C. L. JOHNSTON.

NUMBERING MACHINE.

APPLICATION FILED NOV. 28, 1910.

1,067,222.

Patented July 8, 1913.

4 SHEETS—SHEET 1.

Fig. 4.

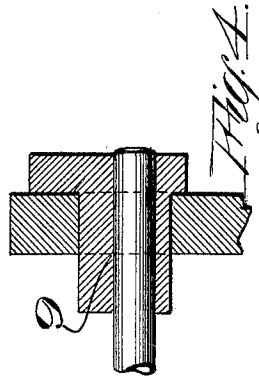
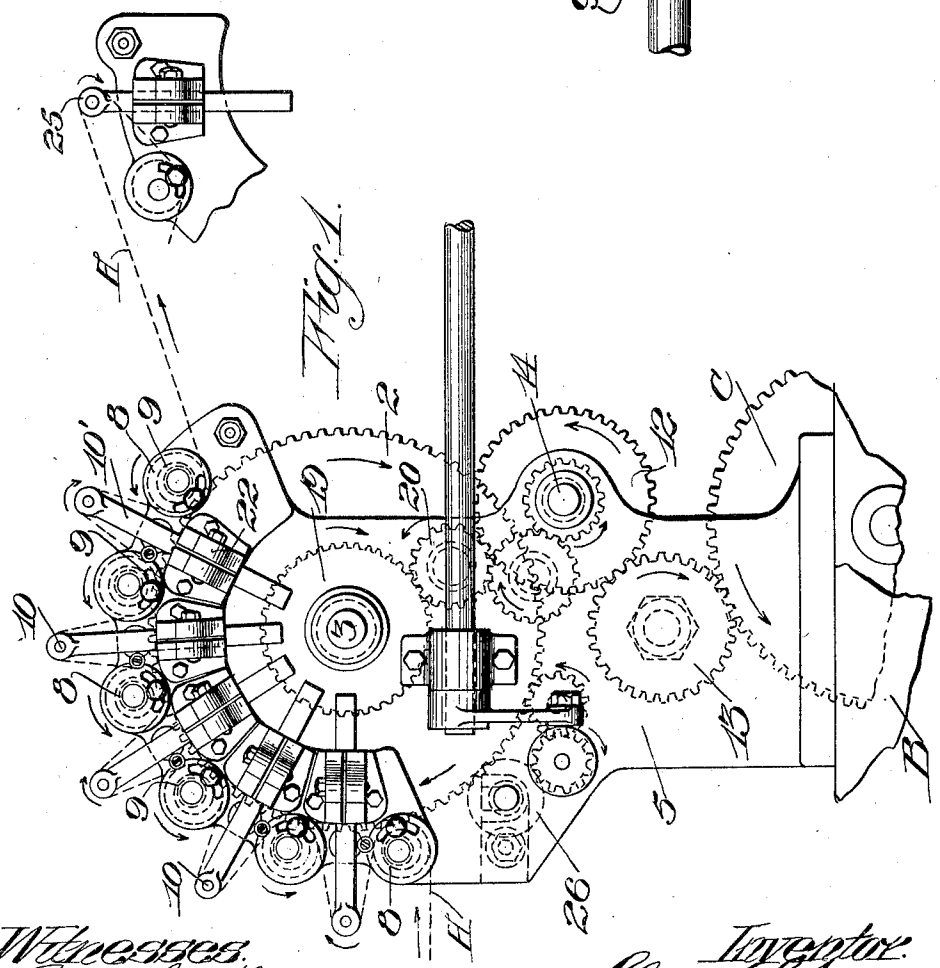


Fig. 1.



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by G. H. Strong
his Atty.

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4 SHEETS—SHEET 2.

