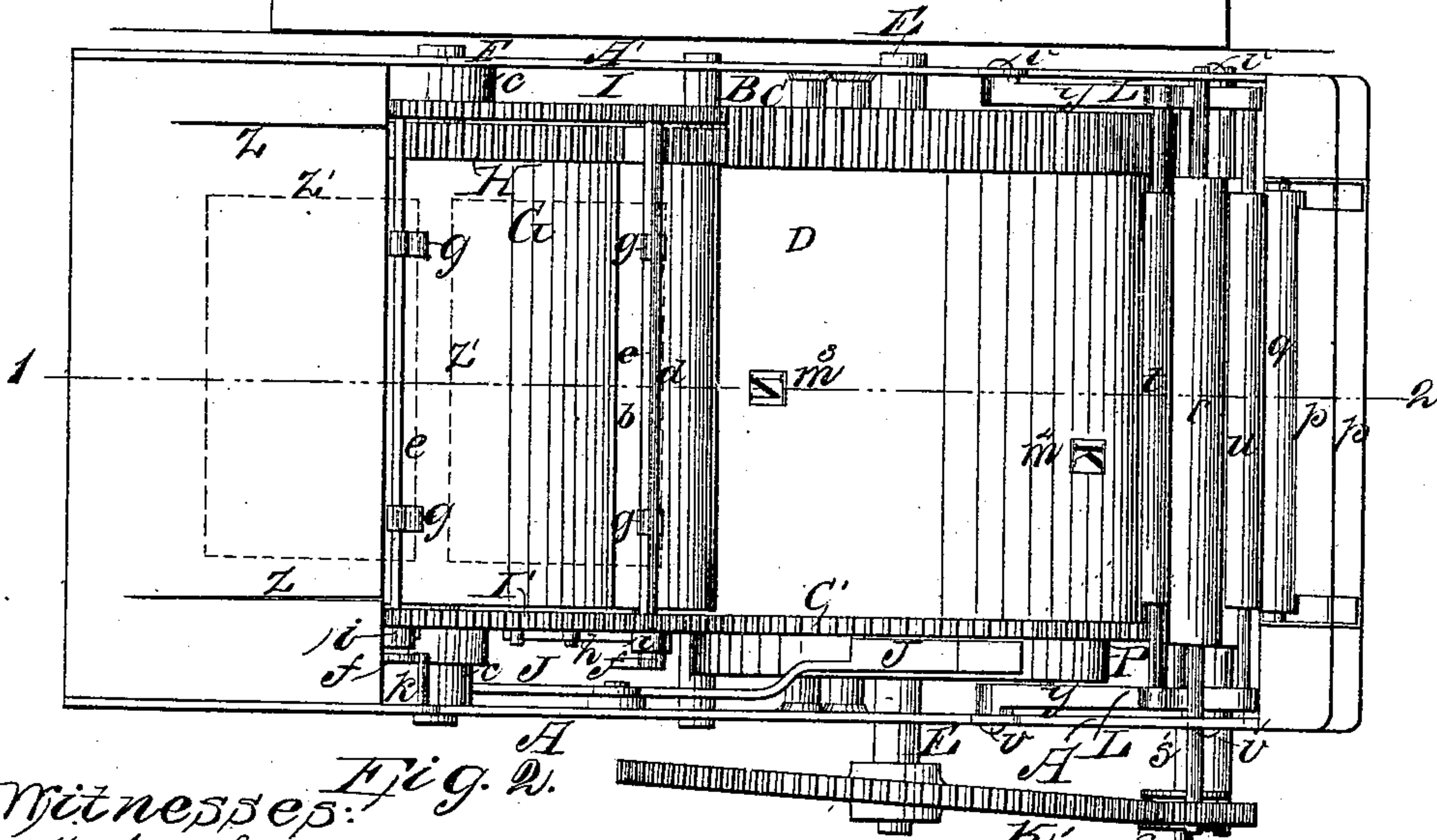
