No. 755,695. PATENTED MAR. 29, 1904.

C. F. PIDGIN.

APPARATUS FOR COMPILING STATISTICS.

APPLICATION FILED JUNE 17, 1899.

NO MODEL. 6 SHEETS—SHEET 1.

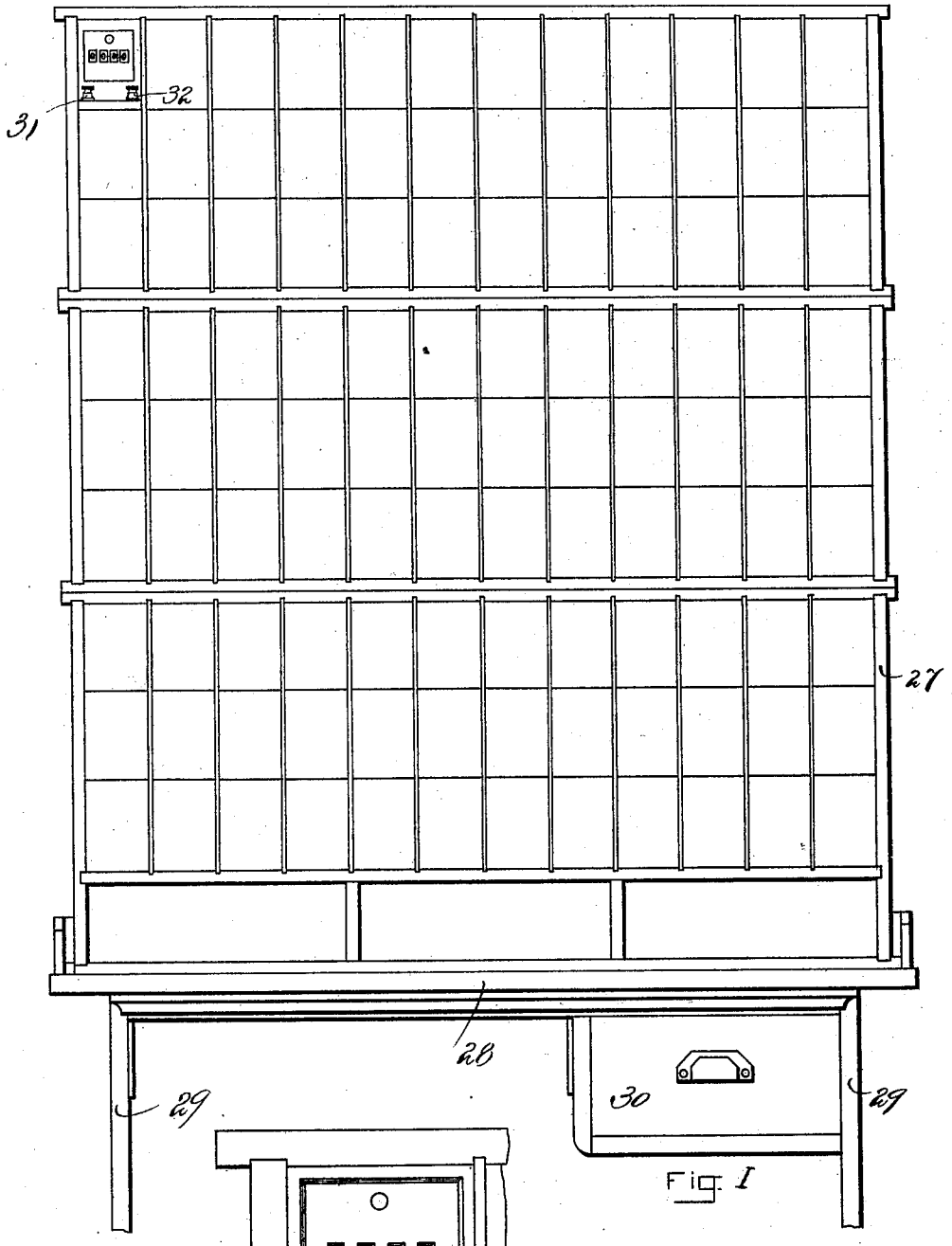



Fig. 1

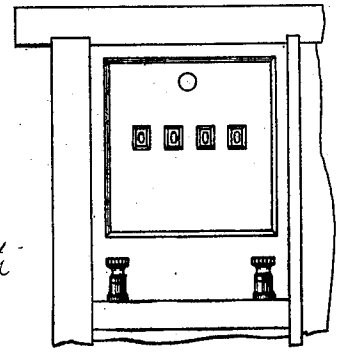


Fig. 2.

