C. L. JOHNSTON.

MULTIPLE NUMBERING MACHINE.

APPLICATION FILED MAR. 15, 1910.

987,372.

Patented Mar. 21, 1911.

2 SHEETS—SHEET 1.

Fig. 2.

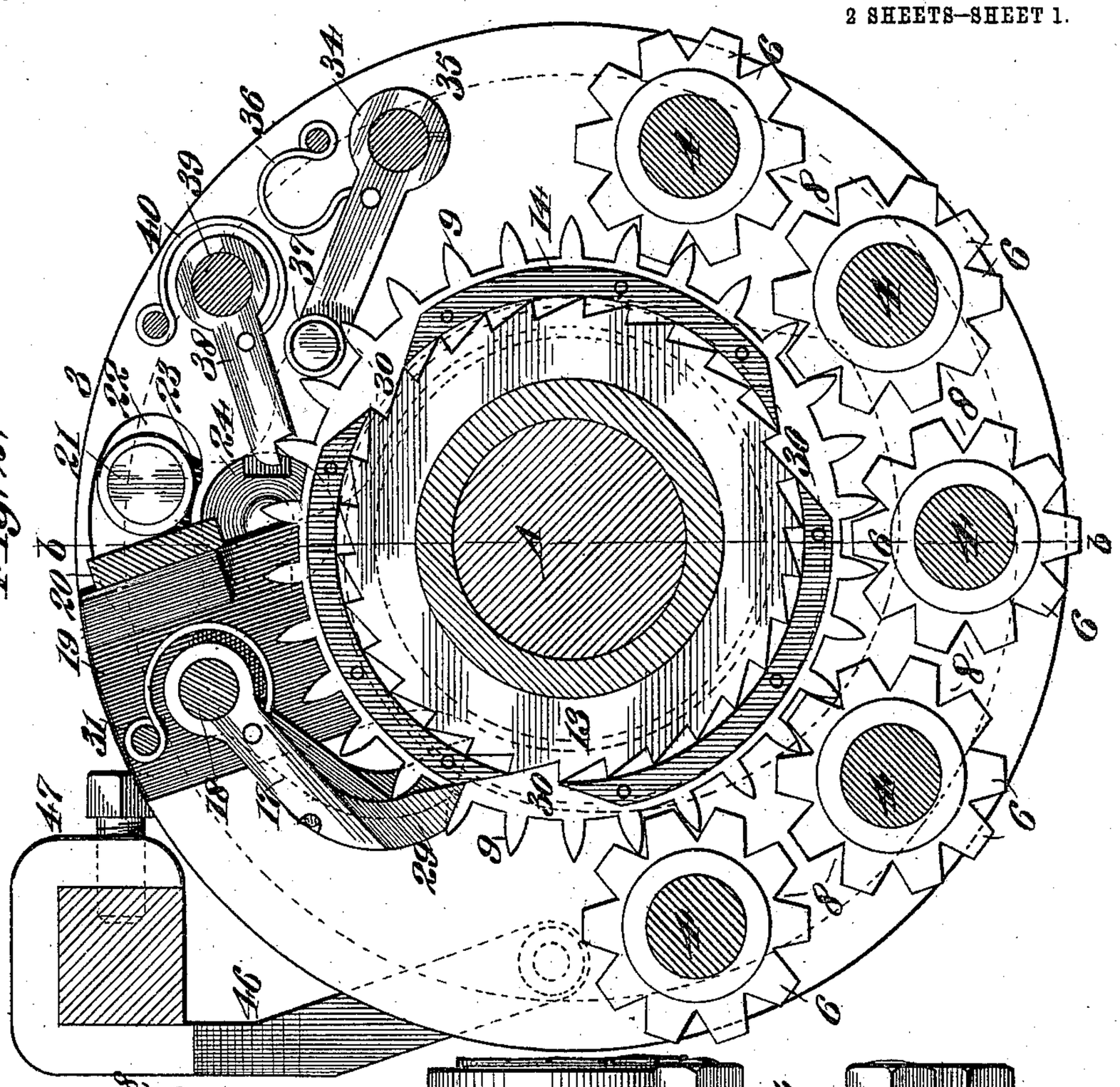
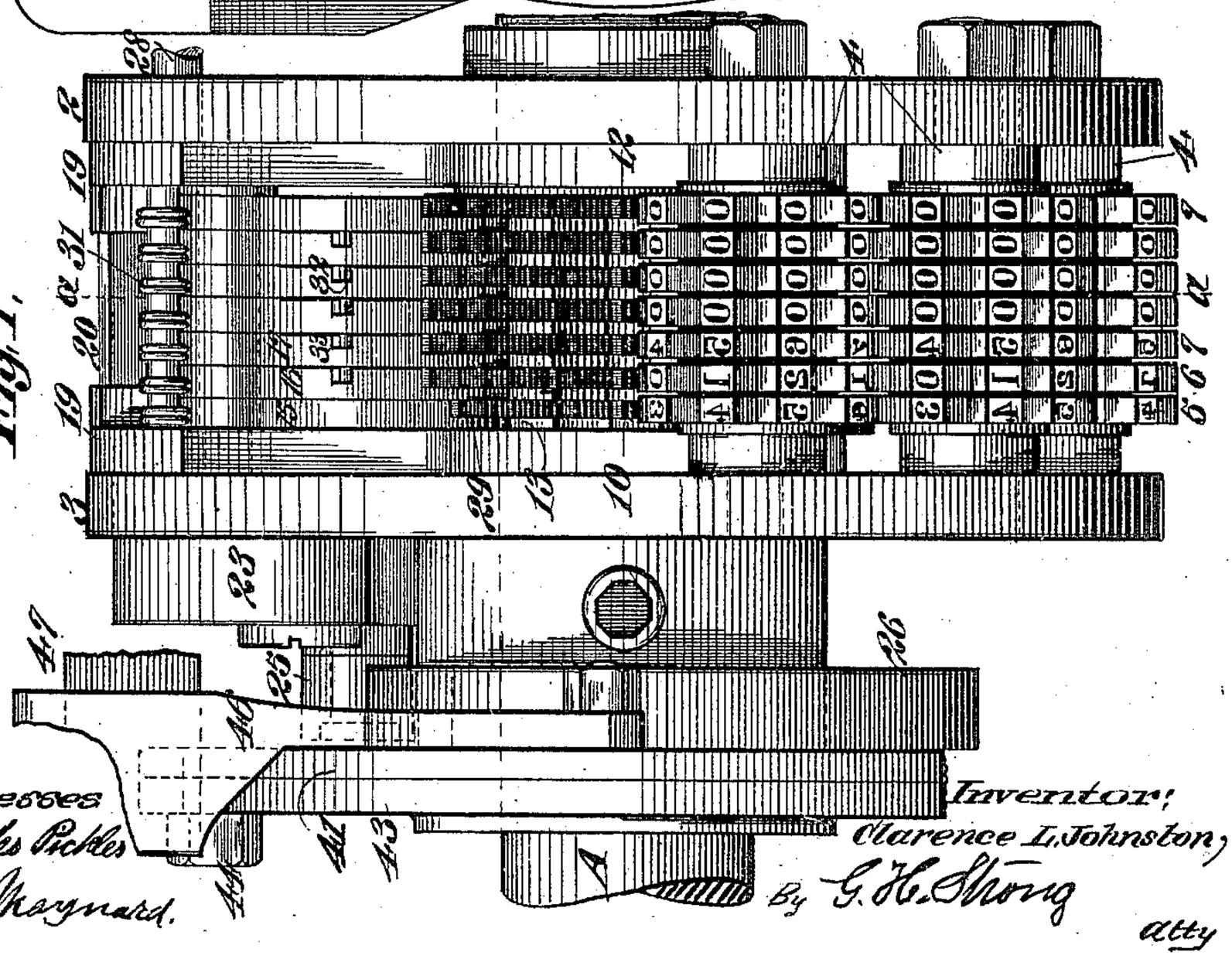


