

N^o 4852



A. D. 1900

Date of Application, 14th Mar., 1900

Complete Specification Left, 13th Dec., 1900—Accepted, 14th Mar., 1901

PROVISIONAL SPECIFICATION. ◊

“Improvements in and relating to Apparatus for the Reproduction of Type Written Matter”

I, FRIEDRICH ERNST PAUL EHRlich, of Gohlis near Leipzig, in the Kingdom of Saxony, German Empire, Company Director, do hereby declare the nature of this invention to be as follows:—

My invention relates to an apparatus for automatically producing any desired number of copies on a type-writer; and consists in means whereby a strip or sheet of paper or other suitable material is perforated at the same time as the original document is written. This perforated strip being afterwards, for the purpose of obtaining copies of the original paper, caused to pass over the outlet openings of a pneumatic apparatus combined in such a manner with a type-writer, that when the perforations of the strip, register with the openings of the pneumatic device, the key levers of the type writer are depressed, and the corresponding types are made to strike against the paper in the same manner as if the machine were operated by hand. My invention embodies also means for the automatic spacing of the lines and the returning of the paper carriage, so that one person can take charge of a number of type writers to which the reproducing apparatus is applied. The completion of a page may be indicated by the striking of a bell or other suitable device.

My invention possesses, over the existing processes of reproduction of type written matter, the marked advantage that an unlimited number of clearly and sharply printed copies may be obtained.

For reproducing a number of copies of the type written document, I prepare, when writing the said paper, the perforated sheet or strip of paper, the perforations of which correspond with the writing. This is effected by punches operated by the depression of the keys of the type writer, and by which the strip of paper is perforated in the order as the keys are depressed. This perforated strip or sheet of paper is now used for the automatic reproduction, by being passed over the wind ducts or passages of an apparatus combined with a type writer, which apparatus is constructed on the known principle of pneumatic musical instruments, and by means of which the keys of the type writer are depressed in the order as the perforations register with the said wind-ducts, in the same way as in such musical instruments the valves of the pipes or reeds are operated. In both cases the strip of paper is fed by means of a pawl and ratchet mechanism actuated by the depression and return of the keys.

In that kind of type writers having three or four rows of keys and type blocks with two letters, the shifting may be effected in the following manner. The shift key of the machine by which the original paper is written and the perforated sheet prepared, is provided with two punches, the one of which is operated by the depression of the key, and the other by the return of the key to its normal position, the perforations so made, lying in two rows of the sheet. In the reproducing type writer, the shift key on its depression is caught by a catch and is held thereby in depressed position until the perforation corresponding to the return of the shift key, registers with the wind duct in connection with such catch, when said catch is withdrawn and the shift key assumes its normal position.

[Price 8d.]

Impts. in and relating to Apparatus for the Reproduction of Type Written Matter.

For automatically returning the paper carriage of the reproducing type writer into its initial position when one line is finished, the paper carriage may, by means of a suitable lever and connecting rod, be connected to bellows, which bellows are closed when the carriage is in the initial position, that is, the position of the commencement of a line. As the carriage is moved along by the ordinary feed mechanism, the bellows gradually opens. As soon as the paper carriage reaches the end of its travel, that is, when the line is finished, it strikes against a valve which opens the communication of the bellows with the wind duct of the pneumatic apparatus. The bellows being thereby immediately contracted, and the carriage moved rapidly back into its initial position.

In this position the platen over which the paper is passed must be turned for the space of one line. This may be effected by an automatic spacing mechanism such as heretofore in use for this purpose in type writers, or it may also be effected by the aid of the pneumatic apparatus in such a manner that in the type writer by which the original paper is written, a special punch is provided in connection with the spacing mechanism by which a perforation is made in the paper strip. In the reproducing apparatus the spacing mechanism is then operated by its being connected with the pneumatic apparatus.

A special key may also be provided for making a perforation in the sheet when the writing on the page is finished, and by means of this, a bell signal or the like can be given in the reproducing type writer.

The feed of the strip of paper in the reproducing type writer may also be effected by a special clock work mechanism instead of a pawl and ratchet mechanism operated by the depression and return of the keys.