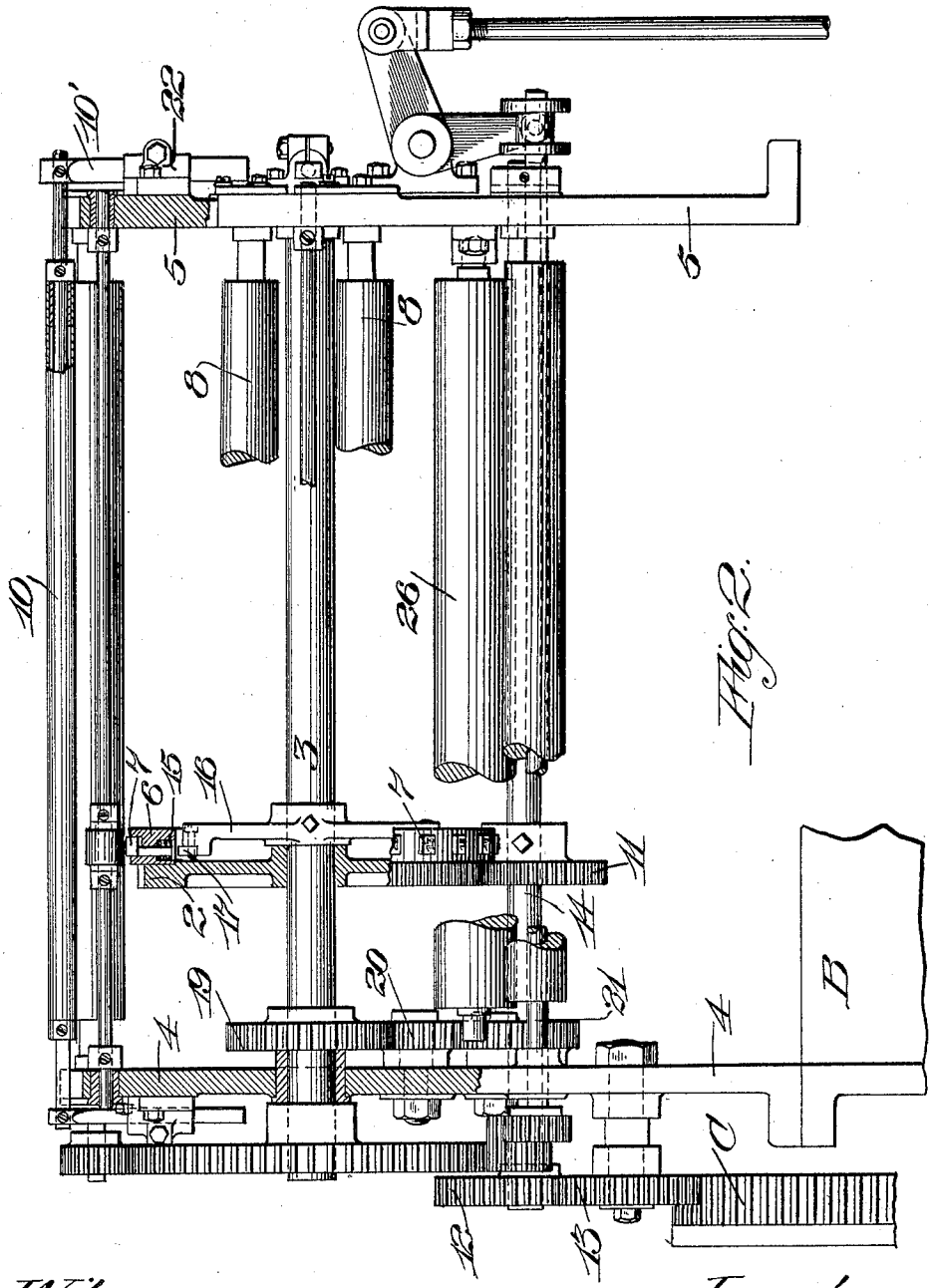


Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 3.