Fig. 1.



Witnesses
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Inventor;
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2 SHEETS—SHEET 2.

Fig. 3.

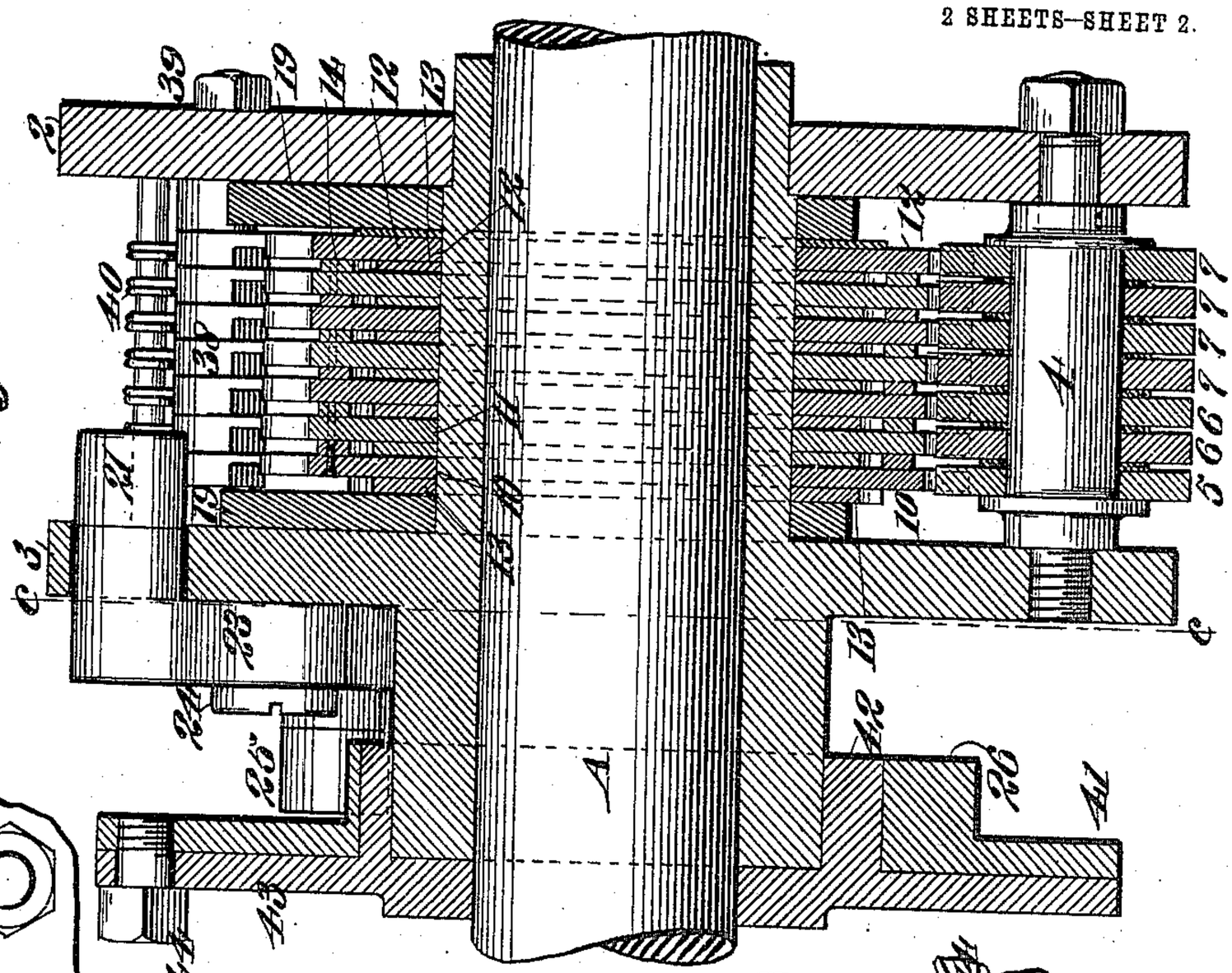


Fig. 5.

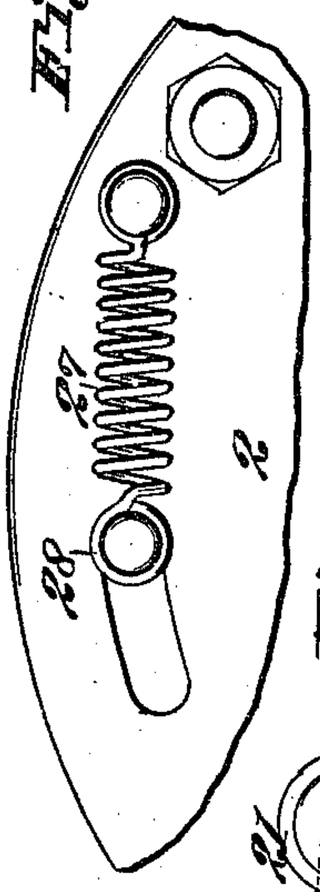


Fig. 4.