Dated this 14th day of March 1900.

HASELTINE LAKE & Co
45 Southampton Buildings, London, W.C. Agents for the Applicant.

COMPLETE SPECIFICATION.

"Improvements in and relating to Apparatus for the Reproduction of Type Written Matter."

I, FRIEDRICH ERNST PAUL EHRlich, of Gohlis near Leipzig, in the Kingdom of Saxony, German Empire, Company Director, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to an apparatus for automatically producing any desired number of copies on a type writer and consists in means whereby a strip or sheet of paper or other suitable material is perforated at the same time as the original document is written. This perforated strip being afterwards, for the purpose of obtaining copies of the original paper, caused to pass over the outlet openings of a pneumatic apparatus combined in such a manner with a type-writer, that when the perforations of the strip, register with the openings of the pneumatic device, the key levers of the type-writer are depressed and the corresponding types are made to strike against the paper in the same manner as if the machine were operated by hand. My invention embodies also means for the automatic spacing of the lines and the returning of the paper carriage, so that one person can take charge of a number of type-writers to which the reproducing apparatus is applied. The completion of a page may be indicated by the striking of a bell or other suitable device.

My invention possesses, over the existing processes of reproduction of type

Impts. in and relating to Apparatus for the Reproduction of Type Written Matter.

written matter, the marked advantage that an unlimited number of clearly and sharply printed copies may be obtained.

The invention consists in the construction and combination of parts for effecting the desired results, which parts are shown in the accompanying drawings and hereinafter described and claimed.

In the drawings Fig. 1 is a cross section showing the punching device and the mechanism for feeding the strip by the space of one perforation, both devices being actuated by the keys of the type writer and also the pneumatic reproducing device.

10 Figs. 2 and 3 show the shifting key lever by means of which the change from caps to small letters and *vice versa* is effected.

Fig. 4 shows a plan view of the shifting key.

Fig. 5 shows a portion of the perforated strip,

15 Fig. 6 is a plan view of the machine and of the mechanism for returning the paper carriage when a line is finished.

Fig. 7 is a partial elevation of this mechanism.

Figs. 8 and 9 are details of the line spacing mechanism.

The type bars carrying the type blocks are connected in the usual manner to the key lever 3 pivoted at 5 by means of the hangers 2 and are operated by 20 the keys 4 which on being depressed cause the type blocks 1 to strike against the paper 7 placed around the plate 6. The operation of the type may of course be also effected in any other suitable manner.

The strip which is to be perforated is conducted over rollers 8 and 9 one of which is provided with ratchet wheels 10 with which the pawl 11 engages. This 25 pawl is suspended at the end of the double armed lever 12 which is kept depressed by a spring 13 attached to the rear of the casing. The other arm of lever 12 is provided with a projection 15 which bears on the shorter free end of the key lever 3.

If now the key lever is depressed, spring 13 causes the pawl connected to 30 lever 12 to move downwards and slide past one tooth of the ratchet which it engages so that on the release of the key lever 3 and consequent upward movement of the pawl a partial rotation of the roller 11 and the forward feed of the strip 16 by the amount of the space of one letter is effected. The perforating operation is effected by a small punch 17 held in its position of rest by a 35 spring 18. The punch 17 is provided at its upper extremity with a stud 19 against which bears another stud 20 connected to the lever 21, which latter is pivotted at 21¹ in a fork or frame 21² pivotted at 21³. The opposite end of the lever 21 is provided with a similar stud 22 bearing on key lever 3. Punch 17 is provided with guides 23, 24 the latter acting as matrix for the paper strip 40 to be punched.

By means of this device a perforation is made on the said strip of paper for each letter and each sign as the corresponding key lever is depressed.

If now a duplicate of the type written document is required, the punching device is thrown out of action, which may be done by turning the fork or 45 frame 21² up, and locking it in the position shown in dotted lines in Fig. 1.

For reproducing the writing by the aid of such perforated sheet, this latter is caused to pass over air suction passages of a pneumatic device which lie close together so that each time when a perforation comes over a passage 25 air is sucked into the latter and distends the diaphragm 26 provided at the end of the 50 said passage, thereby causing the double valve 27 to open outlet 28 and close outlet 29, the chamber 30 being evacuated by means of a suitable air exhausting device.

