER-NEUSTADT, AUSTRIA.

PAPER-BOX MACHINE.

SPECIFICATION forming part of Letters Patent No. 255,018, dated March 14, 1882.

Application filed November 2, 1881. (No model.) Patented in Austria September 18, 1880.

To all whom it may concern:

Be it known that I, CONRAD PRUNER, a citizen of the Empire of Austria, residing at Wiener-Neustadt, Austria, have invented new and useful Improvements in Paper-Box Machines, of which the following is a specification.

The object of my invention is to produce automatically boxes or tubes from paper, paste-board, or similar material by means of a suitably-arranged machine. The machine constructed for this purpose takes the material employed for the production of the boxes or tubes from a roll, prints it on any desired place, pastes the seams, cuts it, and folds the cut material into the desired shape. When match-boxes are to be made it applies paste to their bottom, covers it with sand, (thus forming the friction-surface,) and finally drops the so-finished box. In making other boxes or match-box covers the sanding apparatus may of course be omitted, as well as the printing apparatus, if so desired.

This invention is illustrated in the accompanying drawings, in which Figure 1 represents a side elevation of the machine. Fig. 2 is a plan of the same. Fig. 3 is a sectional elevation, the line $x x$, Fig. 1, indicating the plane of section and looking in the direction of the arrow opposite to that line. Fig. 4 shows the lever arrangement for actuating the cutters in a view corresponding to Fig. 1. Fig. 5 is a side view of the former-disk. Fig. 6 is a plan of the same. Fig. 7 is a section in the plane $x x$, Fig. 5. Fig. 7^a is a section in the plane $y y$, Fig. 5; Figs. 8 and 9, side view and plan of the paste-roller for the boxes; Figs. 10 and 11, the same for the box-covers; Fig. 12, section on the line $y y$, looking in direction of arrow Y in Fig. 2, showing the mechanism for the movable folders; Figs. 13 and 14, side view and plan of the pasting apparatus; Figs. 15 and 16, front and side view of a former and slide; Figs. 17 and 18, front and side view of spring counter-slide for pushing the former-slides toward the circumference of the former-disk; Figs. 19 to 27, the different folders for bottom and side flaps of the boxes in different views. Fig. 28 shows the form of a box-blank ready cut. The shaded parts indicate the places where the paste is to be applied. Figs. 29 to 32 are perspective views of the box in the different stages of manufacture. Fig. 33 shows a finished box, and Fig. 34 a finished cover for such box.

Similar letters indicate corresponding parts. 55

The machine operates in the following manner: The material taken from a roll, a , passes over guide-roll b through a printing apparatus, c , which prints a label, mark, or any design upon it. Then it passes to the paste-applying roller d , supplied by roller f with paste taken from reservoir e . Roller d , being suitably formed for this purpose, as shown in Figs. 8 to 11, applies paste to the box-blank on the proper places where the joints are to be formed. Upon reaching disk g the blank-strip, which is somewhat broader than the mandrel or former, is held by former h while cutters i and m make the required incisions for forming the bottom flaps. These incisions only penetrate in that part of the blank which serves to form the bottom of the box, and which part, while being thus cut, rests upon a circular plate, l , connected with the cutting apparatus k , Fig. 3. 60 65 70

Knife m cuts across the entire width of the material, thus dividing the endless strip into blanks of the required length. A blank thus prepared is shown in Fig. 28 on an enlarged scale, the full lines showing the incisions made by the knives, while the dotted lines indicate where the blank is to be bent in order to form the box. Arriving at n , Fig. 1, the former-slide and former, and with the latter the box-blank, are by the action of a pin, h' , which is guided in an irregular eccentric groove in the stationary disk or plate o , drawn into the corresponding recess of the former-disk g in such a manner that three sides of the former, as well as of the box to be formed around it, are in said recess of disk g , while the fourth side of the former is even with the circumference of the disk. Both ends of the blank, as well as the flaps which are to form the bottom, are still projecting over the side and circumference of the disk. By this first motion the blank has received the form shown in Fig. 29. An arm, p , (folder,) moved by eccentric q and lever device $q' q^2$, Figs. 2 and 12, upon the axis q^3 , folds, by its straight part p' turning down across and against the circumference of the former-disk—that is, in its downward motion from the position shown in Fig. 12 of the drawings by dotted lines into that drawn in full lines—the one side part I, Fig. 30, of the box, while the small roller p folds down the upper part or flap of the bottom, II, Fig. 30. The disk g moving on farther, the second (lower) bottom flap, III, Fig. 31, of the box is turned down by folder r and the second pasted side part, IV, Fig. 31, by 75 80 85 90 95 100 105