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NO MODEL. 6 SHEETS—SHEET 2.

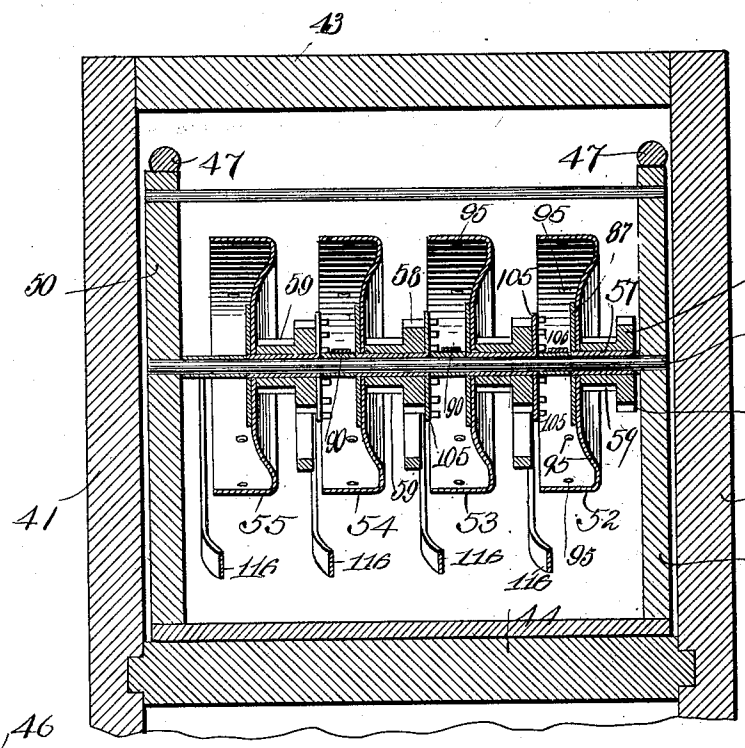



Fig. 5.

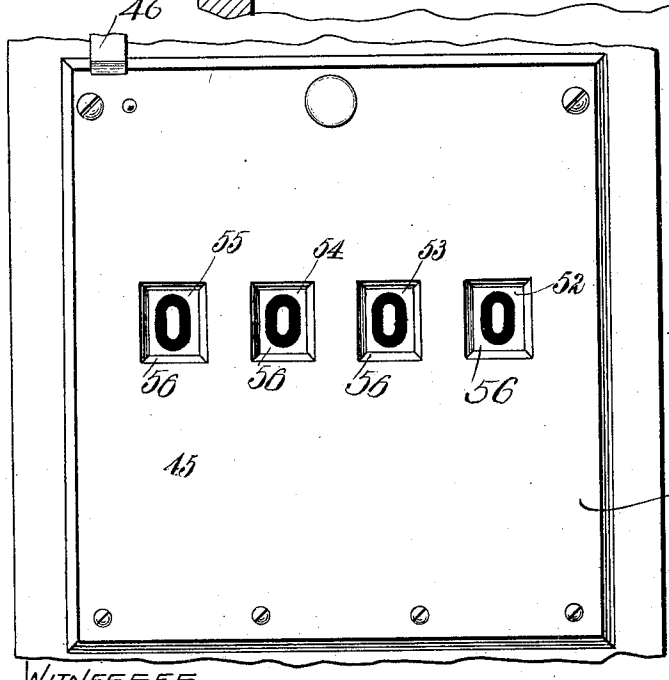



Fig. 3.

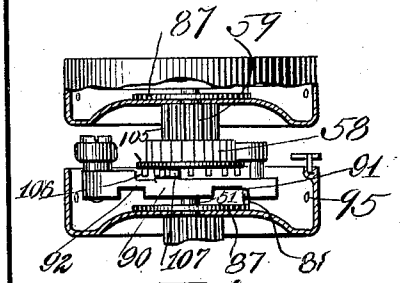



Fig. 6.

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NO MODEL. 6 SHEETS—SHEET 3.