The vacuum chamber 30 is thus set in communication with the bellows 31 connected to the key lever 3 so that on the bellows contracting said key lever 55 is depressed and made to operate the type bar in the usual way.

When the passage 25 is again closed by the unperforated part of the paper strip the diaphragm 26 returns to its original position as air is exhausted from

Impts. in and relating to Apparatus for the Reproduction of Type Written Matter.

chamber 30 and the space in front of the diaphragm, this space communicating with chamber 31 by the small aperture. 32.

Figs. 2, 3 and 4 show the arrangement of the shifting key lever for capital letters the free end of which is forked and provided with small lever gearing, the purpose and operation of which I shall now describe. One part of the gear- 5
ing is shown in Fig. 2 and the other part in Fig. 3. The said lever gearing acts in such a manner that on the key being depressed, the arrangement shown in Fig. 2 effects a perforation, the punching device being thereupon immediately released through the adjustable stop 33 striking against the shorter arm of a bell crank lever 24 and bringing the latter to the position shown in dotted lines in Fig. 2 so that the connection between the key lever and punch- 10
ing device remains interrupted so long as the key is depressed, and any number of "caps" can be printed and the corresponding holes perforated in the strip. The part of the lever gearing shown in Fig. 3 acts to release the shifting key. Its action is as follows: The end of the shifting key lever is connected by means 15
of link 36 to a lever 37 fulcrumed at one end, the other end having attached to it a bell crank, the longer arm 35 of which comes to bear on the stop stud of the punching device when the shifting key lever is depressed. When this latter is released, link 36 pulls 37 downwards and causes the bell crank pivotally attached thereto to actuate the other punching device, while at the same time the 20
shorter arm of the bell crank comes in contact with an adjustable stop 39 so that the bell crank comes into the position shown in dotted lines in Fig. 3 and the punching device is thereby disconnected from the key shifting lever, the spring of the punch bringing it back to its original position. The shifting key effects thus two perforations, one when the lever is depressed, and the other, 25
when it is released. In the automatic reproduction of copies one of the perforations serves for the depression of the shifting key lever, the corresponding bellows being evacuated and the key lever being held down by a catch or a locking device until the other perforation registering with a suitable air duct causes another set of bellows connected to the catch or the locking device to so act that 30
the latter is set free and the shifting lever is released and printing with small letters is resumed.

The strip, part of which is shown in Fig. 5 has the same width as the row of closely lying air passages. It must of course be executed with great accuracy so that the perforations register exactly with the proper corresponding air 35
duct outlets.

I will now proceed to describe the mechanism for returning the paper carriage to its normal position when a line is completed and also for turning the paper roll by the space of a line when the paper carriage is again in its initial position ready to start a fresh line. When writing the original document the 40
paper carriage is shifted in the usual step-by-step manner, but it is obvious that some automatic device must be provided to return it to its initial position when the pneumatic reproducing device is used.

With this object in view I provide on the key board a special lever with punching device of the kind herein before described which the operator has to 45
depress each time a line of the original document is completed, a corresponding perforation being thereby produced in its strip. In the production of the copies the latter perforation comes to register with an air duct of the pneumatic device connected by a pipe 47 to a pair of bellows 46 somewhat larger than the key lever bellows and mounted on a suitable part of the type writer. 50

Assuming the paper carriage to be in its initial position on the right hand side of the type-writer, the bellows 46 will then occupy the position shown in dotted lines in Fig. 7. When a line is completed, and the paper comes to rest in a position on the left, the aforesaid perforation in the edge of the strip registers with the air duct of the bellows 46 which latter is thereby collapsed 55
as shown in full lines in Fig. 7. A double armed lever 48 pivotally attached to the machine at 49 and acted upon by a spring 48¹ locks the bellows in their

Impts. in and relating to Apparatus for the Reproduction of Type Written Matter.

collapsed position, a projection 51 on the bellows engaging a notch 50 provided at the lower end of the lever 48. This locking of the bellows 46 causes a friction roller 43 connected to the bellows by means of a bracket 45 to move downwards and approach a second roller 44 suitably pivoted to the type writer and rotated continuously by suitable means. A ribbon 42 attached to the paper carriage is run between these two rollers and caused by the friction exerted on it by the roller 43 to move forward and pull the paper carriage back to its initial position, a stop attached to the carriage strikes against lever 48, thereby releasing the projection 51 so that the bellows 46 return under the action of the spring contained therein to their initial position. As the platen on reaching its end position on the left was turned by an amount equal to the space between two lines, the writing of a new line can now be at once begun.

