

M. SOBLIK.

METHOD OF AND APPARATUS FOR DUPLICATING TYPE WRITTEN DOCUMENTS.

APPLICATION FILED APR. 9, 1907.

914,464.

Patented Mar. 9, 1909.

3 SHEETS—SHEET 1.

Fig. 1.

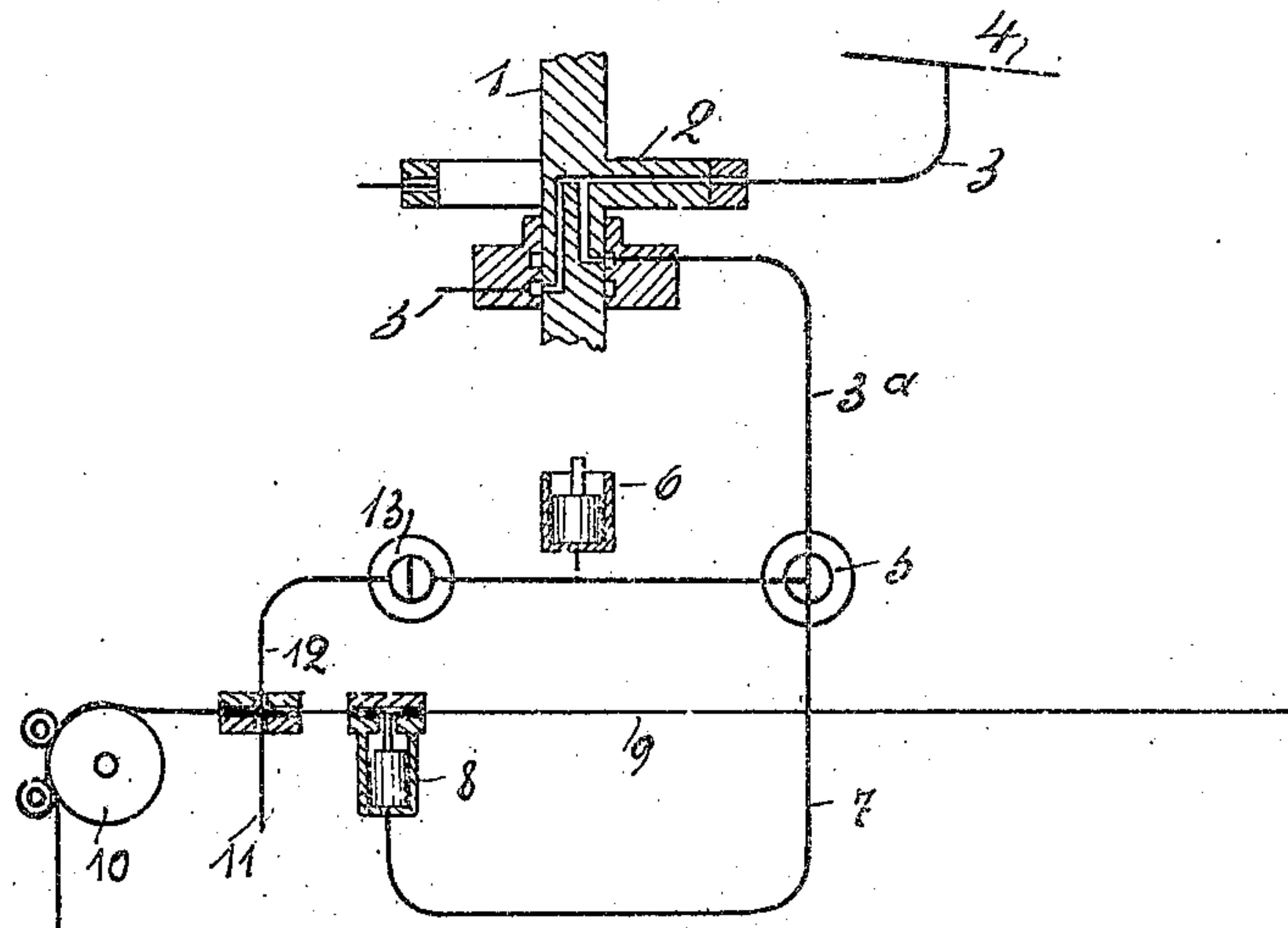


Fig. 2.

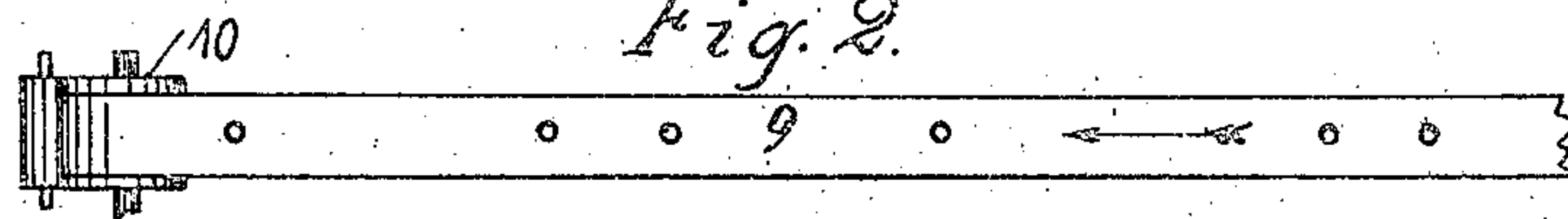


Fig. 3.