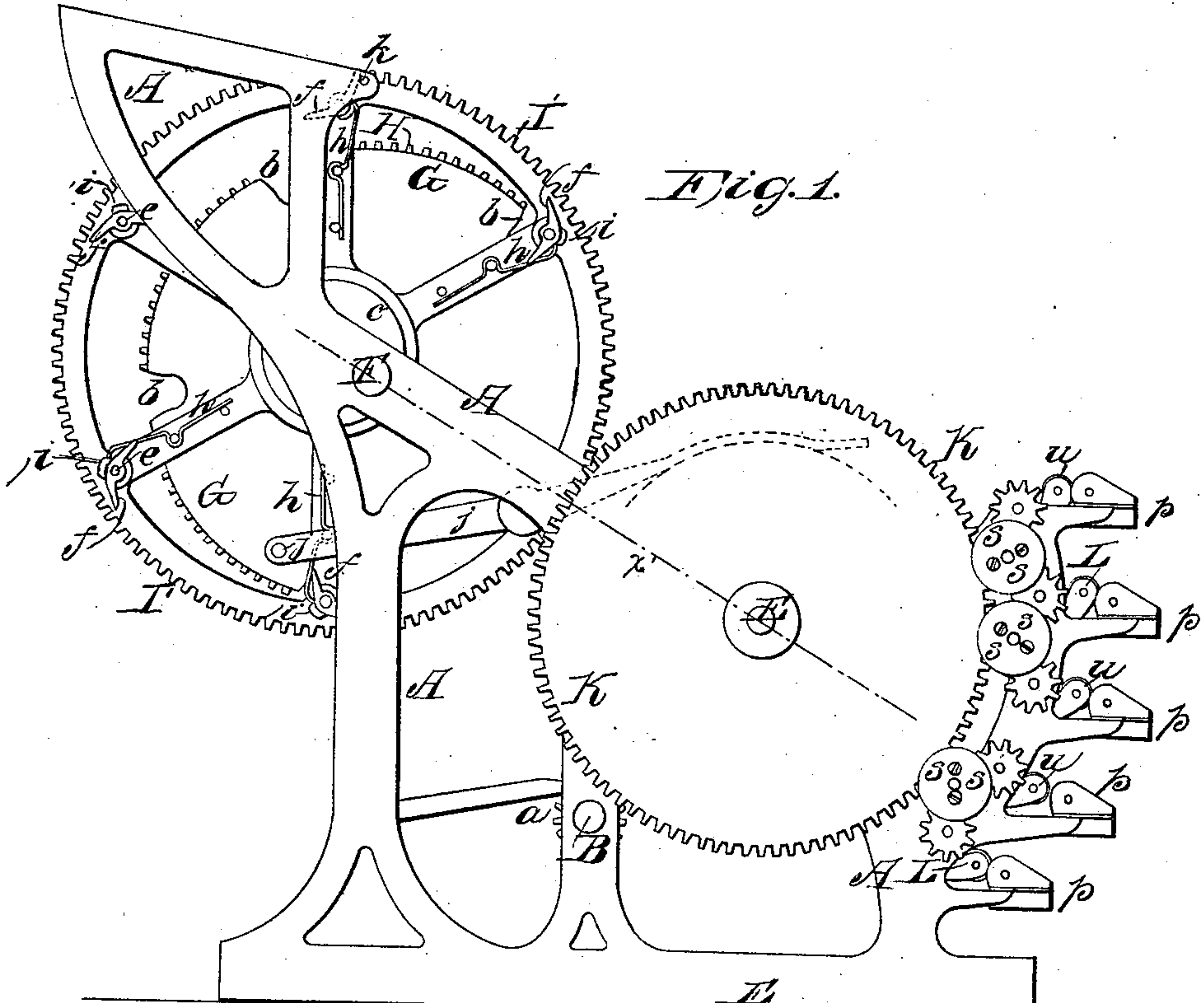