For the purpose of turning the platen by the space of a line when it reaches the end of its traverse I provide on the end of the said platen a crown of ratchet teeth 53 and on the carriage slide 40 a bracket 54. A bell crank lever 55 pivotally attached to the top of this bracket has its horizontal arm fitted with a pawl 56 the end of which is so shaped as to be capable of engaging with the space between any two teeth of the aforesaid crown 53. The top plate of the type writer is provided with a stop 57 which just before the paper carriage reaches the end of its traverse, causes bell crank 55 to assume the position shown in dotted lines in Fig. 9 so that the pawl 56 engages with the teeth provided at the end of the paper roll. The further movement of slide 40 causes a further depression of 56 whereby the platen is turned by the amount equal to the space of a line.

The whole of the operation of the type writer may be effected automatically by the perforated strip. The kind of type writer plays no part, only the small lever connections between the key levers and the punching devices must be varied according to the construction of the type writer to which the device has to be adapted.

It will be seen that the main idea of my invention is the application of special punching devices to type writers one for each operation, for the purpose of producing a perforated strip whilst the original or first copy is being made in the usual manner by hand and thus to enable the operator to reproduce afterwards automatically with the assistance of pneumatic devices any number of copies of the said original by causing the said perforated strip to pass over air passages. In lieu of rarified air, I may use compressed air.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. An apparatus for automatically producing any desired number of copies on a type writer comprising in combination with the type writer, punching devices actuated by the key levers and means for feeding a perforated strip to the punches each time a perforation has been effected, means for feeding the so perforated strip of paper over the air ducts of a pneumatic device and mechanism for depressing a corresponding key of the type writer when a perforation of the strip registers with one of the air ducts of the said pneumatic device, essentially as and for the purpose described.

2. An apparatus for automatically producing any desired number of copies on a type writer comprising in combination with the type writer punching devices actuated each by a two-armed lever bearing on the short arm of the key lever, spring punches, pawl and ratchet mechanism for feeding the paper strip to be perforated to the punches, and means for actuating the pawl and ratchet mechanism by the key levers, essentially as and for the purpose described.

3. An apparatus for automatically producing any desired number of copies on a type writer comprising in combination with the type writer, punching devices, means for throwing the punching devices out of action, and pawl and ratchet

Impts. in and relating to Apparatus for the Reproduction of Type Written Matter.

mechanism for feeding the previously perforated strip of paper over the air ducts of a pneumatic device, essentially as and for the purpose described.

4. An apparatus for automatically producing any desired number of copies on a type writer comprising in combination with the type writer, mechanism for feeding a perforated strip of paper over the air ducts of a pneumatic device consisting of the said air ducts of a chamber with flexible membrane and of double seated valve and of bellows connected with the key levers of the type writer, essentially as and for the purpose described. 5