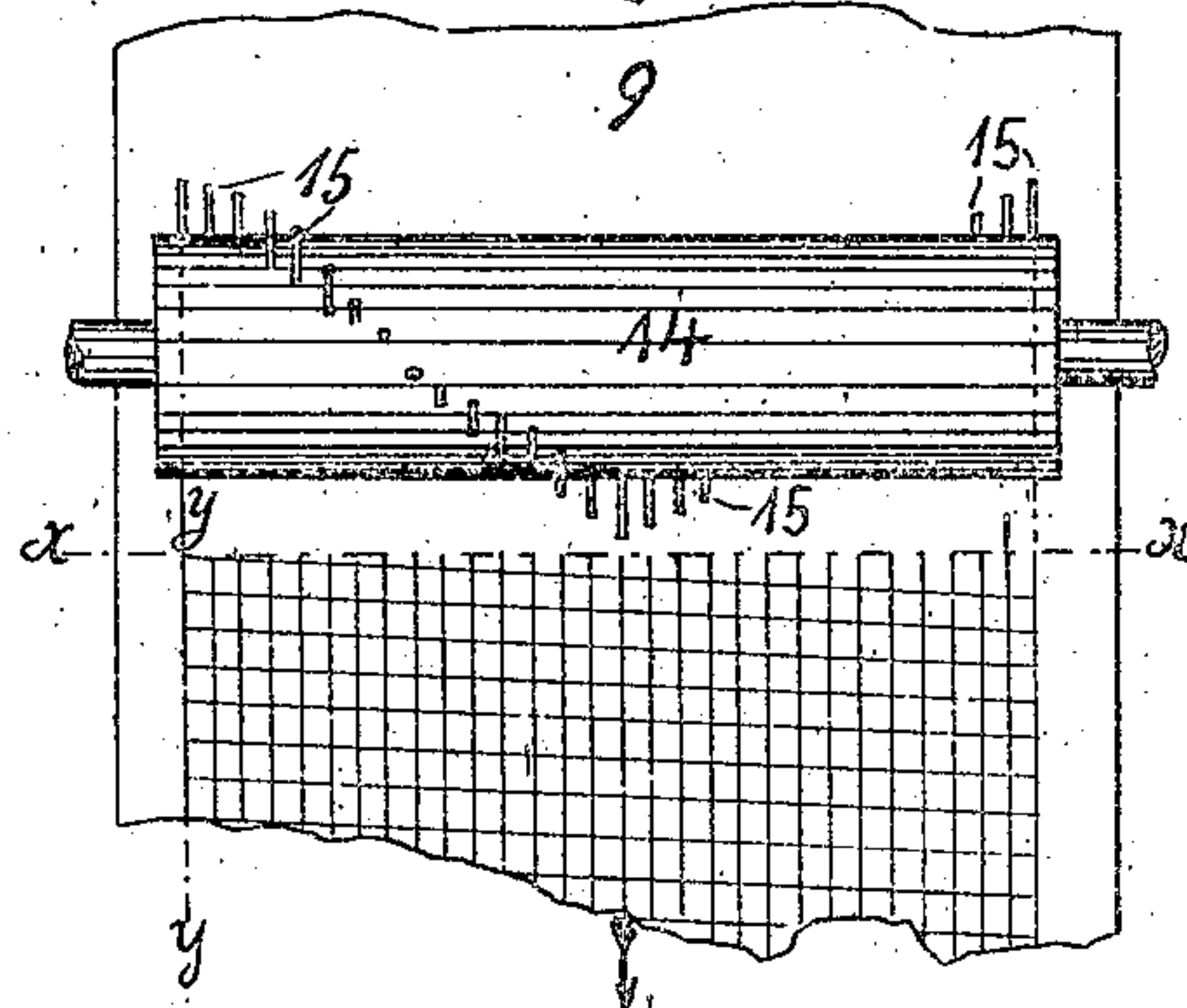


Fig. 4.