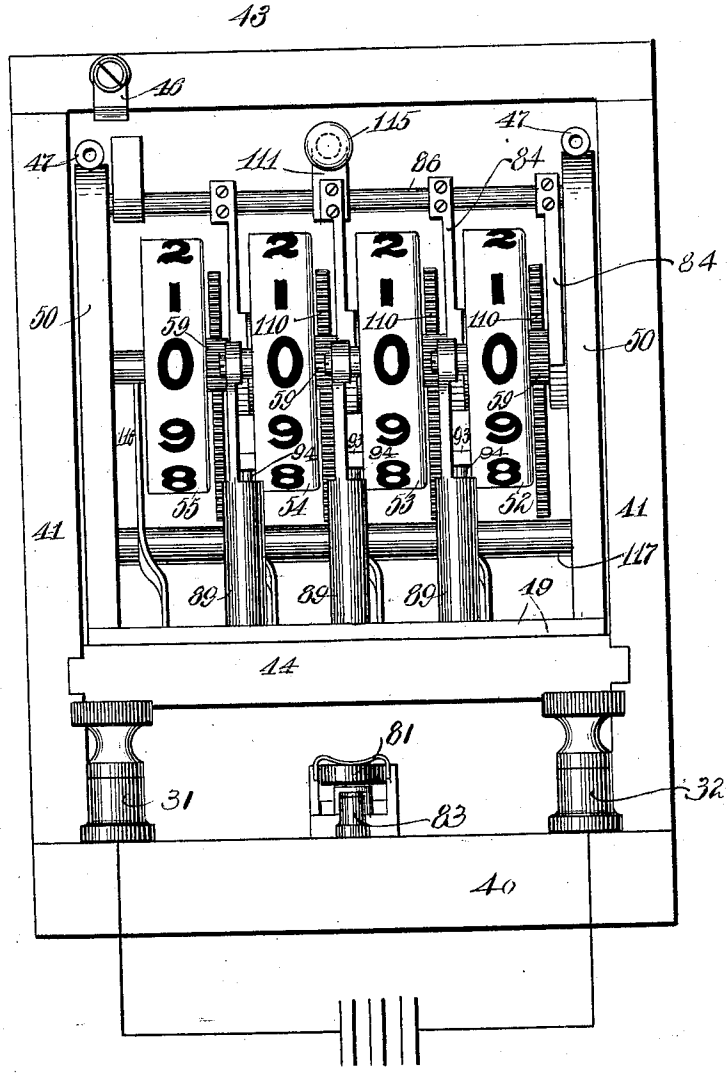



FIG. 4.

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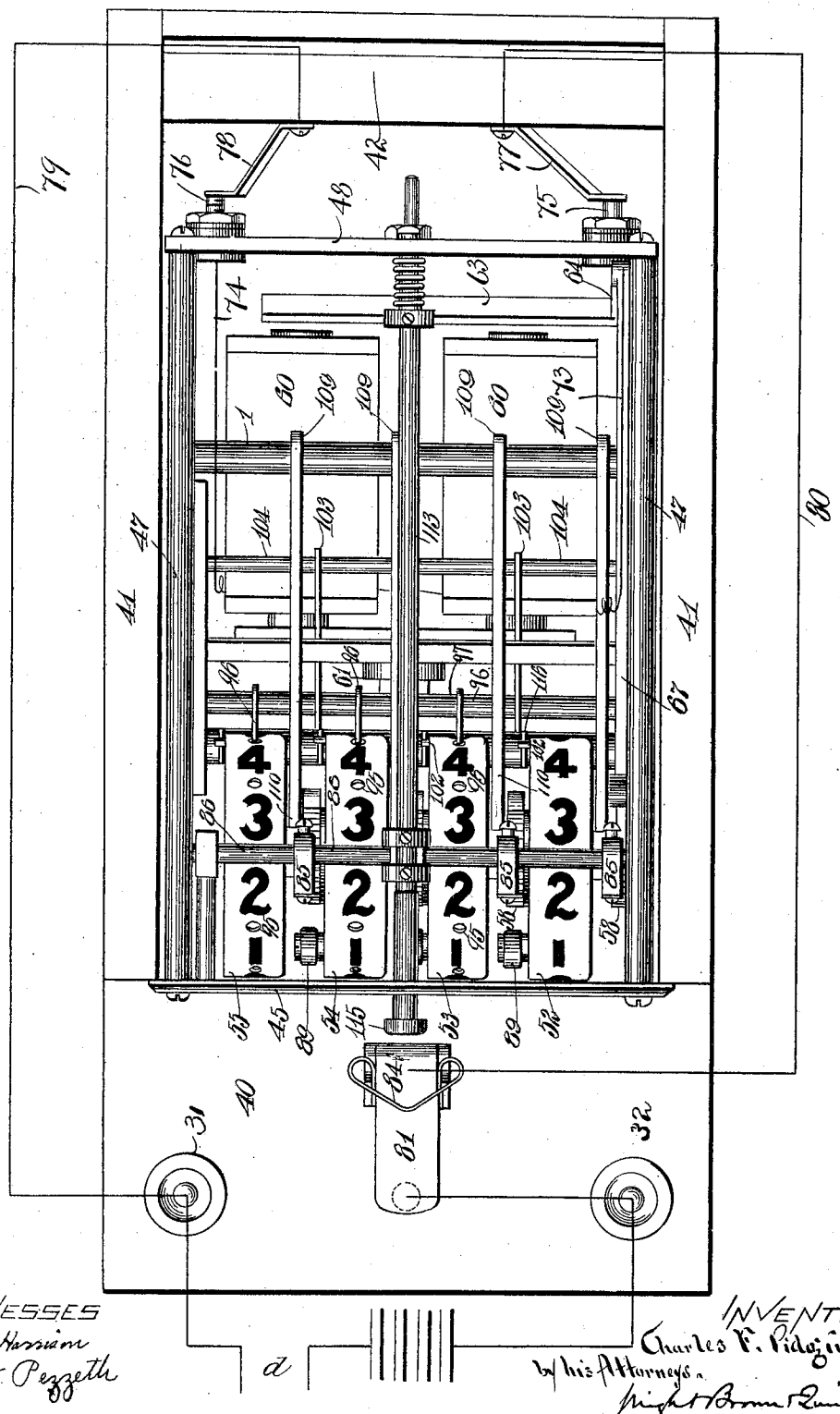
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NO MODEL. 6 SHEETS—SHEET 4.