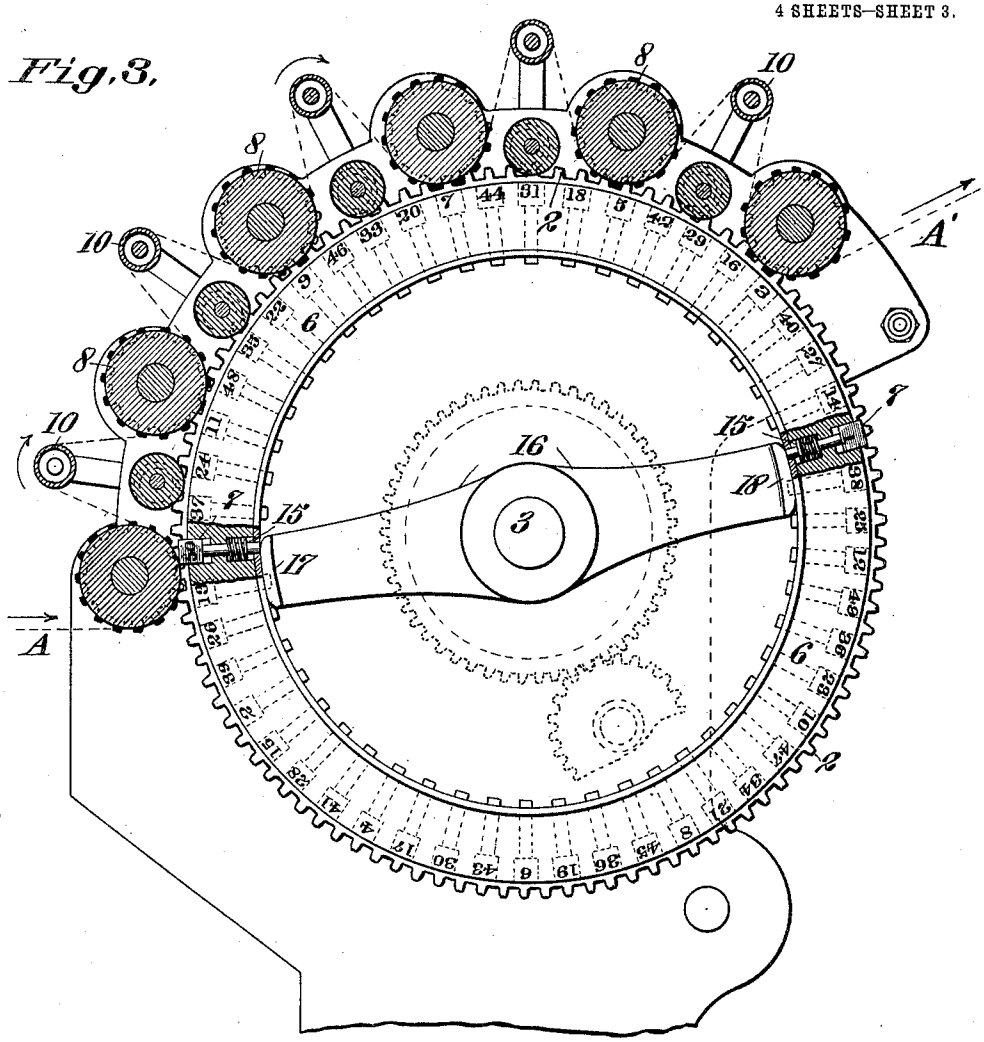
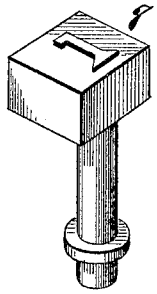


Fig. 7.



WITNESSES:

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NUMBERING MACHINE.