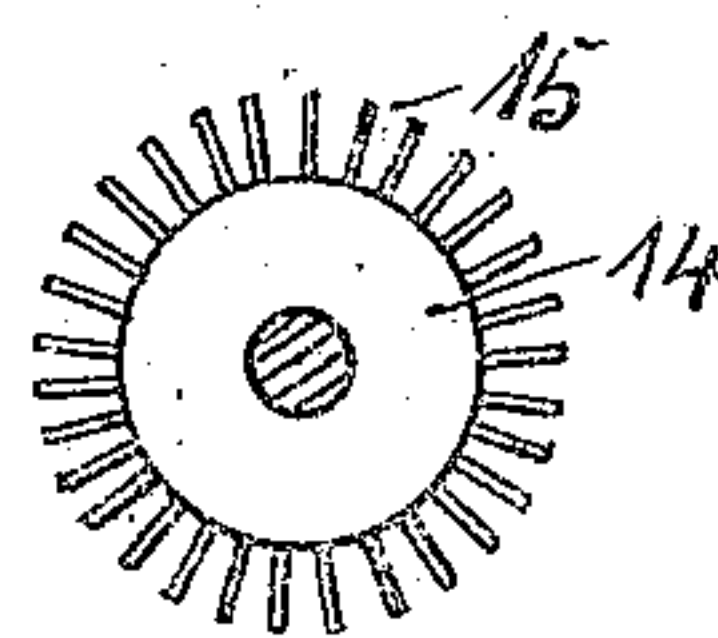
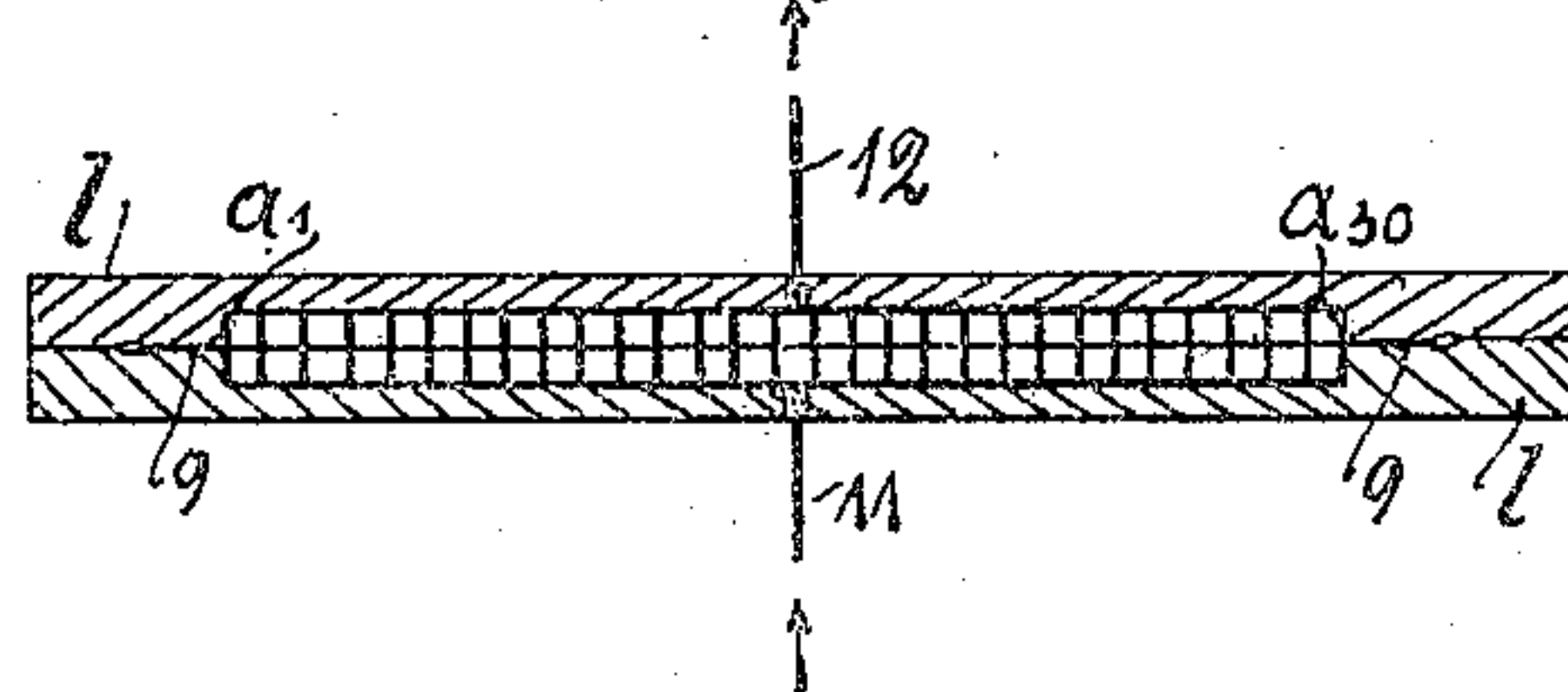


Fig. 5.



WITNESSES;

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3 SHEETS—SHEET 2.

Fig. 6.

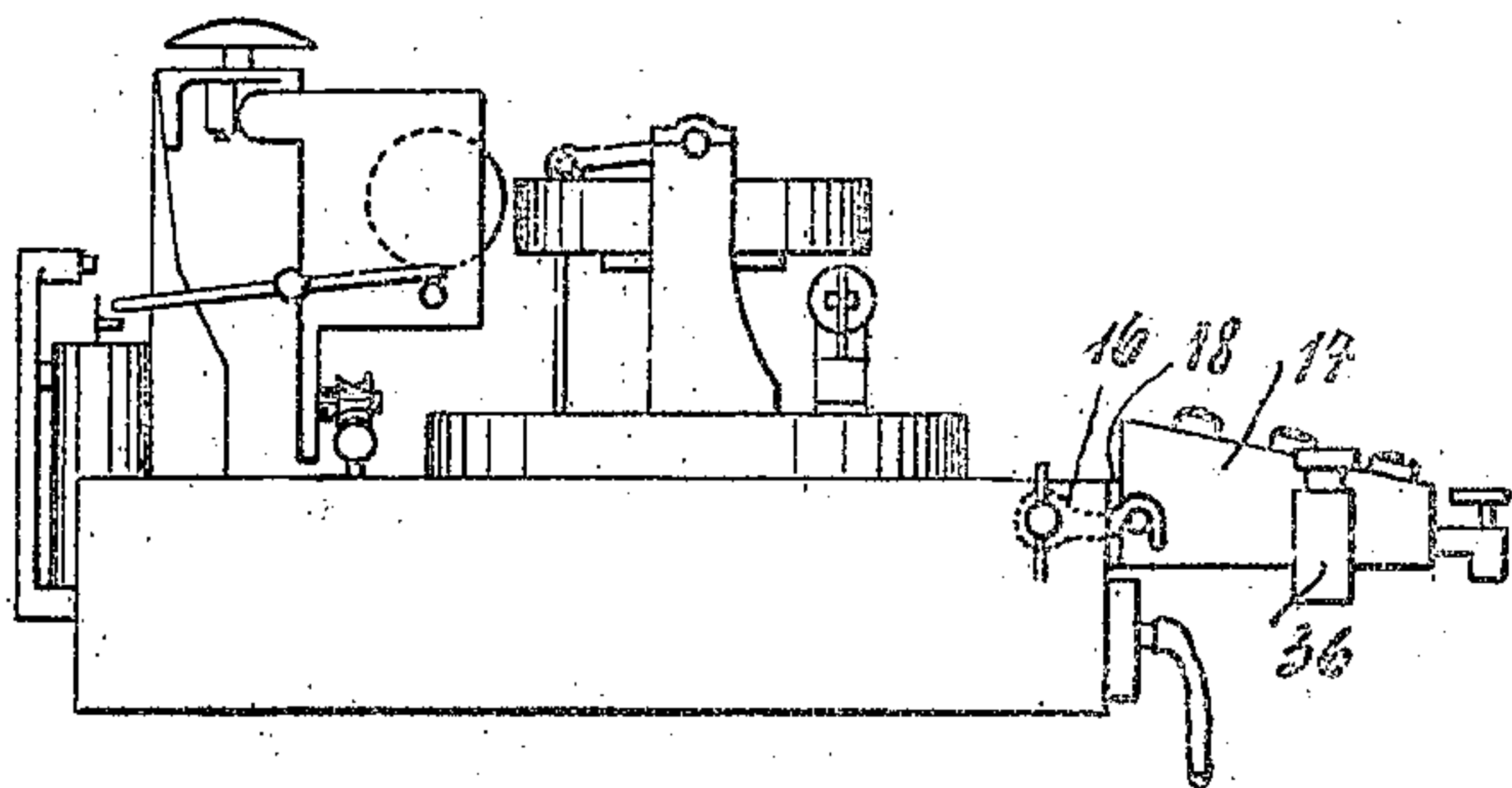


Fig. 9.