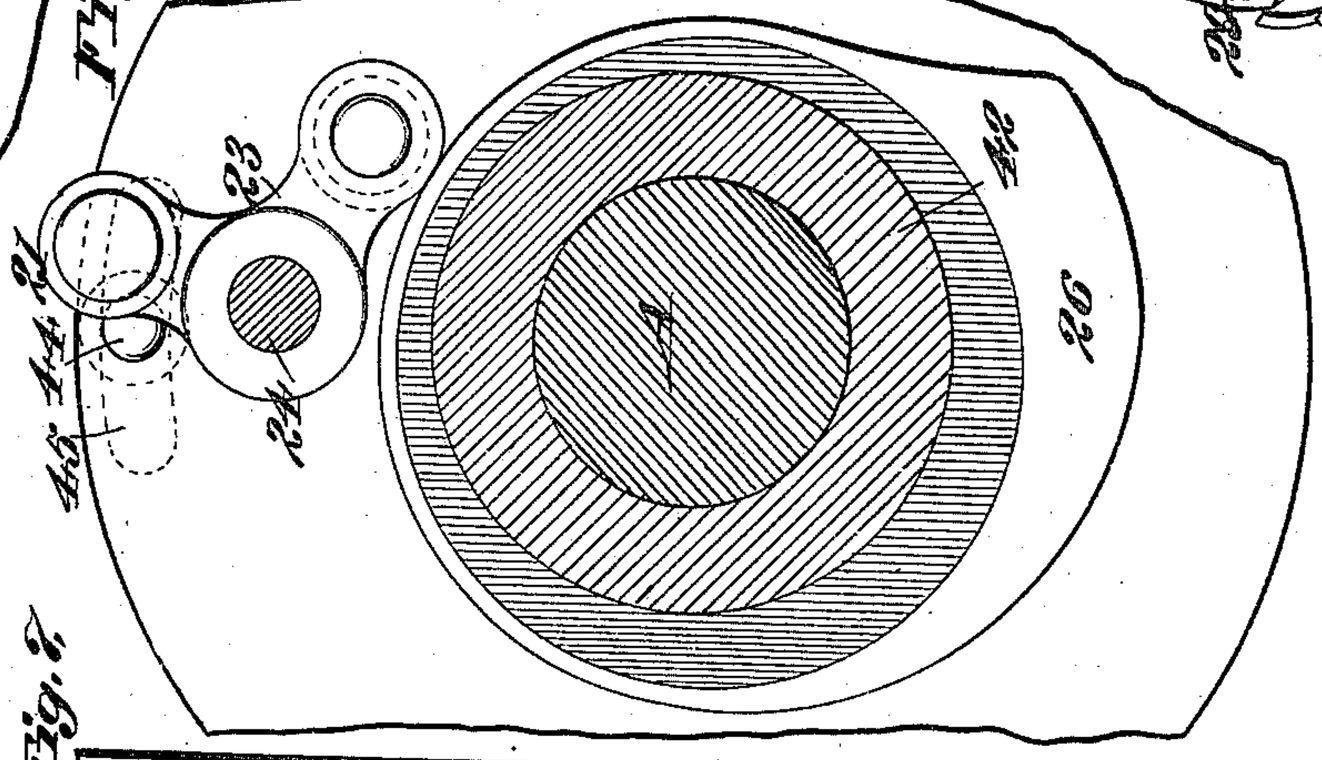
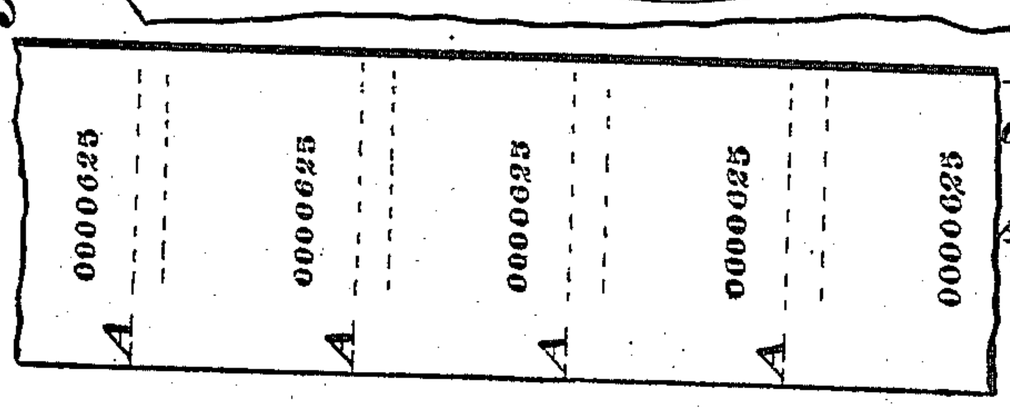


Fig. 6.

Fig. 2.



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Charles Pickles
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UNITED STATES PATENT OFFICE.

CLARENCE L. JOHNSTON, OF EMERYVILLE, CALIFORNIA.

MULTIPLE-NUMBERING MACHINE.

987,372. Specification of Letters Patent. **Patented Mar. 21, 1911.**

Application filed March 15, 1910. Serial No. 549,503.