folder *s*. The oblique folder *t* turns down the third, V, Fig. 31, and folder *u* the last bottom flap, VI, Fig. 33. The last-mentioned four folders are fast to the frame of the machine, and have to each other and to disk *g* the position shown in Figs. 5 and 6. For the better illustration of their different forms, the folders are shown separately—*r* in Figs. 23 and 25, *s* in Figs. 19 and 20, *t* in Figs. 21 and 22, and *u* in Figs. 26 and 27. Pin *h'*, sliding in the eccentric groove of stationary disk *o*, Fig. 1, pushes the former-slide outward past a vertical past-roller, *w*, supplied by roller *x* with past or glue taken from cistern *y*. Paste is applied to the bottom of the box by said roller *w*. When glue is the adhesive material to be used, a lamp, *y'*, is placed beneath the cistern *y* in order to keep the same in a fluid state. The sanding apparatus *v*, through the orifice *v'* from which sand is continually flowing while the machine is in motion, sprinkles sand upon the glue or paste covered bottoms of the passing boxes or tubes to form the friction-surface for matches when the boxes are to be used for this purpose. Pin or crutch *z* of the former *h*, engaging with and following the curve of guideway *a b*, draws the former out sidewise from its slide, causing the finished box or tube shown in Fig. 33 to drop off. When the box has been removed and the former, by the continued rotation of disk *g*, arrives at the place where the strip of material touches the circumference of said disk *g*, the former is moved into its slide again by crutch *z* engaging with and moving along the upper guide-bar, *g d*, seizes the paper, draws it underneath the cutters, and so on, the process just described being repeated.

The machine shown, for example, in the annexed drawings is provided with two former-disks, each having a suitable number of formers and the devices appertaining to them. The object of having two disks is mainly, in making match-boxes, to form upon one disk the boxes, and simultaneously and consequently in like numbers the covers or caps on the others. Covers or caps generally requiring neither label-print nor sand, the printing, bottom-pasting, and sanding devices have been omitted on that side where they are made. The material for caps or covers is here taken from the roll *a*, fed by one or two guide-rollers, 1 2, under the past-roller, from there to the former-disk, and has only to pass the cutters and folders in order to be dropped as a finished cap (shown in Fig. 34) in the same manner as the box.

For the reception of the former-slides and their spring counter-slides, disk *g* is provided with a corresponding number of recesses or radial slots, as shown in Figs. 5 and 7. Plates *g'*, having the form of segments of a circle, are screwed on the sides of disk *g*, so as to securely guide the former-slides and to keep them in their places.

Figs. 15 and 16 show the former and slide in front and side view, the dotted lines indicating the position of the former when drawn aside. Disk *g* is mounted upon shaft 3, and

receives motion by gearing 4 through crank or pulley 5. A pin or stud, *h'*, fastened to the slide fits into the irregularly-curved slot or groove, Fig. 1, of stationary disk *o*, and, following its course during the rotary motion of the disk *g*, causes the former slides to be drawn in or pushed out.

To prevent the outer edge of the former, when its slide is drawn into the disk, from moving in beyond the circumference of said disk, the spring counter-slide *h²* is used, the exterior end of which is bent at right angles, the bent part reaching underneath the former. Spring *h³* continually tends to push this counter-slide outward toward the circumference of the disk. When, by continued rotation of the disk *g*, the former-slide arrives in its lowest position with reference to the machine, the former being drawn out sidewise leaves the disk entirely, and the action of the counter-slide *h²* ceases by the shoulder *h⁴* coming in contact with ring *h⁵*, fastened to disk *g*, which prevents it (the slide *h²*) from coming out beyond the circumference of the disk. The main object of this spring counter-slide is to press the former against folder *s*, when it (the former) is passing, in order to insure a better joining of the sides of the box or tube.

The cutting apparatus *k* (best seen in Fig. 4) consists of a long knife or cutter, *m*, preferably serrated, for cutting the material across its entire width, and of four or five short cutters or knives, *i*, for making the incisions for the bottom flaps. All of these cutters are adjustably fastened by nuts or otherwise upon a shaft, *k'*. This shaft turns in journals *k²* resting upon plates *k³*, fastened onto upright *k⁴*. Plates *k³* also support the circular plate *l*, upon which, projecting over the side of the disk, rests while being cut that part of the blank which is to form the bottom of the box. Motion is imparted to the cutters *i* and *m* by the lever arrangement *k⁵* and *k¹¹* in the following manner: Cam *k¹²*, Fig. 4, turning in the direction indicated by the arrow, acts on the sliding head *k¹¹*, moving the same to the left, thereby drawing the connecting-rod *k¹¹* and lever *k¹⁰*, which latter, through the shaft *k⁹*, raises lever *k⁸*, and as the latter is attached to the rod *k⁷*, which connects the levers *k⁶*, the latter will be elevated, thereby raising the levers *k⁵*, which effect the rocking of the shafts *k'* in their journal bearings or supports *k²*, so that the knives *i* and *m* are depressed or lowered to perform the cutting operation. When the lift of cam *k¹²* recedes from head *k¹¹* levers *k⁵* *k⁸* are free to return by their own weight to their old position, thus lifting the cutters up again. Should the weight of the lifting-levers not suffice to move them back, there is for this purpose a pin, *k¹²*, fastened to the side of cam *k¹²* in such manner as, on turning around with the cam, to engage with another pin, *k¹¹*, fast to the sliding fork of head *k¹¹*, and so to draw the latter back, moving the levers and raising the knives. A vertical rod, *k¹³*, movably connected on its

lower end with the extension of lever k^8 , and guided above by an upright, k^{14} , limits the downward motion of the cutter-actuating lever by its nut k^{15} touching upon upright k^{14} .