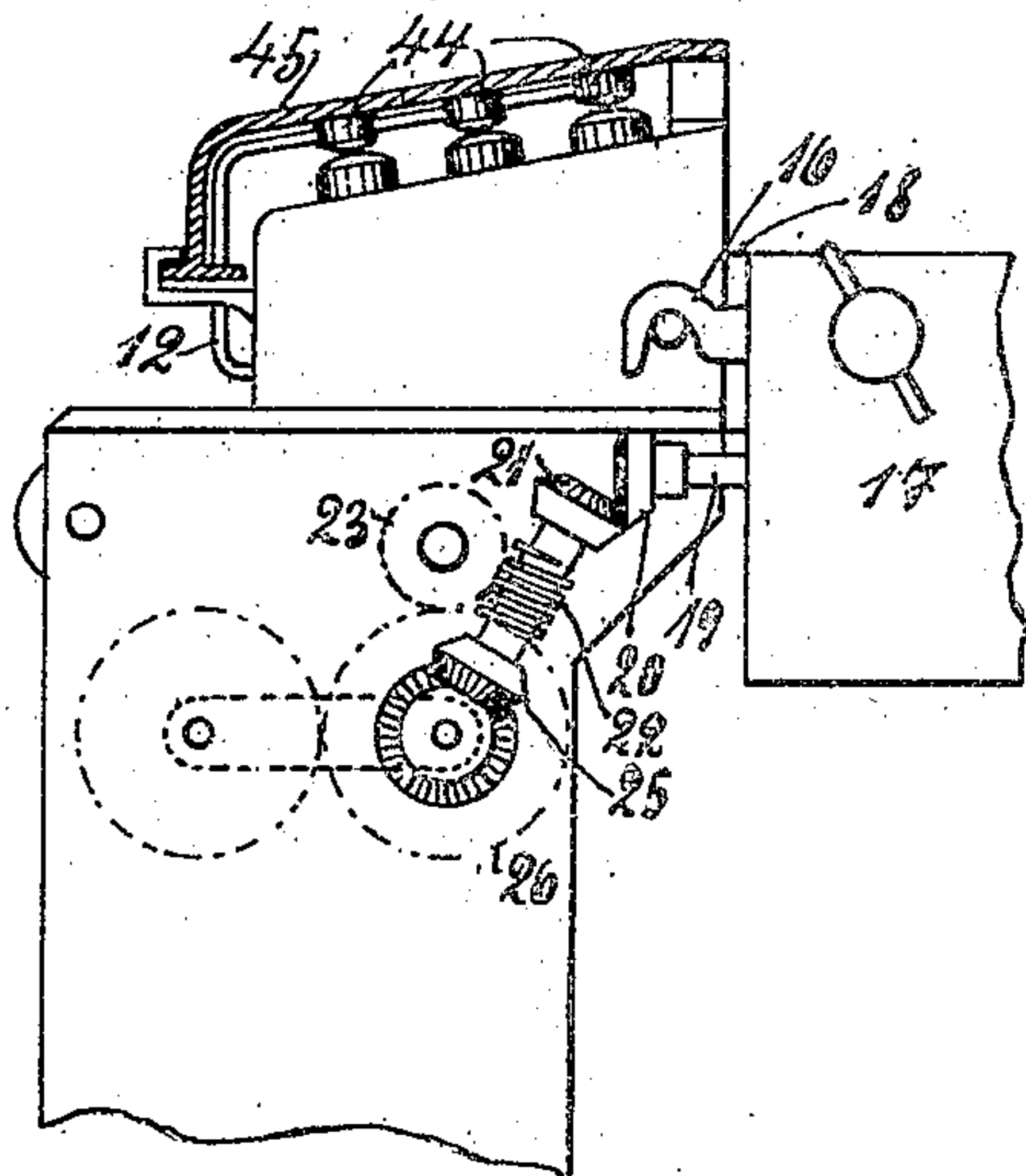


Fig. 10.