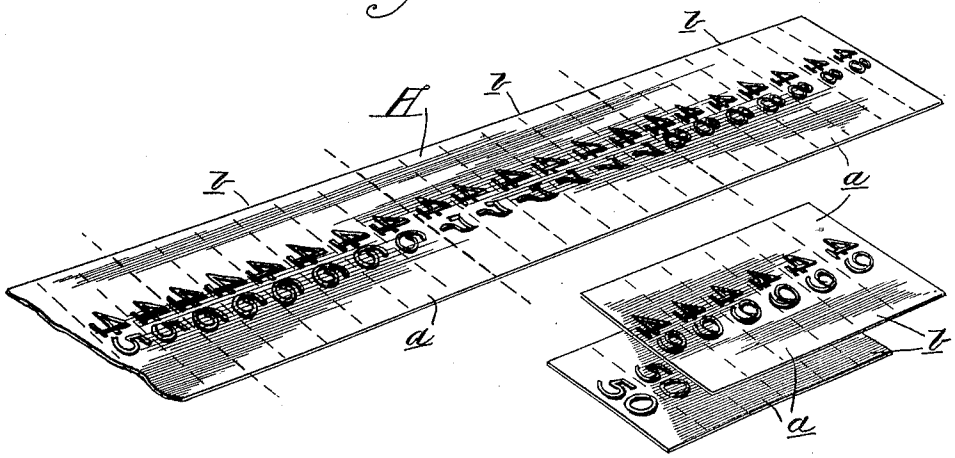
APPLICATION FILED NOV. 28, 1910.

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4 SHEETS—SHEET 4.

Fig. 5.



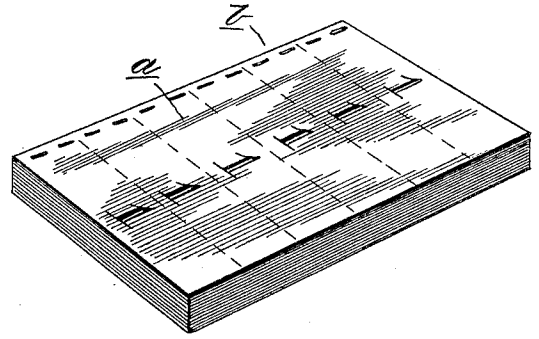


Fig. 6.

Witnesses.
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UNITED STATES PATENT OFFICE.

CLARENCE L. JOHNSTON, OF EMERYVILLE, CALIFORNIA.

NUMBERING-MACHINE.

1,067,222. Specification of Letters Patent. Patented July 8, 1913.

Application filed November 28, 1910. Serial No. 594,455.

To all whom it may concern:

Be it known that I, CLARENCE L. JOHNSTON, citizen of the United States, residing at Emeryville, in the county of Alameda and State of California, have invented new and useful Improvements in Numbering-Machines, of which the following is a specification.

This invention relates to printing apparatus and pertains especially to numbering machines designed for use in consecutively numbering the leaves or sections of manifold salesbooks, street car transfers, etc.

It is the object of this invention to provide a machine whereby a traveling strip of material may have printed upon it a plurality of similar characters; and which characters such as numbers, will be repeated successively a desired number of times and then automatically changed in ascending or descending order consecutively.

It is also an object of this invention to provide an apparatus so adjustable that a web of paper may be printed upon at various regular distances.

In the manufacture of manifold books such as sales checkbooks, which are made in enormous quantities and each leaf of which is numbered, it is desirable to print and number a plurality of leaves adjoining each other on a web run through a suitable press in which the customary form of legend is printed.

To facilitate the manufacture of the books I print at several equal distances along the web the same identical character, and then cut off the web so as to have a sheet on which is printed the several similar characters, which sheet I then cut up into equal sections each forming one leaf of a sales or transfer book or pad.

It is to accomplish the desired manifold copy, on a continuous web, of numbered leaves that the present invention is devised and which consists of the parts and construction and combination of parts as hereinafter more fully described and claimed having reference to the accompanying drawings, in which—

Figure 1 is a side elevation of the machine as mounted on a printing press frame. Fig. 2 is a partial sectional view of the end of the machine. Fig. 3 is an enlarged section across the axis of the press. Fig. 4 is a detail of the eccentric adjustment of the impression cylinders. Fig. 5 is a plan view of a web showing the division of the leaves and the method of imprint. Fig. 6 shows a stack of leaves printed by the machine and before being cut up into separate pads or books. Fig. 7 is a detail of a type bar and its type face.