Fig. 1.




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NO MODEL. 6 SHEETS—SHEET 5.

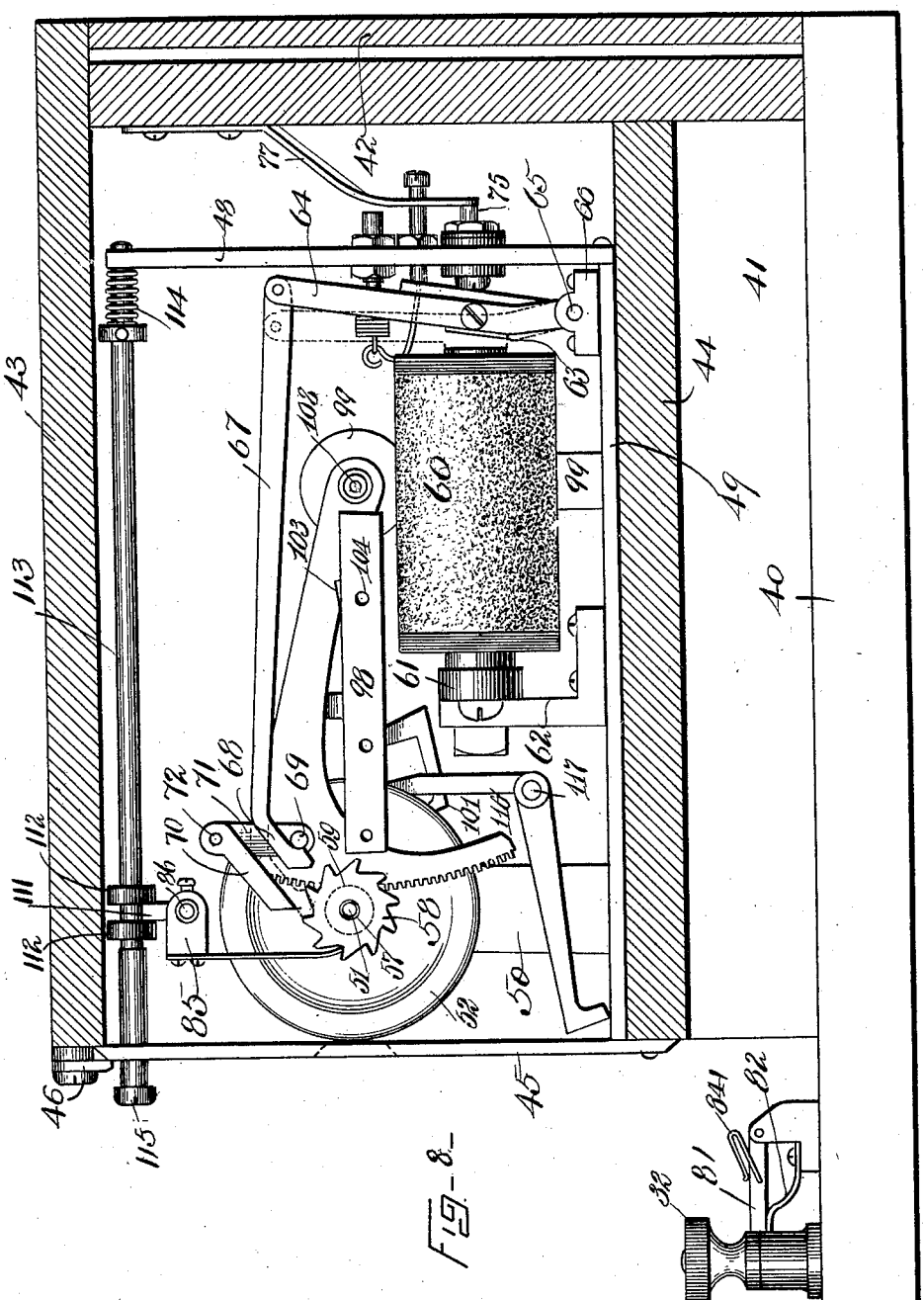