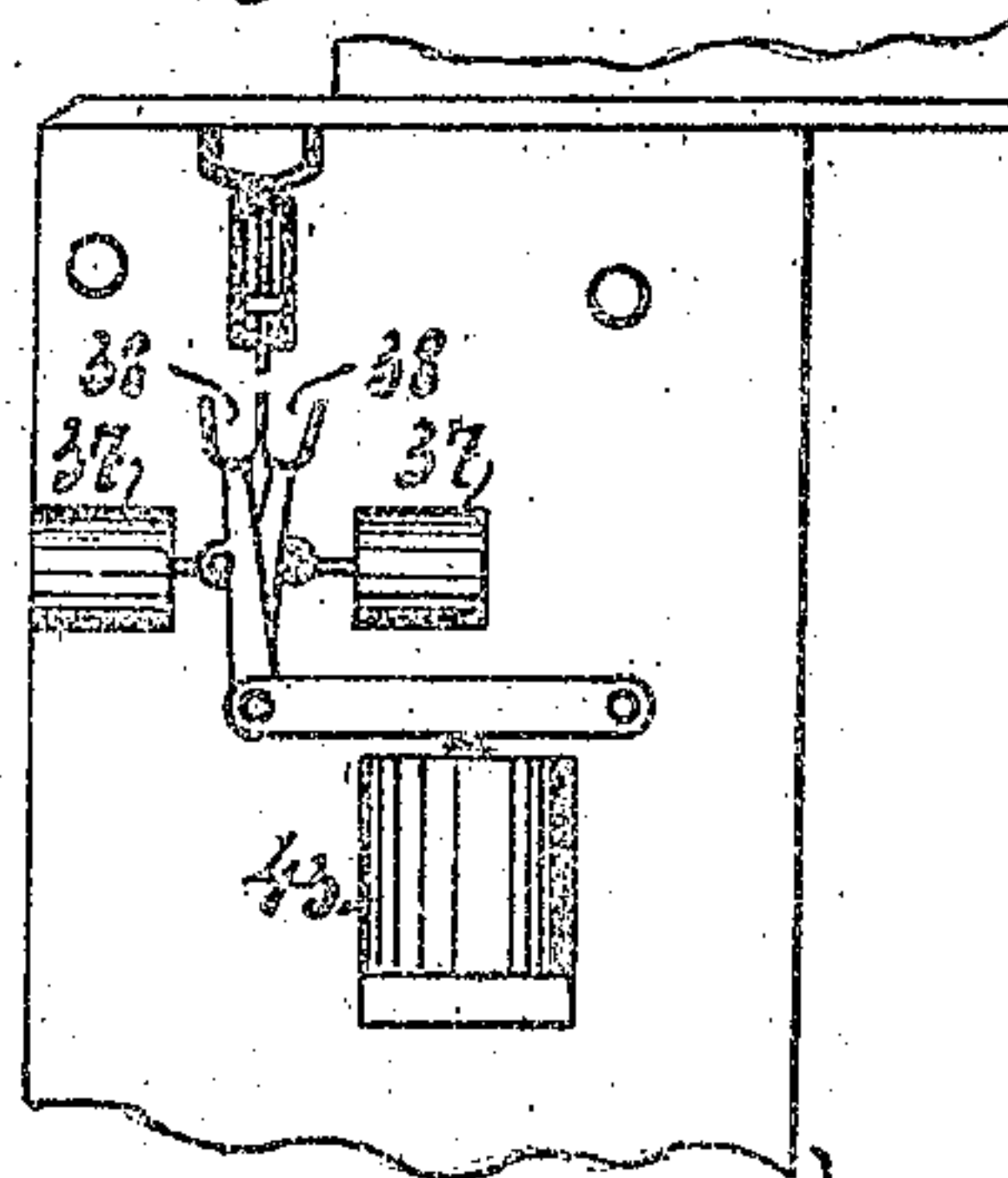
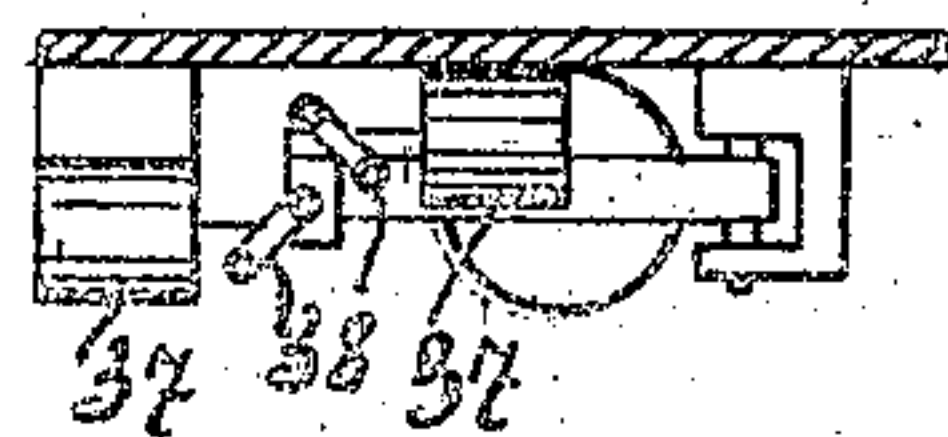


Fig. 11.