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 Multiple-Numbering Machines, of which the following is a specification.

My invention relates to numbering machines, and pertains especially to a continuously operating, automatic, consecutively numbering machine for numbering simultaneously a plurality of sheets, slips, or the like.

The object of the invention is to provide a simple, practical automatic numbering machine for use in conjunction with a printing-press, and especially a press for printing street-car transfers and the like. These transfers are printed usually ten on a sheet, the separate transfers, after numbering, being severed and bound. These transfers are printed in tremendous quantities, and they all have to be numbered so that every book of transfers will have the numbers on the transfers running consecutively. I have designed a simple, practical and successfully-operating numbering machine for numbering these transfers after they are printed onto a sheet, and while the sheet is progressing through the press, and which numbering machine forms the subject-matter of the present invention.

The invention consists of the parts and the 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. Fig. 2 is a cross-section on line *a*—*a* of Fig. 1. Fig. 3 is a longitudinal section on line *b*—*b* of Fig. 2. Fig. 4 is a cross-section on line *c*—*c* of Fig. 3. Fig. 5 is a detail view of one of the disks. Fig. 6 is a detail perspective view of one of the decimal wheels. Fig. 7 is a diagrammatic view of a numbered sheet.

A is a rotary shaft driven at suitable speed by any appropriate means, and the numbering devices are carried by and turn around with this shaft. On the shaft are mounted two disks or side plates 2—3 between which the numbering mechanisms are housed.

In practice, the machine operates to apply simultaneously five exactly similar numbers to as many printed transfers on a sheet. A fragment of one of these transfer sheets, printed and uncut, ready for numbering, is diagrammatically represented in Fig. 7; the transfers on a sheet being numbered, as shown, by my machine as the sheet travels in the direction of the arrow. In order to simultaneously print five like numbers to as many transfers, I arrange five spindles 4 which have their ends suitably journaled in the side plates 2—3, and each of these spindles 4 carries a series of numbering wheels 5—6—7, etc. The number of numbering wheels 5—6, etc., on any one spindle will depend on the highest number, usually seven, which is to be printed by the machine; these wheels 5—6, etc., corresponding to units, tens, hundreds, etc. Each of these wheels has its periphery divided into ten numbering spaces, and bears suitable type, "0"—"1"—"2"—"3"—"4", etc., and each wheel between each of its type face is indented, as shown at 8, to intermesh with the teeth 9 of a corresponding master gear 10—11—12, etc., loose on shaft A. The number of these master gears 10—11, etc., equals the number of counting wheels 5—6—7, etc., on a spindle 4; the master gear 10 being the unit gear for the unit count wheel 5; the gear 11 being the tens gear for the tens count wheel 6; the gear 12 being the hundreds gear for the hundreds count wheel 7; and so on. The five sets of count wheels on the five several spindles 4 are arranged circumferentially of the master gears 10—11, etc., and at a uniform distance from the center of the shaft A; and all the count wheels intermesh with all their corresponding master gears, so that whenever any master gear, as 10, is turned, the five unit count wheels 5 will all turn simultaneously. It is understood that the five counting devices are arranged each to print the same number; the printing peripheries of the count wheels being adapted to project slightly beyond the perimeters of the plates 2—3, when printing.

The mechanism for giving to the master gears a proper step by step movement is housed between the plates 2—3 in such fashion as not to interfere with the paper being printed on. Each master gear carries a ratchet ring 13 on one side, and a decimal ring 14 on the other; and in order to economize space, the ratchet ring on gear 11 is inside of, and in the same plane with, the decimal ring 14 on gear 10. Likewise the ratchet ring 13 on gear 12 is inside of, and in the same plane with, the decimal ring