In the art to which this invention has been particularly applied, a continuous web of paper, A, of suitable width is run through a printing press B of which only the frame and a gear C is here shown. In this press the forms imprint on the web the desired data and lines customary in sales books, or street car transfers, etc., the leaves *a* of which may be of any suitable width.

In the present instance the leaves *a* are printed transversely of the strip and adjoin each other edgewise. If the leaves are narrow, say four inches wide, the web will be cut every twenty-four inches into sheets *b*, which pile up on one another until there is, say, fifty in a pile, then these are stitched or wired through at one longitudinal edge, and finally transversely cut into six equal pads or books of fifty leaves each. Frequently books are made six, eight or twelve inches wide, consequently the twenty-four inch sheet *b* would be divided into four, three or two sections.

My invention embodies a mechanism whereby each leaf-section *a*, of the printed web A, after it passes through the main press will, while still traveling, be so numbered that there will be as many sections numbered in duplicate as there are to be leaves *a* cut from each sheet, *b*. This will result in forming several complete numbered copies of manifold books from each stack of sheets. The manufacture of these books is further facilitated by my machine, in so printing the page numbers on the traveling web A that the pages *a* of the first or bottom sheet of a stack is numbered fifty (50) the next superposed sheet is numbered forty-nine (49) and so on descending in regular order until the top sheet is numbered one (1). The obvious purpose of this being to automatically print the number in such order that a stack will be ready to stitch and cut as soon as fifty sheets are stacked.

This invention pertains especially to the numbering machine used in the manufacture of the books and is here shown as compris-

ing a gear wheel 2 loosely mounted on a transverse counter shaft 3 journaled in side frame plates 4—5.

The counter shaft 3 and the gear 2 travel at different speeds as will be explained later, and to the gear 2 is attached a numbering ring 6 in which are radially slidable a plurality of printing type bars 7 for printing numbers on the web A as it passes from the press B up and around a series of composition impression cylinders 8, mounted circumferentially of wheel 6 in the frames 4 and 5 and adjustable by eccentrics 9, Fig. 4.

Reference being had to Fig. 3 the impression cylinders 8 are shown as evenly spaced in an arc about the shaft 3 and supporting the web while the moving type bar 7 with its type is pressed against it. After being printed at one point while on the first cylinder 8, the web passes outwardly over the first of a series of adjustable, distance or length-compensating rollers 10 from which it returns and passes under a second impression cylinder 8. During the time of the travel of the web from its first printing at the initial cylinder 8 outwardly over and on the first distance roller 10 that particular type bar 7 which printed a number on the web at the first cylinder will have advanced to the second cylinder 8 and will then print the same character on the web A a second time, but really ahead of the previous impression. Now if the leaves *a* are four (4) inches in width, then the distance from the first cylinder 8 out to the top of distance roller 10 will be adjusted to equal the same, and the counting wheel 6 will advance in turn to print the second duplicate number four (4) inches ahead of the first impression, and so on, the wheel 6 will advance regularly and precede the web making successive duplicate impression under each of the six (6) impression cylinders, so that when the last impression is made it will be just twenty-four (24) inches ahead of the first. The speed of travel of the web is exactly the same as that of the numbering ring 6 which is secured to the gear 2 and this is driven by a train of gears 11, 12 and 13 connecting the master gear C on the press. The gear 11 is secured on a shaft 14 which is caused to revolve, by gears 12 and C, at a speed of two to one of the gear C. The ratio existing between the gear 2 and the gear 11 is 100 to 46 so that the gear 2 does not make a whole revolution by eight (8) teeth while the gear 11 is making two (2) revolutions.