FIG. 8.

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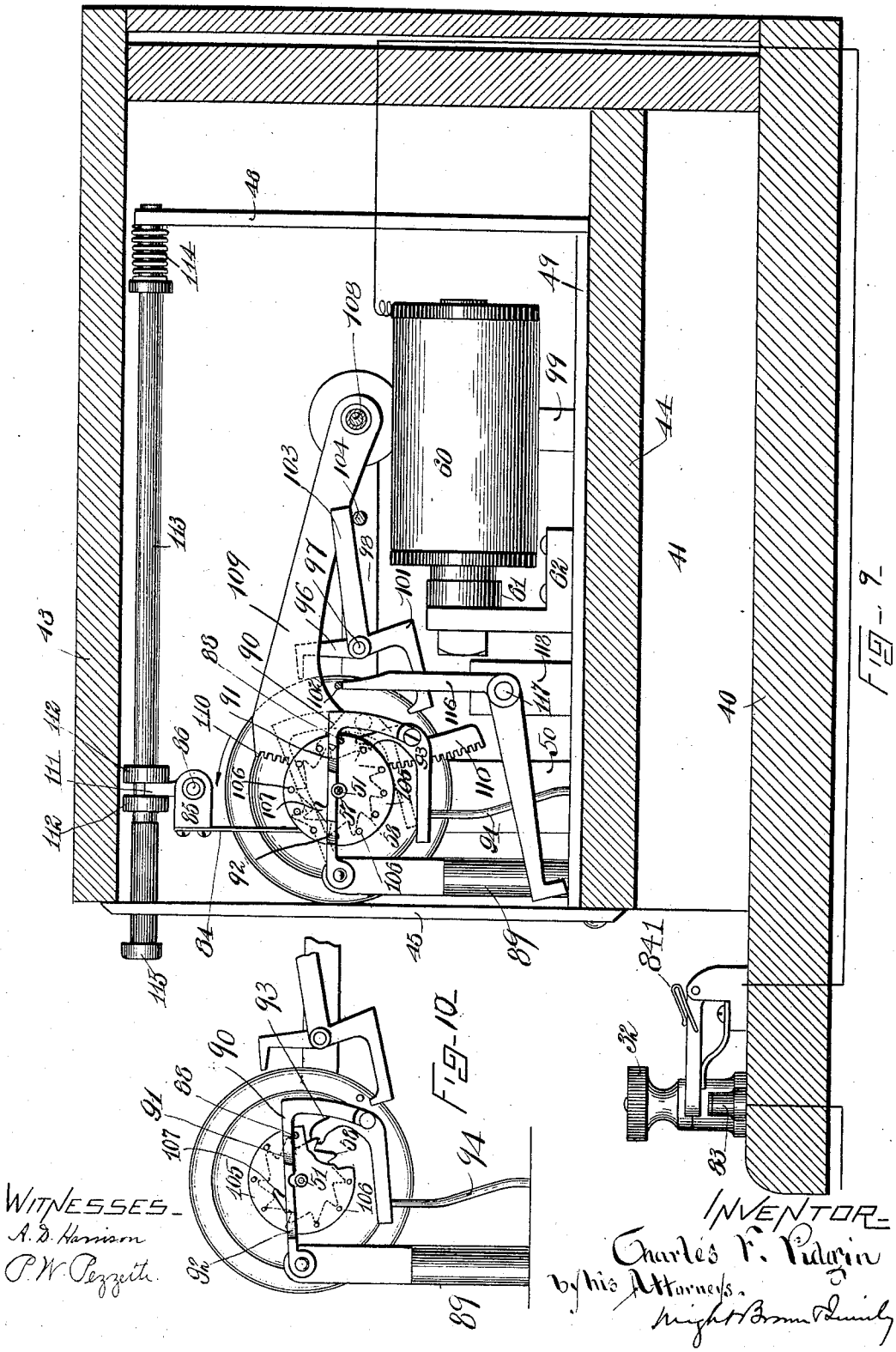
No. 755,695. PATENTED MAR. 29, 1904.