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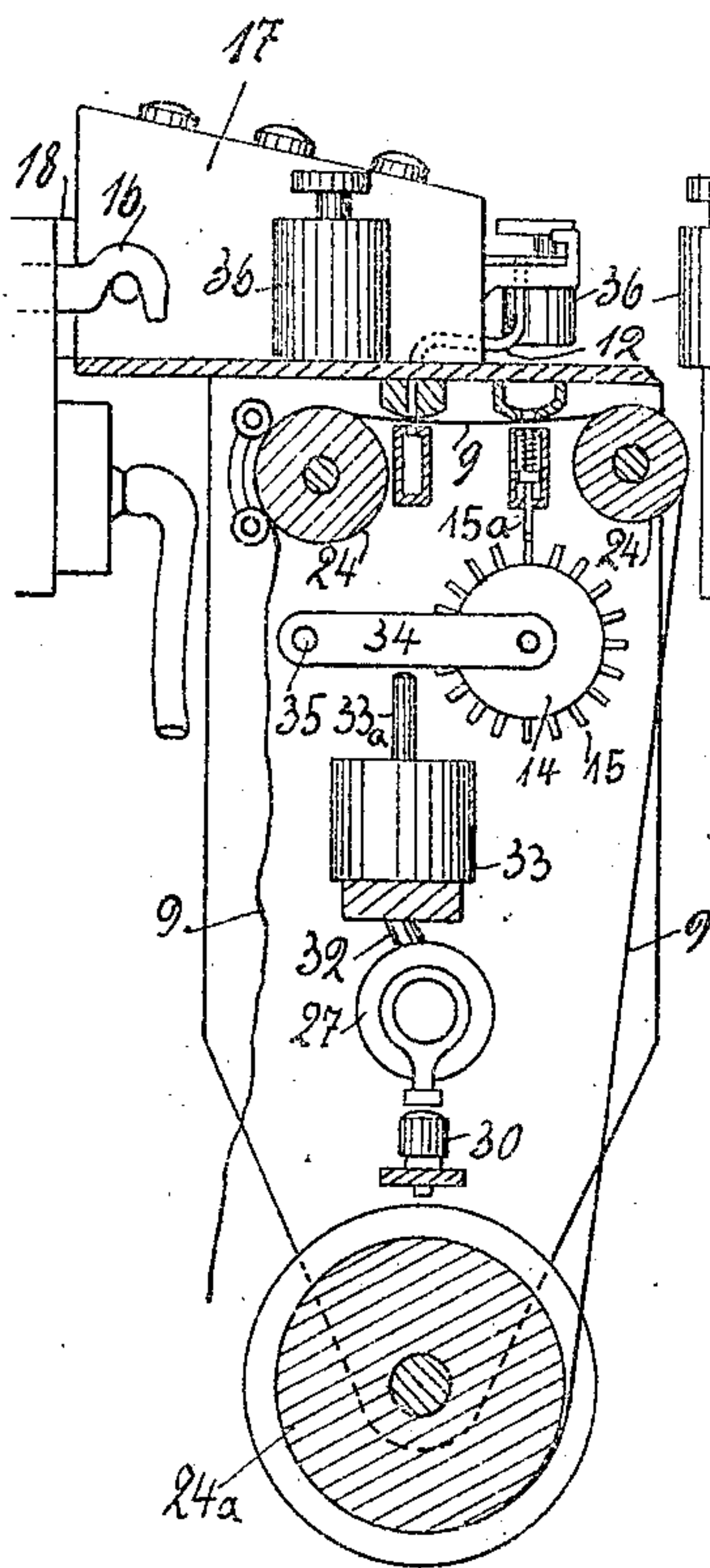
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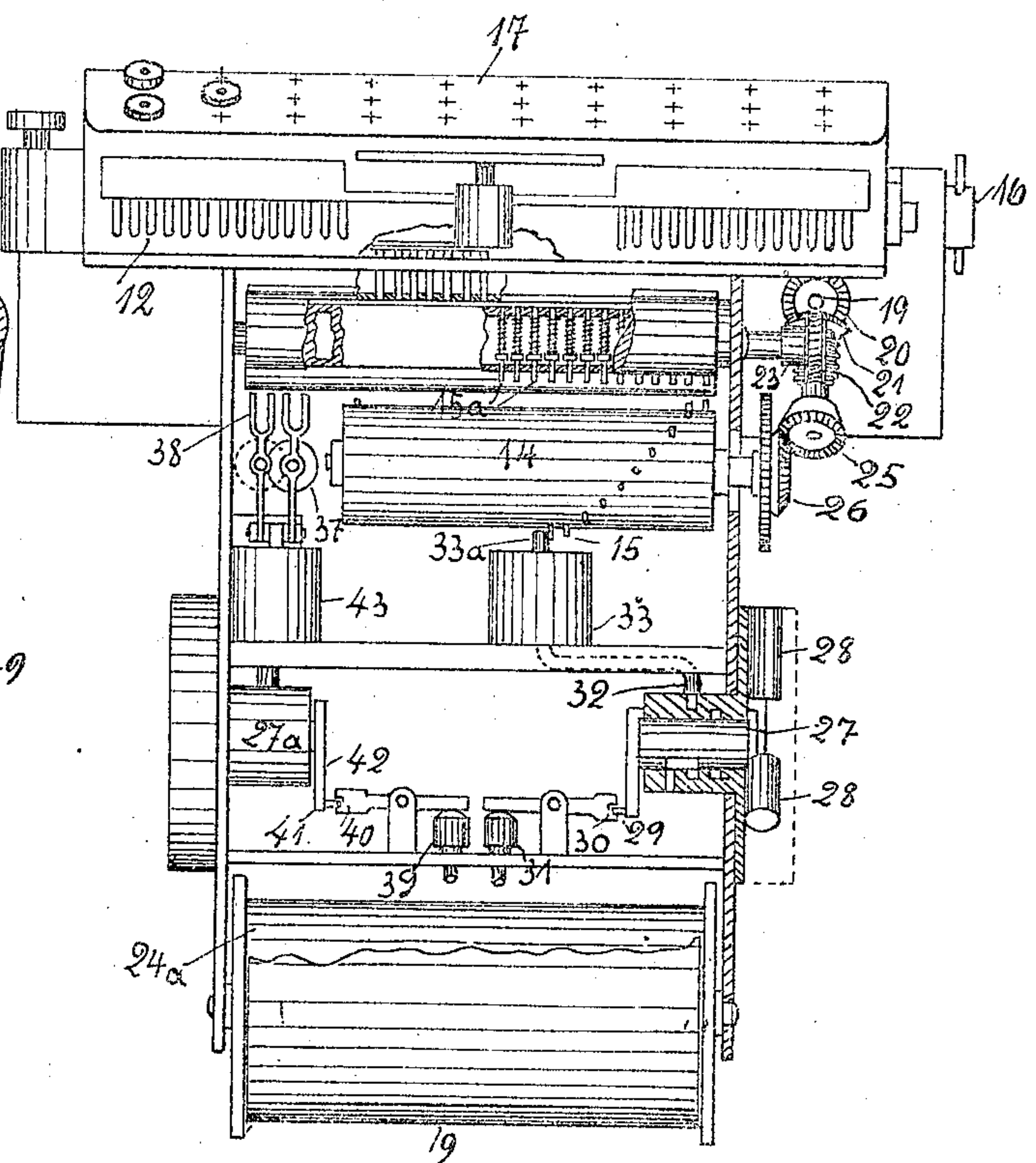
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*Fig. 7.*



*Fig. 8.*



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# UNITED STATES PATENT OFFICE.