14 on gear 11; and so on through the series. Each master gear is operated intermittently by a respective spring-pressed dog 15—16—17, etc., all these dogs being journaled on a transverse pin 18 journaled in a rocking frame 19 which comprises two plates both turning free on shaft A, one on each side of the sets of count wheels and master gears, and suitably connected by a cross plate 20. This rocking lever frame 19 revolves with the shaft and is intermittently oscillated to give a proper step by step movement to the master gears and count wheels, by suitable means, as a crank-pin 21 working in a segmental slot 22 in plate 3, the crank-pin 21 being carried by a bell-crank 23 fulcrumed at 24 on the outside of plate 3, and carrying a roller 25 which projects outwardly and parallel with shaft A, and engages at each revolution of the numbering machine with the fixed cam 26. Every time that roller 25 rides up on the longer radius of cam 26, the crank-arm 21 is thrown forward, pressing on the back plate 20 of frame 19, and rocks the frame 19 forward against the tension of the spring 27. This spring 27 has one end secured on the outside of plate 2, and its other end suitably fastened to a pin 28 which projects through a segmental slot in plate 2 and is fixedly secured to the frame 19. Each of the dogs 15—16—17 has a thin fin or finger 29 equal in thickness to a decimal ring 14. Ordinarily all these fingers 29, except for the units pawl 15, ride or are supported on top of a decimal ring immediately underneath; the finger 29 of the units pawl 15 riding always on its ratchet, because the units numbering wheel is set forward one step with each revolution of shaft A. The tens count wheel 6 and its corresponding gear 11 only move one step with each ten revolutions of shaft A, and so on progressively through the series. So, starting with all the count wheels at zero, all the pawls, except the unit pawl 15, would be resting and riding on the smooth outer surfaces of their corresponding decimal rings 14, and although the frame 19 would rock forward with each revolution of shaft A, pushing all the pawls forward at the same time, yet only the units pawl would catch the teeth of its ratchet ring 13, until the shaft A had made ten revolutions. On the tenth revolution of shaft A, the units master gear 10, with its ratchet ring 13 and its decimal ring 14, would have moved ten steps forward, and on its tenth step a notch 30 in this decimal ring would be brought into register with the finger on the tens pawl 16, which would allow this finger to drop through far enough to engage, on the next oscillation of frame 19, the ratchet ring 13 on the tens master gear 10 and shift the latter forward one step and correspondingly turn one-tenth of a revolution all of the tens count wheels 6. The moment, however, that the roller 25 has ridden off of cam 26 and the pawls are thrown back by the action of spring 27, the finger 29 of the tens pawl 16 rides upward again on to the decimal ring 14 of the units gear 10 and remains out of engagement with its tens ratchet ring until the shaft A has made ten more revolutions, when the pawl 16 is allowed to drop through another notch 30 in the units decimal ring and shift the tens gear and count wheels forward another step. This action is repeated until the shaft has turned one hundred times, when a notch 30 in the decimal ring on the tens gear 11 allows the hundreds pawl 17 to drop through and catch the hundreds ratchet 13 and move it a step forward. This progressive movement is continued throughout the series in a manner readily understood. The number of teeth 9 on the several master gears is a multiple of the number of indentations 8 on the count wheels. In the machine here illustrated there are thirty teeth on each master gear, and consequently three notches 30 in each decimal ring 14 so as to allow an actuating pawl to drop through at the completion of each cycle. The pawls are all acted on by springs 31 to cause them normally to press toward the ratchet rings and decimal rings; and in order to prevent any pawl from bearing down too hard, or engaging prematurely its ratchet ring before it should do so, I provide each pawl with a laterally projecting pin 32 which is adapted to seat in a corresponding notch 33 in the top of and on the adjacent side of the next adjacent pawl. Thus, any pawl can be lifted, but it can only drop down to engage its ratchet ring when all the pawls to the right, or toward the unit end of the device, are engaged with their ratchet rings.

In order to center the several counting devices after each actuation of the pawl-carrying frame 19, suitable means are provided, as the brake levers 34 which fulcrum on a pin 35 fixed in the plates 2—3. There is one of these brake levers 34 for each master gear, and each lever is acted on by a spring 36 to cause the lever to press inward and carry a roller 37 in between a pair of teeth 9 of a corresponding gear. The teeth 9 of all the gears are beveled, so that the rollers 37 readily seat between them and prevent back lash; at the same time the tension of the spring 36 is such as to allow the rollers readily to be pushed out and to drop again into a succeeding tooth space when the pawl frame 19 is oscillated.

In order to insure further precision of operation, and prevent duplication of numbers or mistakes by the possible turning back of the count wheels, I provide the check levers 38 which journal on a pin 39 carried by the plates 2—3. These check levers 38 are acted on by a spring 40, and each lever

has a notched end engaging, each time a master gear comes to rest, with the point 9 of the gear. These levers 38 will thus allow the gears to turn forward, but effectually prevent any retrograde movement.

As nicety of adjustment is essential to a successfully-operating machine of this character, and as wear on the cam 26 is inevitable, I provide a simple, practical means for adjusting this cam from time to time so that it will always give a uniform throw to the pawl-carrying frame 19. As shown, the cam 26 is part of a plate 41, and this plate 41 in the hub of the cam has an eccentric bore in which fits the eccentric hub 42 of another plate or disk 43; the two plates 41—43 being adjustably locked together by means of a lock-screw 44 which threads into plate 41 and is adjustable in a segmental slot 45 in plate 43. The plate 43 is arranged concentric with shaft A, but is held stationary by suitable means, as the hanger 46 engaging a fixed bar 47. From this it is seen that by loosening up on the set-screw 44 and turning the plate 41 which carries cam 26, in one direction or the other, the longer radius of the cam 26 will be lengthened or shortened correspondingly; and on the length of the radius of cam 26 depends the amount of throw given to the pawl-carrying rocking frame 19.