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APPLICATION FILED JUNE 17, 1899.

NO MODEL. 6 SHEETS—SHEET 6.







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No. 755,695. Patented March 29, 1904.

# UNITED STATES PATENT OFFICE.

CHARLES F. PIDGIN, OF BOSTON, MASSACHUSETTS.

## APPARATUS FOR COMPILING STATISTICS.

SPECIFICATION forming part of Letters Patent No. 755,695, dated March 29, 1904.

Application filed June 17, 1899. Serial No. 720,995. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES F. PIDGIN, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Compiling Statistics, of which the following is a specification.

This invention has for its object the provision of means for tabulating or compiling statistics, such as sociological or population statistics of a census.

Heretofore in the compilation of items or characteristics relating to individuals, as in census work, it has been the practice for each enumerator of a district to place upon a large sheet capable of receiving forty or fifty names all the data or items relating to each individual—as, for instance, age, sex, color, place of birth, conjugal condition, birthplace of parents, employed or unemployed, relation to head of family, length of residence in a town, city, or state, &c. From these sheets tables are made with particular reference to certain items or correlations of items, each individual being regarded as a unit. For instance, it is not only necessary to prepare tables showing how many persons are male or female, white or black, natives or foreigners, &c., but also to prepare others showing how many persons have the same characteristics or how many are white males twenty-one years of age, are native born, and follow the same occupation. Consequently it has been the practice to transfer from the large sheets data relating to each individual and subsequently compile statistics from such transferred items. The present invention is applicable for transferring from the said sheets or returns said items.

Referring to the drawings which illustrate one embodiment of my invention and upon which similar reference characters indicate similar parts or features, as the case may be, wherever they occur, Figure 1 represents in front elevation the counting-machine. Fig. 2 represents, somewhat enlarged, one of the counters. Fig. 3 represents a still larger view of the counter. Fig. 4 represents the same with the face-plate removed. Fig. 5 represents a vertical section through the counter. Fig. 6 shows the device for carrying one of the numeral-bearing devices to the other. Fig. 7 represents a plan view of the mechanism of one of the counters. Fig. 8 represents a longitudinal section through the same. Fig. 9 represents another section taken on a different plane. Fig. 10 represents a portion of the carrying device.

In case the original enumerator has made his returns upon the ordinary census-sheet, as previously referred to, which contains a vertical column of names and the facts relating to the individuals extending in a line horizontally from each name across the sheet from left to right, it is necessary to transfer the items to the punch-cards, and hence the counting of the items is coincident with the punching of the cards, since the punch closes the electric circuit which operates the counting mechanism whenever an aperture is made in the card; but where the original enumerator punches the cards the closing of the circuit is accomplished by inserting a punch or pin through the apertures already made.

The counting mechanism is confined within a suitable casing 27, supported by a table 28, placed on legs or standards 29. The casing is divided into three detachable sections, as shown in Fig. 1, placed on top of each other, and each section is subdivided by partitions into thirty-six compartments, each of which is adapted to receive a counter. The table 29 is formed with a suitable drawer 30 to receive the cards, and the flat portion of the table projects in front of the casing 27 to receive the punch-board. The counters are detachably inserted in the compartments in the casing and are all the same, so that I shall describe only one of them. Each counter has a base-plate 40, with upright side walls 41, a rear wall 42, and a top wall 43, all made of wood and suitably connected together. The base is projected forwardly to receive the binding-posts 31 32, (and a circuit-closer, hereinafter referred to.) The side walls have internal grooves to receive a shelf 44, which may be slid horizontally into place. The counting or registering mechanism is secured upon the shelf so that it can be easily removed for inspection or repairs. A face-plate 45 is secured at its lower end to the shelf 44 and is adapted to be secured at its upper edge to the top 43