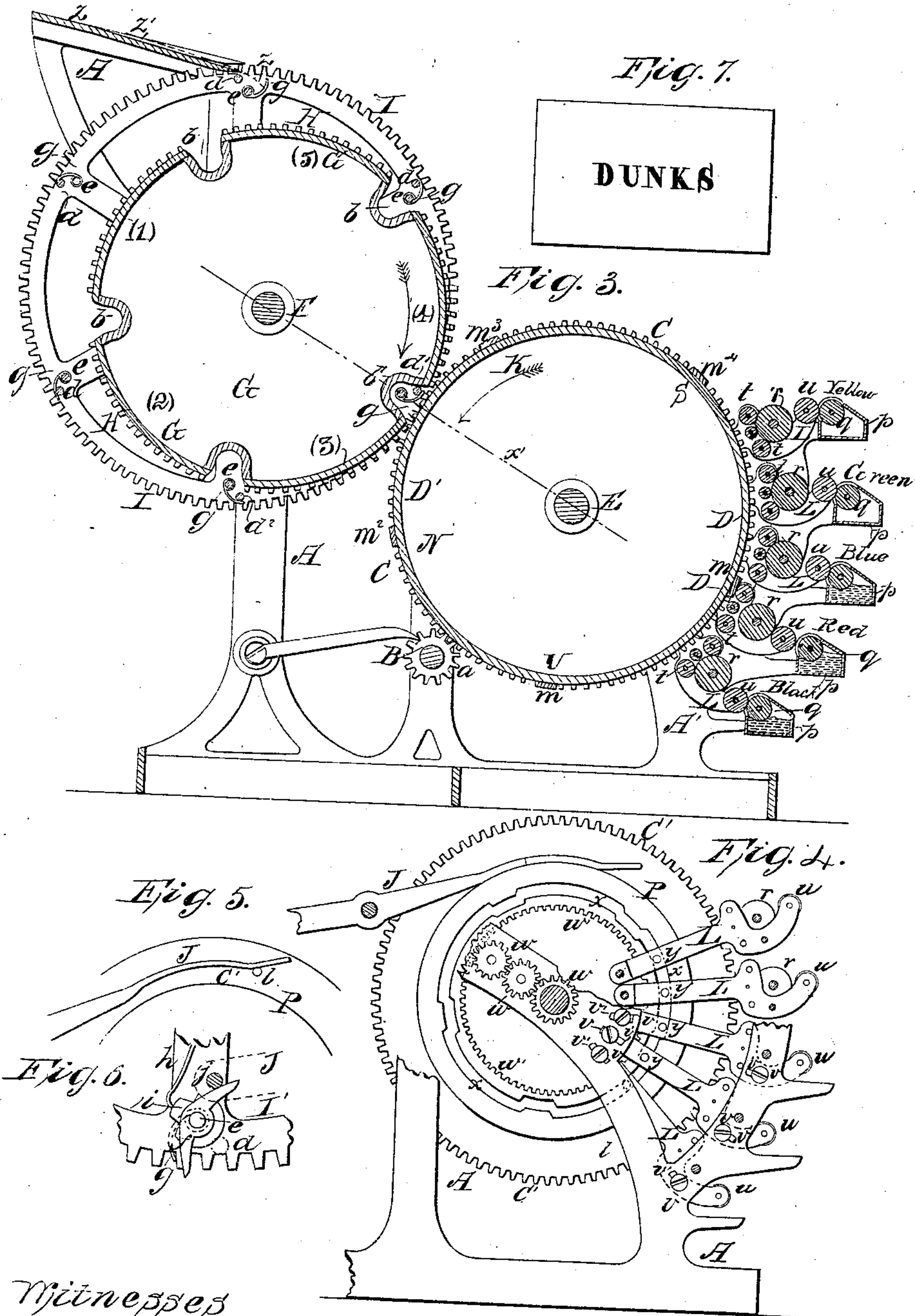
A. A. DUNK.
MACHINE FOR PRINTING IN DIFFERENT COLORS.
No. 75,394. Patented Mar. 10, 1868.