The operation of the device is briefly as follows: The sheets to be imprinted are made to pass under the numbering machine and in a direction at right angles to the shaft A. Shaft A being suitably rotated will carry at each revolution all of the numbering devices down on the underneath traveling paper, so as to make five successive imprints; all the imprints being alike, as represented, for instance, in Fig. 7. If there are more than five imprints, or more imprints than the one numbering machine can make upon a single sheet of paper, then there will be a successively arranged numbering machine which will print in the spaces omitted by the first numbering machine. All the counting wheels and numbering devices are carried around by the shaft, and on each revolution the roller 25 engages with the fixed cam 26 to rock the pawl-carrying frame 19 forward to actuate the units gear wheel 10 and all the corresponding unit wheels 5 one step movement forward. All the pawls, except the first, 15, ride on the underneath decimal rings 14, except when a notch 30 is brought around so as to allow one of the pawls to drop through and pick up its corresponding ratchet ring and turn its master gear and its corresponding count wheels. Thus, except when there is a decimal change to take place in the count wheels, the several ratchets, except the units ratchet, are guarded by the decimal rings.

It will be manifest that there could be any number of these counting devices arranged circumferentially of the shaft, or equivalent revoluble support, each counting device comprising a series of denomination pinions, and all these pinions being actuated at proper intervals by suitable master gears.

One of the important features of this invention is the use of the decimal rings by which only a single pawl is necessary to actuate a plurality of denomination pinions. And at all times, except when making a decimal step up in the numbering devices, all the pawls, except one, are inoperative, although they all move forward each time the frame 19 is oscillated.

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

1. The combination of a rotary shaft, a loose master-gear thereon, a series of circumferentially arranged denomination pinions intermeshing with said gear, a decimal ring and a ratchet wheel fixed to opposite sides of the master-gear, and means including a single pawl acting on said master-gear to rotate all of said denomination pinions.

2. In a register mechanism, the combination of a rotary shaft, a series of circumferentially arranged counting members, each of said counting members comprising denomination pinions in series, and master gears loose on the shaft and meshing with corresponding denomination pinions, said pinions and master gears turning with the shaft, and means operative during the rotation of the shaft imparting a progressive step by step movement to said master gears, said last-named means comprising a ratchet ring and a decimal ring on each master gear, and pawls intermittently engageable with said ratchet rings.

3. In a register mechanism, the combination of a rotary shaft, a series of circumferentially arranged counting members, each of said counting members comprising denomination pinions in series, and master gears loose on the shaft and meshing with corresponding denomination pinions, said pinions and master gears turning with the shaft, and means operative during the rotation of the shaft imparting a progressive step by step movement to said master gears, said last-named means comprising a ratchet ring and a decimal ring on each master gear, and pawls intermittently engageable with said ratchet rings, the ratchet ring on one gear being normally shielded by the decimal ring of a succeeding gear.

4. In a register mechanism, the combination of a rotary shaft, a series of circumferentially arranged counting members, each of said counting members comprising denomination pinions in series, and master gears loose on the shaft and meshing with corresponding denomination pinions, said

pinions and master gears turning with the shaft, and means operative during the rotation of the shaft imparting a progressive step by step movement to said master gears, said last-named means comprising a ratchet ring and a decimal ring on each master gear, and pawls intermittently engageable with said ratchet rings, the ratchet ring on one gear being normally shielded by the decimal ring of a preceding gear, and each decimal ring notched at intervals to allow a pawl to drop through and engage a ratchet ring.

5. In a register mechanism, the combination of a rotary shaft, a series of circumferentially arranged counting members, each of said counting members comprising denomination pinions in series, and master gears loose on the shaft and meshing with corresponding denomination pinions, said pinions and master gears turning with the shaft, and means operative during the rotation of the shaft imparting a progressive step by step movement to said master gears, said last-named means comprising a ratchet ring and a decimal ring on each master gear, and pawls intermittently engageable with said ratchet rings, said pawls mounted on an oscillating frame, and means for intermittently oscillating said frame.