MAX SOBLIK, OF DUSSELDORF, GERMANY.

METHOD OF AND APPARATUS FOR DUPLICATING TYPE-WRITTEN DOCUMENTS.

No. 914,464.

Specification of Letters Patent.

Patented March 8, 1909.

Application filed April 9, 1907. Serial No. 367,246.

*To all whom it may concern:*

Be it known that I, MAX SOBLIK, a subject of the Emperor of Germany, and resident of Dusseldorf, Germany, have invented a certain new and useful Improvement in Methods of and Apparatus for Duplicating Type-Written Documents, of which the following is a specification.

This invention relates to improvements in and relating to pneumatically operated typewriting machines of the kind described in U. S. Patents Nos. 859,203, 878,590 and 757,068.

In the known processes for automatically duplicating a writing by means of a perforated strip serving as a stencil which is produced by the typewriter when writing the copy to be reproduced, a hole must be provided in the stencil for every sign, the holes corresponding to the same sign being in a row running parallel to the direction of travel of the paper strip. For this reason there are as many perforating devices as there are signs. These perforating devices lie adjacent to one another in a line across the line of travel of the strip of paper for producing the stencil. On every transverse line there is a perforation. The strip of paper is advanced for the following sign to the extent of two transverse lines, which necessitates the use of a great amount of paper.

According to the present invention this object is attained by other means with pneumatic typewriters with constantly rotating type carriers, namely, by the stencil paper being simultaneously moved with the rotation of the typewheel and to the same extent as the latter (that is to say, not, as formerly, step by step with every type impression) so that at every stroke of the type a perforation is produced in a section of the paper strip corresponding to the amount of the relative rotation of the typewheel. In the known manner compressed air serves to rotate the typewheel and also to drive the strip of paper to be used as the stencil, as well as the perforation device.

This invention, illustrated in the accompanying drawings, is based on the above-mentioned fundamental ideas.

Figures 1 and 2 show diagrammatically the means for carrying out the invention. Figs. 3 and 4 show a modification. Fig. 5 shows a detail for carrying out the herein-described method in reproducing a writing. Fig. 6 is a side elevation of a Soblik type-

writer with its ordinary keyboard, to which the invention is applied. Figs. 7 and 8 show partly in section a side and a front elevation of the device for carrying the improved method into effect. Fig. 9 is a part side elevation of the typewriter with a special keyboard (shown in section) for mechanically operating the ordinary keyboard, when a writing is being reproduced. Figs. 10 and 11 show the device required for the automatic return of the paper carrier and its movement.

In Fig. 1, 1 denotes the axle of the typewheel of a typewriter of the kind described with the wing 2, which is fed by a system of tubing 3 with air, which air is delivered in the known manner from the keys of the board 4. The closing of one end of the tube will cause an increase of pressure in the branch tube 3<sup>a</sup> which at the position of the three-way cock, as shown in the drawing, causes the piston of the stopping cylinder to make a stroke, to stop the typewheel and thus in known manner to print a character. At the same time, however, there will be an increase of pressure in the tube 7 which also branches off from the three-way cock. The tube 7 leads to the perforating cylinder 8. Thus in striking a character this is at the same time recorded by a perforation in the paper strip 9 moved over its roller 10 in correspondence with the typewheel which is coupled with it by a transmission device.

In Fig. 2 the perforations produced denote for example the German word "schreib." Assume this word to be produced, then on setting the typewheel and the paper strip to the zero point and on starting the machine again the air entering the stencil holes at 11 whenever one passes is forced into the tube or pipe 12, which, when the cocks 13 and 5 are in the position shown in the drawing, cause the cylinder to make a stroke and in so doing to stop the typewheel, in order to print a character.

In the arrangement above described the stencil holes are in one line. This, however, would necessitate with lengthy writings a considerable length of paper strip. In order to reduce this length another mode of carrying that fundamental method into effect is provided as shown in Figs. 3, 4 and 5, in which the perforating device is not stationary as in Fig. 1 but is moved so that the perforation progresses in lines across the strip and not lengthwise thereof, and after



every typewheel revolution a new line of perforations beginning from the initial point at the left in Fig. 8 is commenced. For this purpose the perforating device consists of a roller 14 placed across the strip, revolving simultaneously and proportionately with the typewheel and equipped with pins 15, which are arranged in a spiral row around the roller (Figs. 3 and 4). As the paper strip progresses in the direction of the arrow Fig. 3 the stencil holes appear at intersecting points of parallel lines (being the result of the advance of perforations across the strip and of its longitudinal advance) and longitudinal lines  $y-y$  lying in planes through the striking pins vertically to the roller. In this method the paper strip requires, assuming there are 30 characters on the typewheel's circumference, a width 30 times as large as that in Fig. 1, but only a length 30 times smaller, since after every revolution of the typewheel the striking pin placed where the spiral line commences returns to its perforating position on the extreme left hand line. The above-mentioned word "schreib" will now with this form of the method appear on the wide paper strip as indicated in Fig. 8 by the trace of perforations s-c-h-r-e-i-b, if the vertical lines  $y-y$  are named in alphabetical order from the left to the right. The coördinate  $w-w$  parallel to the perforating roller axle corresponds to a total typewheel revolution, and the same types have the same vertical line. The lines  $y-y$  vertical to the roller axle and to  $w-w$  are dividing lines of the typewheel revolution and the pitch lines, these latter representing the line of travel described by the point of perforation. These, together with the coördinate  $w-w$ , being according to the geometrical rule of similarity of triangles intersected at proportionate sections by the parallel lines  $y-y$ , the perforating points of equal types coinciding with the intersecting points must in consequence of the transmitting connection of the typewheel with the roller always fall in the same vertical lines  $y-y$ . In the reproduction by means of a perforated stencil paper thus produced, the air pressure pipe 11 terminates, as shown diagrammatically in Fig. 5, in 30 branches  $a^1-a^{30}$ , one for every character of one typewheel section, which for the passage of the paper strip 9 are bisected and held together by two bars and connected again to one pipe 12 in the upper bar.