The type bars 7 are slidable in their carrier ring 6 and are normally depressed from engagement with the web A by springs 15 surrounding their stems, and in order to project the type bars 7 at the proper time and portion of the rotation of the wheel 2 so as to engage and print the web I have provided a double cam-arm 16 having laterally off-set cams 17 and 18 on its periphery each adapted to engage alternate of the type bars 7 of the numbering ring, as later described. This cam-arm 16 is secured upon the shaft 3 and this shaft is driven at a speed of one to two of the driving shaft 14, consequently the cam-arm 16 is making one complete revolution while the wheel 6 is still eight (8) teeth short of a revolution; the cam shaft 3 being provided with a fixed gear 19 meshing with an intermediate gear 20 which is driven from the driving shaft 14 by means of a pinion 21, bearing a ratio of 1 to 2 of the gear 19.

One of the cams as 17 is designated to engage only the even numbered type bars 7, (Fig. 3), and the opposite offset cam 18 engages only the odd numbered type bars, and the relative length of these cams is just sufficient to engage and project its respective type bars and for only a given portion of the rotation of the members 6 and 16.

As hereinbefore stated, there is a differential speed between the numbering rings 6 and the cam-arm 16, and this difference is such that the cam 17 will pick up and project a given type bar 7, as No. 50, Fig. 3, when this type bar is in printing position opposite the first cylinder 8; and as the ring 6 and the cam-arm 16 turn in the same direction past the cylinders 8, the cam 17 continues to support the projected "No. 50" type bar, though the speed of the cam 17 is slightly faster than that of the type bar, each type bar printing against each cylinder 8 in succession before being released by its cam. It is for the reason of this differential speed that the cams 17 and 18 are given a certain length, so as to support an engaged type bar 7 until it has passed beyond the last cylinder 8. There are shown in this numbering ring fifty (50) independent numbering type bars 7 arranged in a particular and peculiar order which is best defined by stating that as there are one hundred (100) teeth in the gear 2 and fifty (50) type bars 7, there are two (2) teeth for each type bar.

When one of the cams as 17, has made a complete revolution it actually gains eight (8) teeth on the gear 2 and type ring 6, or what is the same, it gains four (4) type bars, which will bring it to position under the die No. 48 when that type bar (No. 48) has been carried from position shown in Fig. 3 to a position under the first cylinder 8 occupied by the die No. 50. Now since there are two (2) cams, the "odd number" cam 18 will gain two (2) type spaces in one-half ($\frac{1}{2}$) a revolution of the cam-arm 16 and pick up the type bar "No. 49" when that member is in printing position opposite the first cylinder 8, and after the "even number" cam 17 has printed "50" six times on the web A. It will be noticed that the type bar No. 49 is not diametrically opposite the type bar

No. 50 but is two (2) type bar pitches below that point, these pitches being the equivalent of four teeth of gear 2.

From the foregoing description it will be clear then that in one revolution of the cam 17 it will have gained on the gear 2 and ring 6 so as to coincide with the type bar No. 48 on the ring when that type bar No. 48 is adjacent the first cylinder 8. Meanwhile, during the contemporaneous travel of the cam 17 and type bar No. 50 and the web A six successive duplicate impressions are made at equidistant points on one side of the web. The arrangement of the type bar 7, is then determined by the differential movement of the type bar ring 6 and the cam-arm 16, and further by the multiplicity of cams 17 and 18.

Each cam 17—18 is designed to successively pick up type bars, 7, having their inner ends arranged in the path of respective cams. The cams are so positioned on the ends of the arms 16, that they travel in different but close parallel orbits, due to the fact that they are laterally offset, so that one, as 17, will successively engage the stems of the even numbered type and the other cam 78 will successively engage the odd numbered type. The stems of the even numbered type are arranged to one side of the type wheel 6 (see Fig. 2) and the stems of the other type are arranged toward the other side of the wheel so that the offset cams 17—18 will only engage and project those types whose stems are in their path.