Witnesses:
Wm. Albert Steel
Parker

Inventor:
A. A. Dunk
By Wm. H. Brownson

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A. A. DUNK, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 75,894, dated March 10, 1868.

IMPROVEMENT IN PRINTING-PRESSES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, A. A. DUNK, of Philadelphia, Pennsylvania, have invented a Machine for Printing in Different Colors; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention consists of certain mechanism, fully described hereafter, by which ornamental and pictorial impressions of different forms and in different colors may be imparted to a sheet of paper with accuracy and precision.

In order to enable others skilled in the art to make and use my invention, I will now proceed to describe its construction and operation, reference being had to the accompanying drawing which forms a part of this specification, and in which—

Figure 1 (Drawing No. 1) is a side elevation of my improved machine for printing in different colors.

Figure 2, a plan view.

Figure 3, (Drawing No. 2,) a vertical section on the line 1-2, fig. 2.

Figure 4, a detached view, partly in section, of a portion of the press, showing the operation of the inking-rollers.

Figures 5 and 6, detached views of parts of the press; and

Figure 7, a diagram for illustrating the operation of the machine.

Figure 8, a diagram illustrating a modified machine.

Similar letters refer to similar parts throughout the several views.

A and A' are the opposite side-frames of the machine, in which turns the main driving-shaft B, a pinion, *a*, on the latter, gearing into a cog-wheel, C, secured to one end of a cylinder, D', on a shaft, E, which also turns in the side-frames. To a shaft, F, turning in the said frames, is secured a cylinder, G, which is of the same diameter as the cylinder D', measuring across the printing-forms attached to the latter. As the cog-wheel C gears into a similar wheel H on the same shaft as the cylinder G, the two cylinders will revolve at the same speed, and simultaneously with each other. The two cylinders are so arranged in respect to each other that the surface of the cylinder G is in contact with the forms on the cylinder D'. The cylinder G is in the present instance separated into five equal portions by the deep grooves *b*, which extend across its face, fig. 3, each portion forming a separate segmental platen for the press, as more fully described hereafter.

A cog-wheel, I, adjacent to, but of greater diameter than, the wheel H, turns on a stationary disk, *c*, secured to the side-frame A', and also gears into the wheel C of the cylinder D', and a similar wheel, I', at the opposite end of the cylinder G, gears into a cog-wheel, C', secured to the cylinder D'.

It should be here understood that the stationary disks *c*, on which the cog-wheels I and I' turn, are placed eccentrically with the shaft F, but that the centre of each is on a line, *x'*, drawn through the centres of the shafts E and F, as seen in fig. 1.

The wheels I and I' are secured together by rods *d* *d*¹ *d*², &c., and turn independently of the cylinder G, the shaft F of the latter passing through their bearing-disks *c*, as shown in fig. 1. The diameter of each of the wheels I and I', in respect to that of the wheel H, is as six of the former to five of the latter, so that the wheels I and I' will make but five-sixths of a revolution while the latter completes one revolution. The rods *d* are situated at equal distances apart from each other, and at the same distance from the centre of rotation of the wheels I and I', and the wheels are so adjusted in respect to the cylinder G that when the parts are in the position shown in fig. 3, the rod *d*¹ of the wheels shall be contained within that one of the grooves of the cylinder marked *b*'. If the cylinder G and wheels be now turned in the direction of the arrow, fig. 3, until the former has completed a revolution, it will be evident from the above that the rod *d*², instead of the rod *d*¹, will be contained within the groove *b*'. The purpose of this will be rendered apparent hereafter.

Adjacent to each of the rods *d*, and turning in the rims of the wheels I I', is a rod, *e*, one end of which projects through the wheel I', and has a two-armed lever, *f*. To each of these spindles are secured two curved nippers, *g*, the outer ends of which are maintained in close contact with the adjacent rods *d* by the action of a spring-catch, *h*, which bears against a notched projection, *i*, of the rod, as seen in fig. 6, the latter view representing the said lever *f* as in the act of moving from one position to another.

A lever, *J*, is hung to the side-frame *A* of the machine, and is operated by a pin, *l*, secured to one side of the cog-wheel *C'*, as shown in figs. 4 and 5, the opposite arm of the lever being provided with a projecting pin, *j*, which, when the lever is operated, strikes one arm of the lever *f*, and partially turns its rod *e*, thus moving back the nippers *g* away from the adjacent rod *d*, fig. 6. The rod remains in this position until one arm of its lever *f* strikes a pin, *k*, fig. 1, which projects from the side-frame *A'*, and which turns the lever and its spindle to their first position. When the cog-wheel *C'* and its pin *l* have made a complete revolution, the lever *J* is again operated, and another of the rods *e* is turned, the rods, and consequently the nippers, being thus operated in succession by the lever for a purpose described hereafter.

The machine shown in the drawing is arranged to print in five colors, and the five forms of type are secured at equal distances apart to the cylinder *D*, as shown at *m*, *m*¹, *m*², *m*³ and *m*⁴, fig. 8. These forms are shown in the drawing, fig. 2, as simple types, each of a different letter, for the sake of simplifying the description.