by a fastener 46. This plate is connected by bars 47 47 (see Figs. 5 and 7) with a rear upright plate 48, whose lower edge is attached to the end of a flat horizontal plate 49, placed on the shelf 44. Rising from the plate 49 are two standards 50, in which is secured a shaft 51 for the numeral-bearing wheels 52, 53, 54, and 55, which represent units, tens, hundreds, and thousands, respectively, in the order named. The face-plate 45 is formed with four apertures 56, in each of which appears one of the numerals of the wheel which is located directly behind it, as shown in Fig. 3. Each of the wheels has a flange broad enough to receive the numerals and is concave, (see Fig. 5,) being in the form of a cup-shaped shell. Each wheel is rigidly secured on a sleeve 57, loose on the shaft 51, and the sleeves are separated by spacers to hold them against axial movement. Rigidly secured to each sleeve 57 is a ratchet 58 and a pinion 59, formed in one integral part or member, the ratchets having ten teeth each to correspond to the numerals on the wheels 52 to 55, inclusive. The ratchet for the units-wheel is rotated one step at a time by mechanism actuated by an electromagnet 60, having its cores secured to a strip 61, in turn supported by a bracket 62, as shown in Figs. 7 and 8. The armature 63 extends laterally from a lever 64, fulcrumed on a pin 65 in a bracket 66 on the plate 49. To the upper end of the lever is pivoted an elongated pawl 67, whose free end is bent downwardly, as at 68, and rests upon a stud 69, projecting from the standard 50. When the armature is drawn toward the magnet, the end of the pawl 67 slides down the stud 69 and engaging the ratchet 58 rotates it one step. To prevent the ratchet from being caused to rotate by momentum more than the proper distance, an inclined stop 70 is placed in front of and above the end of the pawl, so that the latter encounters it when it has been thrown forward and has reached the end of its movement and is wedged between the teeth of the ratchet, and the latter is thereby held from further rotation. Said stop is secured rigidly to a small metallic strip 71, attached by the stud 69 and a pin 72 to the standard 50. As shown in Fig. 7, the coils of the magnet are connected by wires 73 74 with contact-pins 75 76, adjustably secured in the rear plate 48. The pins when the shelf 44 is slid into place bear against the spring-contacts 77 78, respectively, which are located on the rear wall 42, (said wall being formed of two separated layers.) The contact 78 is connected by a wire 79 with the binding-post 31, while the contact 77 is connected by a similar wire 80 with the post 32. By this arrangement the wiring of the casing can easily be accomplished while the counters are removed and the latter secured detachably in place without directly connecting the wires thereto.

On Fig. 7 I have shown the counter as having a complete independent circuit, including a key for closing it. The key is indicated at 81 and is held by a spring 82 out of engagement with a stationary contact 83. A slip of paper, as a card, may be attached to the key by a spring-clip 841 to designate the items for tabulating which the counter is used. Usually these keys, of which there are one hundred and eight, may be arranged in banks, so that they can be manipulated like those of a type-writer.

Referring once again to the counter and to Figs. 5, 6, and 8, it will be seen that the ratchets 58 are held against reverse movement by spring-pawls 84, attached to arms 85, mounted rigidly upon a shaft 86, journaled in the standards 50. The carrying device for imparting one movement to the next adjacent numeral-bearing wheel when the wheel to the right of it has moved ten steps or one complete rotation comprises the following members: On each of the sleeves 57, inside the wheel carried thereby, is a disk 87, provided with a single pin 88 near its outer edge, and pivoted on a post 89, arranged between and in front of each pair of wheels, is a lever 90, which extends backward and normally rests upon the shaft 51. This lever lies in the path of movement of the pin 88 and is engaged and lifted thereby, being provided with a slot 91, through which the pin passes when it has raised the lever the desired extent. The lever is provided with another slot 92 in front of the shaft 51 to permit the free passage of the pin 88 after it has been raised thereby. The end portion of the lever is curved downwardly in a curve struck from the pivot as a center, and on its extremity is pivoted a weighted pawl 93, having a notched end adapted to engage a tooth of the ratchet 58 to the left thereof. When the lever 90 is resting on the shaft 51, the weighted tail of the pawl 93 strikes against an upright pin 94 and holds the notched end of the pawl away from the ratchet. As one numeral-bearing wheel completes its ninth step or movement the pin 88 engages the lever 90 and raises it slightly, as shown in Fig. 10, to move the end of the pawl 93 into engagement with a tooth of the ratchet for the next wheel, and on the tenth movement of the first-mentioned wheel the said lever is lifted and the pawl turns the ratchet one step. In order to prevent the pawl from turning the ratchet when it is initially moved into engagement therewith, a lock is arranged to temporarily engage the wheel connected to the ratchet, and to this end the wheels, beginning with that for indicating tens, are all provided with ten equally-spaced holes 95. The lock consists of fingers 96, adapted to enter said apertures and formed on sleeves placed loosely on a shaft 97, extending across the machine and having its ends secured in arms 98, which project rearwardly from the standards 50, (said arms being secured or formed on small