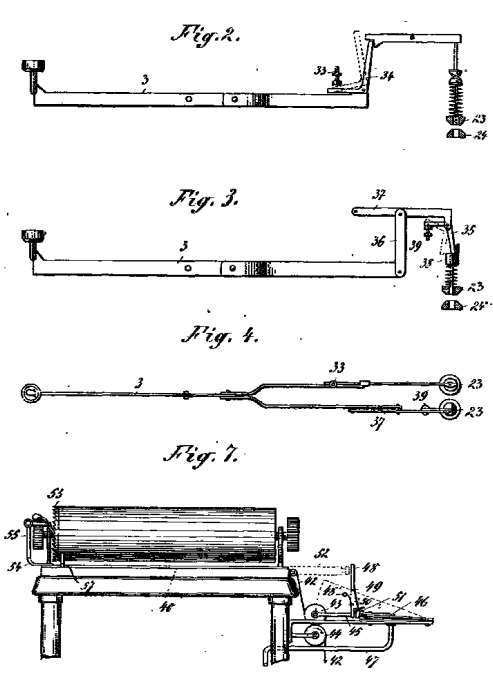
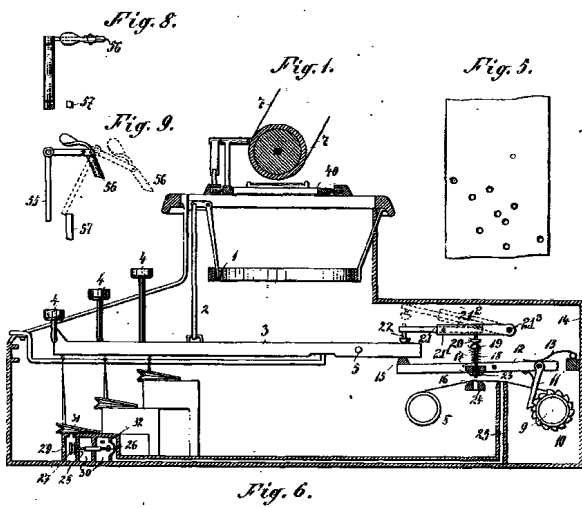
5. An apparatus for automatically producing any desired number of copies on a type writer comprising in combination with the type writer, mechanisms for feeding a perforated strip of paper over the ducts of a pneumatic device, mechanism for actuating the key levers of the type writer by said pneumatic device and a device for returning the paper carriage to its initial position whenever a line is completed consisting of a continuously rotated roller, a ribbon attached to the paper carriage and passing around the said roller, a second roller connected with a pair of bellows which by means of a pneumatic device is caused to collapse on a line being finished and so located that on the bellows collapsing, the second roller presses the ribbon against the continuously rotated roller, double armed lever for locking the collapsed bellows and stop fixed to the paper carriage for tilting the said lever and releasing the bellows on the carriage reaching the end of its return movement, essentially as and for the purpose described. 10 15 20

6. An apparatus for automatically producing any desired number of copies on a type writer comprising in combination with a type writer, mechanism for feeding a perforated strip of paper over the air ducts of a pneumatic device, means for actuating the key levers of the type writer by said pneumatic device, means for returning the paper carriage to its initial position on a line being completed and line spacing device consisting of a crown of ratchet teeth on one end of the platen, bracket attached to the frame of the type writer, bell crank lever with pawl attached to the bracket and stop on the type writer frame, all essentially as and for the purpose described. 25 30

7. An apparatus for automatically producing any desired number of copies on a type writer comprising in combination with the type writer, punching devices actuated by the key levers, forked shifting key lever and means in connection with the prongs of this shifting key lever for making one perforation in the paper strip on the shifting key lever being depressed and another perforation on the lever being released, essentially as and for the purpose described. 35

Dated this 13th day of December 1900.

HASELTINE LAKE & Co
45 Southampton Buildings, London, W.C., Agents for the Applicant. 40



[This Drawing is a reproduction of the Original on parchment rolls.]