5 When the machine is in operation the disk g has a continuous rotary motion, and as the cutting of the paper or other material requires a certain space of time, a tearing of the material would be the consequence if the cutters
10 respectively of the whole cutting apparatus did not partake of the forward circular motion of the disk. To permit the apparatus making this circular motion along with the disk, the whole is, by upright k^4 , movably mounted upon
15 main shaft 3. Catches h^6 , Fig. 1, are fastened to disk g , so as to engage with the lever of cutter m when it descends to make a cut, carrying the whole cutting apparatus along, turning upon its axis 3. After the cut has been
20 made the knives are raised, lever m is disengaged from catch h^6 , and by rod k^{16} being acted upon by spring k^{17} the whole cutting apparatus is swung back into its original position; and at every fresh cut this proceeding is
25 repeated.

Fig. 2 shows a plan, and Fig. 12 a side view, of the device for operating lever p . Motion is imparted by eccentric q upon shaft q^4 . In this case, where two former-disks are used for
30 the purpose already mentioned, two levers, p , are of course required, and in order to raise and lower them simultaneously and uniformly they are connected with each other by straps q^5 and q^6 .

35 The sanding apparatus v , Figs. 1 and 3, consists of a box or casing fastened to a plate, v^2 , in which box turns a bucket-wheel, v^3 . The apparatus works automatically in the following manner: On turning the shaft v^4 , upon the
40 end of which, reaching into the sand-box, the bucket-wheel is fast, the latter also revolves. The buckets, dipping up the sand which had previously been poured into the box through funnel v^5 , deliver it on reaching the top into
45 funnel v^6 , from where it runs out through orifice v^7 , and there covers the bottoms of the boxes as they pass. The superfluous sand runs through funnel v^7 back into the box, to be dipped up again. The bucket-wheel shaft receives motion from shaft d^2 by pulley v^8 and d^1 . d^2 is the shaft of the paste-roller d .

For printing the box-blanks any kind of press may be used and be operated by suitable gearing.

55 All parts and devices above described are so connected with each other that all may be driven by a single crank or pulley, as shown in the drawings.

The blank-strips for the boxes or tubes to be
60 made are obtained by cutting up a broad endless roll of material into a number of strips of the required breadth.

In conclusion it must be remarked that the machine herein described may be used for
65 making boxes or tubes of any size and almost any shape by simply exchanging the former-

disks, formers, and paste-rollers for others corresponding to the desired shape and size.

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

70 1. In a machine for making boxes or tubes from paper, pasteboard, or other suitable material, a former-disk, g , provided with a number of recesses or radial slots, in combination with formers and former-slides h and spring
75 counter-slides h^2 , fitting into and sliding in the slots of said disk g , a stationary disk or plate having on its side an irregular eccentric groove moving by pin h' , the former-slides in the slots of the disk g , a folder or presser-arm, p , operated by suitable mechanism, and four stationary
80 folders or pressers, $r s t u$, for the purpose and substantially as herein described and shown.

2. In machines for making boxes or tubes from paper, pasteboard, or other suitable material, the combination, with former-disk, g , of
85 a cutting apparatus, k , consisting of a number of cutters or knives, $i m$, for cutting the paper or other material while resting upon the circumference of disk g , and of a device, substantially as described, for operating said cutters,
90 the whole cutting apparatus being loosely mounted upon shaft 3 of disk g , so that when engaged by catches h^6 of said disk it will move or swing in the same direction as disk g , for
95 the purpose and substantially as described.

3. In a machine for making boxes of paper or other material, the combination of a pasting apparatus consisting of a roller, w , for applying
100 paste or other adhesive substance to the bottoms of the boxes or tubes, a second roller, x , for taking paste or other adhesive substance from a reservoir or receptacle and feeding it to roller w , and a lamp underneath said receptacle for keeping the glue, when such is used, warm
105 and soft, with an automatic sanding apparatus consisting of a stationary box and a bucket-wheel revolving inside of the same, for sprinkling sand upon the bottoms of the passing boxes, the superfluous sand falling back into
110 the sand reservoir or box, to be used over again, substantially as described.

4. The combination, in a machine for making boxes or tubes from paper, pasteboard, or similar material, of a paste-roller provided with
115 paste, applying ribs and segments, a former-disk, g , with slides and formers for holding and shaping the material, a cutting apparatus which cuts off the blanks and makes the necessary incisions for forming the bottom flaps,
120 a movable folder or pressure-arm, and four stationary folders or pressers for folding the ends and bottom flaps of the blank, all substantially as described and shown.

In testimony whereof I have hereunto set
125 my hand and seal in the presence of two subscribing witnesses.

CONRAD PRUNER. [L. S.]

Witnesses:

ROBT. B. JENTZSCH,
HANS KOTTAS.