The different colored inks are contained in troughs, *p*, fig. 3, which are secured to projecting portions of the opposite side-frames, and within each trough is arranged, to turn, a carrying-roller, *q*. Distributing-rollers *r* turn in the side-frames of the machine, and motion is communicated to them by a large cog-wheel, *K'*, on the shaft *E*, through the medium of flanged pinions *s*, fig. 1, which are arranged to turn and move to and fro freely on stationary pins *a'*, the cog-wheels *K'*, as shown in fig. 2, being secured to its shaft in an inclined position, so that, as it turns, the distributing-rollers *r* will be rotated, and at the same time will have a reciprocating motion imparted to them.

The inking-rollers *t* and rollers *u* turn in radial arms *L*, which are attached to the side-frames *A* and *A'* by screws *v*, the latter passing through slots *v'*, which permit the arms to move longitudinally to a limited extent from or towards the centre of the shaft *E*, (see figs. 3 and 4.) A cam-wheel, *P*, turns freely on the shaft *E*, at each end of the cylinder *D*, each wheel being turned from the shaft *E* at a much slower rate of speed than the cylinder, by means of the train of pinions *w*, and an internal cog-wheel, *w'*, (see fig. 4.) A cam-groove, *x*, or rather an annular groove, the continuity of which is interrupted by five cams, at equal distances apart, is formed in each of the wheels *P*, and a pin, *y*, projecting from each of the radial arms *L*, enters this groove.

The rollers *u* are carried by the arms *L*, and the ink is conveyed by these rollers from the rollers *q*, and deposited on the rollers *r*, and, as the latter have a reciprocating as well as a rotary motion, the rollers *t*, when in contact with them, are thoroughly inked.

The highest and the lowest inking-rollers bear on separate forms simultaneously, while the other rollers are clear of the forms; but while any one of the intermediate inking-rollers is acting on a form, all the others are clear of the forms which they have to ink, this operation of the different inking-rollers at different intervals being effected by the cam-wheel *P* acting on the arms *L*, or by other equivalent mechanism.

Operation.

As before remarked, the cylinder *G* is separated by longitudinal grooves *b* into five segmental platens, which in fig. 3 are numbered respectively 1, 2, 3, 4, and 5, while the forms *m*, *m*¹, *m*², *m*³, and *m*⁴, consist of type for printing the letters *D U N K S*, the colors supposed to be employed being red, blue, green, yellow, and black, arranged as indicated in the drawing. The several parts of the machine being in the position illustrated in fig. 3, sheets of paper, each no larger than one of the segmental platens, are placed on the inclined platform *z*, and the cylinders are then caused to revolve in the direction of their arrows.

The first operation is the seizing of a sheet of paper by the uppermost nippers. This is caused by one arm of the lever *f* of the said nippers coming in contact with the stationary pin *k*, fig. 1, on the frame *A*, which moves the nippers towards the adjacent rod *d*, so that the paper is grasped between them. The nippers, having thus seized the paper, will, as the cylinders and wheels continue to turn, gradually find their way into the nearest longitudinal groove, *b*, fig. 3, and the segment, 1, of the roller *G* will act as the platen for this first sheet of paper, while an impression is imparted to it by the form *D* of the cylinder *D'* when that platen and that form arrive at such a relative position that the form will roll over and in contact with the paper backed by that platen; in other words, when the form and platen are simultaneously and at the same speed crossing the line *x'*, fig. 3, drawn through the centres of the shafts *E* and *F*. It will be understood that prior to this impression being made by the form *D* on the paper, the red-inking apparatus had been brought to bear against the form by means of the mechanism described above, fig. 3 of the drawing showing the red-inking rollers in contact with the form *D*; hence the impression imparted to the paper will be a red, *D*, (see diagram, fig. 7.) The sheet, still held by the first-mentioned nippers, is carried around with the same, and moves in the arc of a circle equal to one-sixth of its circumference, while the cylinder *G* moves in the arc of a circle of the same extent as that traversed by the nippers, but equal to one-fifth only of the circumference of the platen-roller *G*; hence, when the sheet of paper is brought to a position to receive the second impression from the form *m*¹, which is a type of the letter *U*, previously inked with the blue-inking apparatus, the segment marked 2, of the roller *G*, will be the platen for the paper while it is receiving its impression, which will be a blue *U*. The paper is carried round a third time, and is transferred to the segmental platen 3 to receive the impression of a green *N* from the form *m*². It is then a fourth time carried round, and is transferred to the segmental platen 4, to receive a yellow impression of the letter *K* from the form *m*³, and is finally carried round a fifth time and transferred to the segmental platen 5, to receive a black impression of the letter *S* from the form *m*⁴. The sheet, having now received the desired number of different-colored impressions, it becomes necessary to release it, a duty which is accomplished in the following manner:

The pin *l*, fig. 4, is the actuating-medium for releasing the paper, and this pin, once in every revolution of the form-cylinder *D'*, so acts on the lever *J* as to depress its outer end, the pin *j* on the latter bearing against one arm of the lever *f*, (see fig. 6,) thereby turning the rod *e*, opening one of the nippers, and releasing the sheet of paper. But it will be borne in mind that there are six nippers, each of which makes one-sixth of a

revolution while the pin *l* is making but one-fifth of a revolution; hence, any one set of nippers is never in the proper position to be acted on by the pin *l* through the medium of the mechanism described until it has completed five revolutions, when it reaches a point to be acted on by the pin *j* of the lever the moment the latter is operated by the pin *l*. After one set of nippers has been thus operated, they are carried round in the opened condition until they arrive at a point ready to seize another sheet of paper in the manner described above.

Hitherto I have referred to one sheet of paper only as being carried round five times in order to receive five impressions of different colors, but it will be seen that there are six nippers to five segmental platens and forms, and that during the operation of the machine five nippers are on active duty, each holding and carrying a sheet of paper, while the sixth is discharging a sheet, and remaining open preparatory to seizing another. One completely-printed sheet of paper is thus discharged from the machine at every revolution of the platen and form-cylinders.

As before remarked, the simple letters D U N K S have been illustrated and referred to with the view of simplifying the description of the machine's operation. If properly-engraved blocks be substituted for these simple letters, each block imparting different colors and forms to the paper, elaborate colored pictures may be produced, and the capacity of the machine for the production of ornamental and pictorial objects in different colors may be increased by an increased number of inking-apparatus, and a corresponding increase in the number of forms and segmental platens, the nippers in all cases being one in excess of the number of forms, and these nippers moving in a circle larger than and eccentric with that in which the platen-roller traverses, for on this the most important feature of my invention depends, namely, that of transferring a sheet of paper from one platen to another, so that each form may have its own platen. The importance of this feature will be understood when it is borne in mind that each platen may require an independent backing up in order to bring out the proper impression from the form appropriated to this platen, and it is only by transferring the sheet of paper from one platen to another that this important end can be obtained, for if the paper remained, during the operation of the machine, in contact with the same platen, to receive the impressions of different forms requiring different backing, the result would be a series of more or less imperfect impressions, and a blurred and unfinished picture.

Without confining myself to the precise construction or arrangement of parts herein described, I claim as my invention, and desire to secure by Letters Patent—

1. The combination of the form-cylinder *D'*, the cylinder *G* separated into as many segmental platens as there are forms on the said cylinder *D'*, and nippers constructed in the manner described, or any equivalent to the same, but, in number, one in excess of that of the forms or segmental platens, and arranged to revolve in a circle larger in diameter than, but eccentric with, that of the platen-roller, all substantially as and for the purpose herein set forth.

2. The grooves or channels *b* of the cylinder *G* and intervening segmental platens, in combination with the series of nippers, so many in number in respect to the grooves, and revolving in a course so eccentric with that of the cylinder that each set of nippers will transfer a sheet from one platen to the other, and will find its way from one groove to another, all substantially as and for the purpose herein set forth.

3. The said revolving nippers, moving in a circle eccentric with the cylinder *G*, having segmental platens, in number, one less than that of the nippers, in combination with the devices herein described, or any equivalent to the same, by the aid of which the paper, carried by any one set of nippers, shall be released, but not before it has been carried round as many times as there are platens on the said cylinder.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

A. A. DUNK.

Witnesses:

JOHN WHITE,

W. J. R. DELANY.