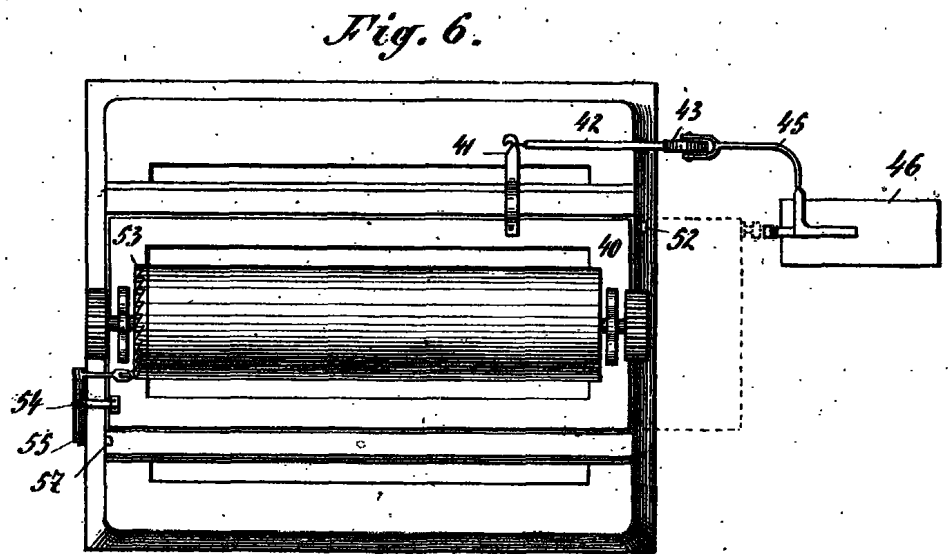
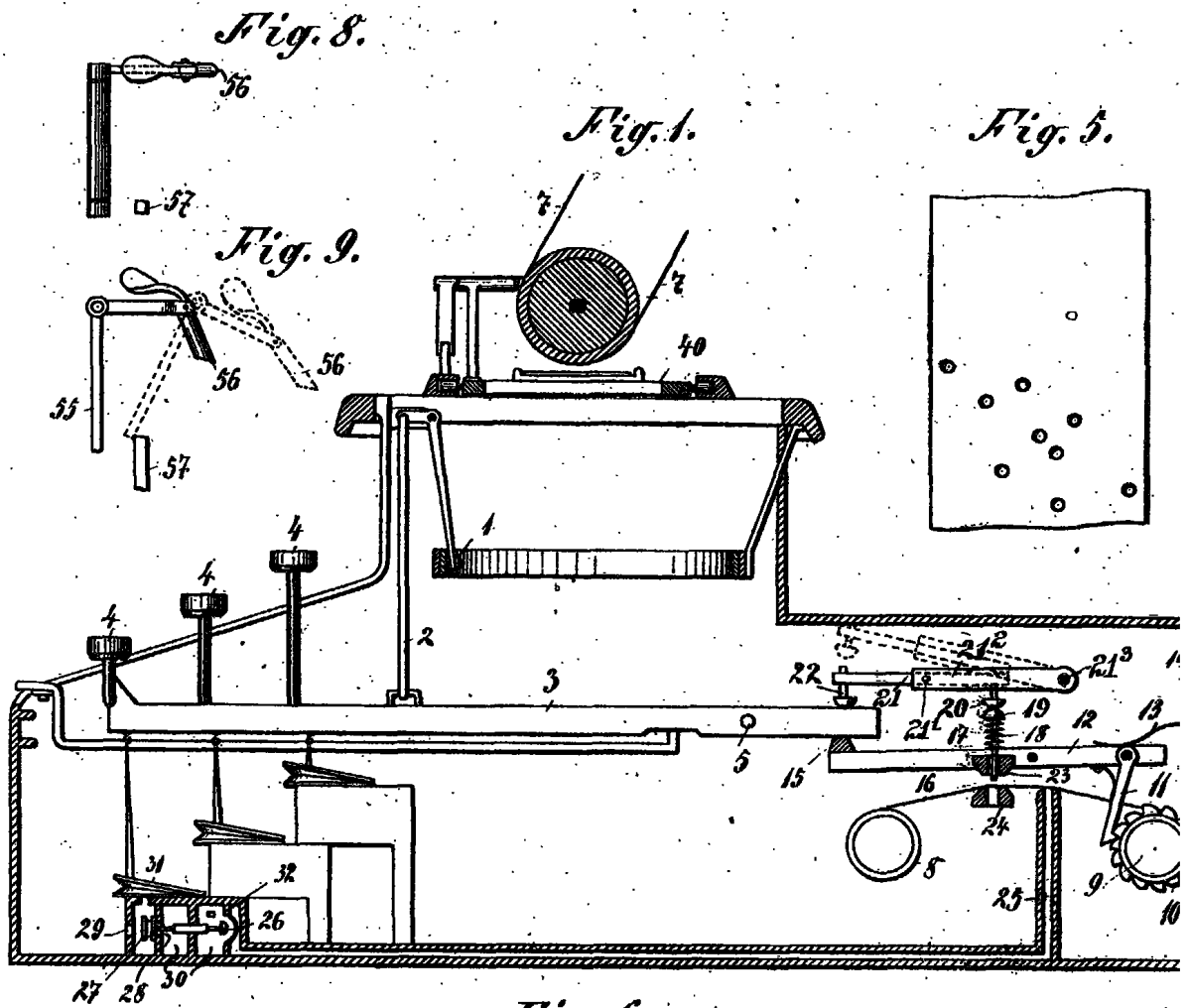


Fig. 2.