6. In a register mechanism, the combination of a rotary shaft, a series of circumferentially arranged counting members, each of said counting members comprising denomination pinions in series, and master gears loose on the shaft and meshing with corresponding denomination pinions, said pinions and master gears turning with the shaft, and means operative during the rotation of the shaft imparting a progressive step by step movement to said master gears, said last-named means comprising a ratchet ring and a decimal ring on each master gear, and pawls intermittently engageable with said ratchet rings, said pawls mounted on an oscillating frame, means for intermittently oscillating said frame, said last-named means including a crank member engageable with said frame to rock the latter, said crank member revolving with the shaft, and a stationary cam to actuate said crank member.

7. In a register mechanism, the combination of a rotary shaft, a series of circumferentially arranged counting members, each of said counting members comprising denomination pinions in series, and master gears loose on the shaft and meshing with corresponding denomination pinions, said pinions and master gears turning with the shaft, and means operative during the rotation of the shaft imparting a progressive step by step movement to said master gears, said last-named means comprising a ratchet ring and a decimal ring on each master gear, and pawls intermittently engageable with said ratchet rings, said pawls mounted on an oscillating frame, means for intermittently oscillating said frame, said last-named means including a crank member engageable with said frame to rock the latter, said crank member revolving with the shaft, and a stationary cam to actuate said crank member, and means to adjust the throw of said cam.

8. In a numbering machine, the combination of a rotary shaft, a gear loose thereon, a denomination pinion meshing with said gear, a rockable frame revolving with the shaft and having a pawl engageable with said gear, a fixed cam, and a crank member engageable by the cam and operative on the frame to actuate said pawl at each revolution of the shaft.

9. The combination of a rotary shaft, a loose master-gear thereon, a series of circumferentially arranged denomination pinions intermeshing with said master-gear, and means including a ratchet-ring on the master-gear, and a pawl engaging the ratchet-ring whereby the denomination pinions are rotated in unison, and a decimal ring fixed to the master-gear and lying outside of and in the same plane with said ratchet-ring.

10. The combination of a rotary shaft, a series of loose master-gears thereon, circumferentially arranged denomination pinions intermeshing with said master-gears, and means including a ratchet-ring on each master-gear, a decimal ring on each master-gear, and a pawl engaging the ratchet-ring whereby the denomination pinions are rotated in unison, and means to actuate said pawl on each revolution of the shaft.

11. The combination of a rotary shaft, a loose master gear thereon, a series of circumferentially arranged denomination pinions intermeshing with said gear, means including a single pawl acting on said master gear to rotate all of said denomination pinions, a rocking frame concentric with the shaft carrying said pawl, a fixed cam, and means acted on by the cam to oscillate the frame.

12. The combination of a rotary shaft, a loose master gear thereon, a series of circumferentially arranged denomination pinions intermeshing with said gear, means including a single pawl acting on said master gear to rotate all of said denomination pinions, a rocking frame concentric with the shaft carrying said pawl, a fixed cam, and means acted on by the cam to oscillate the frame, said last-named means comprising a crank member journaled for revolution with the shaft and having a part in the path of the cam and another part in the path of said frame.

13. The combination of a series of loosely mounted co-axial and independently turnable master gears, denomination pinions en-

gageable by each gear, a rocking frame, a series of pawls corresponding to the number of master gears, each gear carrying a ratchet engageable by its pawl, and means by which all the pawls, except the first, are maintained out of engagement with their ratchet rings except on each tenth, hundredth, etc., revolution of the shaft.

14. The combination of a series of loosely mounted co-axial and independently turnable master gears, denomination pinions engageable by each gear, a rocking frame, a series of pawls corresponding to the number of master gears, each gear carrying a ratchet engageable by its pawl, and each gear also carrying a decimal ring concentric with and outside of the next adjacent ratchet ring, said pawls, except one, normally riding on said decimal rings, and said decimal rings each having a notch or opening to pass a pawl.

15. The combination of a rotary shaft, a numbering device carried thereby, said numbering device comprising a series of denomination pinions, and means for giving said pinions a step by step movement, said means including a rocking frame rotatable with the shaft, and a fixed cam, said cam having means for varying its throw.

16. The combination of a rotary shaft, a numbering device carried thereby, said numbering device comprising a series of denomination pinions, means for giving said pinions a step by step movement, said means including a rocking frame rotatable with the shaft, and a fixed cam, said cam carried by a plate and the cam and plate having a bore, a plate with an eccentric hub fitting said bore, said cam having a limited turning movement about said hub, and means for locking the cam plate to the hub plate.

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

CLARENCE L. JOHNSTON.

Witnesses:

HORACE P. BROM,

J. V. KIMBALL.