From Fig. 6 it is clear that by the eccentric hook 16 the usual keyboard 17 can be detached from the typewriter and replaced by the device Figs. 7 and 8 for perforating and reproducing. In doing so, the tubing of the machine on the one hand is connected to the tubing 12 of the device by an elastic plate 18, and on the other hand the type-

wheel is coupled by the spindle 19 with the rollers serving for advancing and perforating the paper strip wound off from the supply roller 24<sup>a</sup> over the two guide rollers 24. As shown in Fig. 9, the spindle 19 carries a bevel wheel 20 meshing with the bevel wheel 21. 22 is a screw engaging the worm 23 fixed to the roller 24 for advancing the paper strip. The pair of bevel wheels, 25-26, rotate the perforating roller 14. This latter may be struck either directly on the paper strip or it may, as shown in Figs. 7 and 8, transmit the stroke to the punching pins 15<sup>a</sup>. The perforating device 8 or 14 can also be worked by an intermediate apparatus instead of being actuated directly by the stopping cylinder 6. For this purpose a small compressed air motor is used, which is formed by three small cylinders 28. The rotation of the motor is regulated by the catch 29 of the stopping arm 30. The catch can on printing a type be released by a membrane 31 connected with the cylinder 6, which causes the rotary disk 27 to quickly revolve once. This rotary disk for a moment sends compressed air into the cylinder 35 by means of the pipe 32 and gives by means of its piston rods 33<sup>a</sup> a stroke to the perforating device 8 or 14. The perforating roller 14 is provided with a lever 34, with pivot 35, which carries the roller in bearings. Thus on actuating the cylinder 33 the lever is struck against the punches 15<sup>a</sup>.

Figs. 10 and 11 show the device which by perforation records the movements for the paper carrier's return to a new line and for its shifting. These movements are effected by depressing small slides 36, which admit compressed air into certain working cylinders. The cylinders communicate by means of pipes with the cylinders 37 (Fig. 10) and the pistons of which cause the forks 38 to change their position when put under air pressure. In this case also the device 27, 28, 29 and 30 already described for punching the holes that cause the carriers to return and shifting and line spacing may be used, whereby the cylinders 37 terminate in common in a member 39, which releases the catches 40 and 41 and produces by means of the arm 42 of the rotary disk 27<sup>a</sup> in the cylinder the effect necessary to punch the holes.

In the foregoing the compressed air in the connecting pipe 12 is utilized for the purpose of reproducing the writing on the stopping cylinder 6. In another way the reproduction can be effected according to Fig. 9 by this, that the compressed air acts directly upon the writing keys. For this purpose the air ports  $a^1-a^{30}$  (Fig. 5) are not connected but are led by separate pipes 12 into small membranes 44 which by their inflation depress the keys. These membranes are carried by a board 45, which after the com-



pletion of an original writing is put over the usual keyboard with the membranes in touch with the keys and with the tubing 3 of the machine in communication with the pipes 12 leading from the ports  $a^1$ — $a^{30}$ . While the machine is running and the air blowing through the stencil hole then passing, the membrane corresponding to it is inflated and closes the opposite keyhole exactly in the same order as it was closed by hand in writing the original. The returning and shifting of the paper carrier also takes place exactly in the same order which determined the writing.

15 The operation of the herein-described device for reproducing the original writing is as follows: Fix the device before writing the original tightly on the machine by means of the hooks 16, thereby coupling the tubing of the former with that of the latter and the typewheel with the said device.

20 While writing the perforating of the paper strip is now going on, after which at any time a new writing can be reproduced which is an exact facsimile of the original one. For this purpose the typewheel motor is started, from which also motion is transmitted to the stencil paper, and the machine automatically reproduces the same typewheel strokes which took place when writing the original by hand operation.

30 Having described my invention, what I claim and desire to secure by Letters Patent of the United States is:—

55 1. The herein described method of duplicating documents consisting in typewriting the original document with a pneumatically operated typewheel typewriting machine, the paper stencil being moved by and simultaneously with the typewheel in such a manner that the distances of the stencil holes are in a determined relation to the corresponding distances of the typewheel revolutions, the perforations advancing in lines across the strip, and a new line of perforations being started after every revolution of the typewheel.

of the typewheel.

2. The herein described apparatus for duplicating documents, comprising, in combination, a pneumatically-operated typewriter having a type-wheel and actuated by compressed air, a perforating device actuated by compressed air, and serving to make a perforation in a paper stencil simultaneously with the striking of each character of the original document by the typewriter, said perforating device comprising a roller rotating synchronously with the type-wheel, said roller formed with punches distributed spirally over its circumference, and means for enabling the typewriting machine to duplicate the original document, the duplication being effected by compressed air from the said reservoir.

3. The herein described apparatus for duplicating documents, comprising, in combination a pneumatically-operated typewriting machine having a keyboard and a typewheel and actuated by compressed air, a perforating device for making a perforation in a paper stencil simultaneously with the striking of each character of the original document by the typewriter, said perforating device actuated by compressed air, and means for enabling the typewriter to duplicate the original document, said means actuated by compressed air, and comprising a board adapted to be exchanged for the keyboard, said board having keys formed with perforations, and diaphragms which close the perforations on the passing of the perforated stencil.

In testimony whereof I have signed my name this 26th day of March 1907 to this specification in the presence of two subscribing witnesses.

MAX SOBLIK.

Witnesses:

CASPAR HILGE,  
ADOLF RIKER.