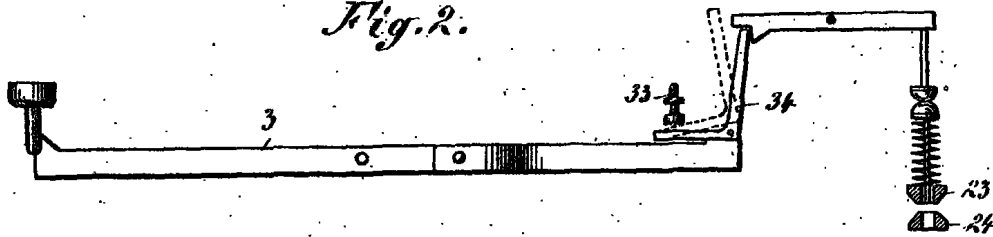


Fig. 3.

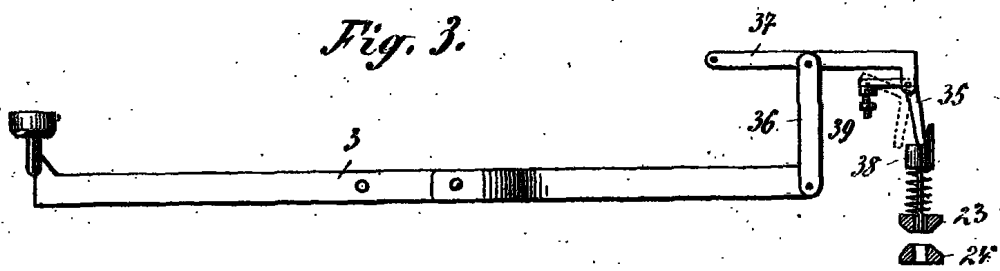


Fig. 4.

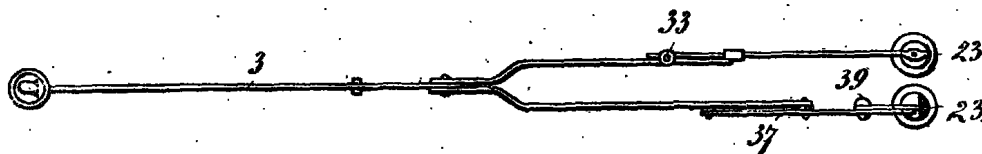
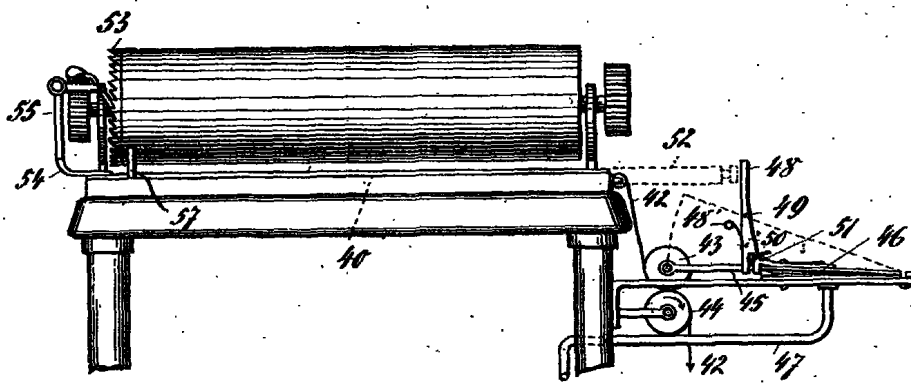


Fig. 7.



[This Drawing is a reproduction of the Original on a reduced scale]