While the type are traveling from the last cylinder 8 toward the first, they will be projected successively by their respective cams 17—18, but this is of no consequence, since they will only print when adjacent a cylinder. For instance, the cam 18 is shown as leaving type bar 49, and approaching type bar 25. Now as the cam 18 is moving faster than ring 6, it will project 25 during its travel below the shaft 3 and will drop it in time to project the next successive bar 7, in its path, which will be 49, when this arrives at the first cylinder 8. By arranging the type bar stems in staggered peripheral relation, as shown, they will be actuated only by their respective cams 17 or 18.

As the printing proceeds, for the reasons stated, in regular descending order, after the type bar No. 50 has performed its function, then the next type bar to be actuated will be No. 49, this being accomplished by the cam face 18; next, the cam face 17 will project the type bar No. 48, and this regular descending selection and projection of the type bars will continue until the entire fifty have been impressed upon the web thus forming, as each duplicately numbered section passes from the press and is secured, a pile of fifty sheets with the topmost being numbered "1."

When it is desired to print any number of sections of greater width than four (4) inches, then it is only necessary to turn the eccentric bearings 9 sufficiently to carry the cylinders 8 away from the projected face of the several type bars 7 leaving only such cylinder in printing position as is desired. Thus if it is intended to print sheets twelve (12) inches wide, all but the last two (2) cylinders 8 are receded, and then the distance rollers 10 are so adjusted by rods 10′ in clamps 22 that the distance the paper is caused to travel between the last two operative cylinders 8 will constantly pitch the numbers printed a distance of twelve (12) inches apart on the web. By proper adjustment of the several rollers 10 and the cylinders 8, any number of leaves *a* may be printed on the sheets *b* within the limits for which a particular machine is designed. When it is proposed to print numbers on both sides of the web then I simply run it over a reversing roller 25, Fig. 1 and then through a machine the duplicate of that used to number the other side. Any appropriate inking apparatus may be employed and I have shown a composition distributer 26 to transfer ink to the printing heads.

It is manifest or possible that the construction herein specified may be varied without departing from the principle of the invention, and I desire it to be understood that the invention is not limited to any specific form or arrangement of parts, except in so far as such limitations or their mechanical equivalents are specified in the claims.

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

1. In a numbering machine, the combination of a rotary support having a series of radially disposed type bars bearing odd and even numbers, means having a differential motion with respect to the support for actuating the even numbered type-bars, and other similar means having a differential motion to actuate the odd numbered type-bars, both of said means being turnable about a common axis.

2. In a numbering machine, the combination of a rotary support, a series of radially disposed staggered type bars movable radially in said support, and a type bar actuator having a plurality of cams, each adapted to successively project alternate number bearing type bars.

3. In a printing and numbering machine, a rotary carrier, a plurality of movable type having stems radially mounted in the carrier, and a rotary actuator having a plurality of circumferentially offset cams, said cams adapted to engage the inner ends of said stems, and each cam coöperative with certain of the stems to effect the successive projection of the type thereon.

4. A type wheel having a series of radially projecting, normally retracted type bars, a plurality of circumferential impression rollers, a cam concentric with the wheel, means for giving the cam and wheel a differential movement in the same direction, said cam adapted to act on a single type to project it into contact with each successive impression cylinder during each cycle of revolution of the type wheel, whereby the same combination of numbers may be printed a plurality of times on one complete revolution of the wheel.

5. A type wheel having a series of radially projecting, normally retracted type bars, a plurality of circumferential impression rollers, a cam concentric with the wheel, means for giving the cam and wheel a differential movement in the same direction, said cam adapted to act on a single type to project it into contact with each successive impression cylinder during each cycle of revolution of the type wheel, whereby the same combination of numbers may be printed a plurality of times on one complete revolution of the wheel, said cam having a plurality of operative faces whereby said type are alternately projected.

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

CLARENCE L. JOHNSTON.

Witnesses:
WILLARD W. WHITE,
CHAS. N. CRAMPIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."