standards 99, rising from the plate 49.) To each sleeve is secured a second finger 101, which projects forwardly into the path of a pin 102 on the numeral-wheel to the right of that engaged by the finger 96. Each pair of fingers 96 101 resembles in appearance a clock-escapement, and to the sleeve on which they are formed is secured a rearwardly-extending weight 103, adapted to normally rest upon a bar 104, lying between the arms 98 98. The pins 102 are placed in such relation to the pins 88 that just before the pin 88 on the units-wheel, for instance, engages the lever 90 the pin 102 engages the finger 101 and rocks it to cause the finger 96 to enter an aperture 95 in the hundreds-wheel and prevent it from moving. Another device is employed for preventing the numeral-wheel from moving when the wheel on the right thereof completes its tenth step, and it consists of a disk 105, secured to the right end of each of the sleeves 57 except that for the units-wheel. The disks each have ten pins 106 projecting to the right, and on each of the levers 90 is a spur 107. When one of the levers 90 is raised to its limit of movement, the spur 107 enters between two of the pins 106 and acts as a stop to limit the further movement of the disk, and consequently of the numeral-wheel on the same sleeve as the disk.

It is desirable to quickly return the numeral-wheels of each counter to zero when one tabulation is complete, and hence I provide resetting devices, which are shown in Figs. 12 and 15. On the shaft or bar 108, which extends between the standards 99 above the electromagnet, is pivoted a plurality of arms 109, having segmental racks 110 at their front ends intermeshing with the pinions 59, previously referred to as rigidly connected with the numeral-wheels. These arms are sufficiently weighted to turn the pinions when the latter are free, for as the pinions are rotated by the ratchets the segments are raised. To free the pinion, the shaft 86, to which the retaining-pawls 84 are secured, is rotatable and is provided with a finger 111, entering between two collars 112 on a bar 113, projecting through the plates 45 and 48 and held forward by a spring 114. By forcing the knob 115 on the forwardly-projecting end of the bar backward the shaft 86 is rotated, carrying the retaining-pawls 84 from engagement with the ratchets 58, whereby the segments return the pinions and numeral-wheels toward zero position. The pin 102 on each wheel when said wheel reaches zero position is engaged by the end of an elbow-shaped stop 116, pivoted on a bar 117, extending between the standards 118 and adapted to yield when the wheel rotates in the forward direction.

I claim—

1. A counting-machine comprising a series of numeral-bearing wheels, devices for carrying from one of said wheels to the other, means for actuating the units-wheel, and means for resetting each of said wheels, said resetting means being normally in engagement with said wheels but supported independent thereof, and brought into operative position by the normal operation of said wheels.

2. A counting-machine, consisting of a series of numeral-bearing wheels, devices for carrying from one of said wheels to the other, means for actuating the units-wheel, and separate means for resetting each of said wheels independently of the others, said means comprising a pinion connected to each wheel and a weighted rack intermeshing with the pinion, and adapted to be raised by the rotation of the pinion.

3. A counting-machine, consisting of a series of numeral-bearing wheels, devices for carrying from one of said wheels to the other, means for actuating the units-wheel, and separate means for resetting each of said wheels independently of the others, said means comprising yielding stops to limit the reverse rotation of said wheels, pinions connected to said wheels, and weighted racks intermeshing with said pinions and raised by the forward rotation of said wheels.

4. A counting-machine, consisting of a series of numeral-bearing wheels, devices for carrying from one of said wheels to the other, means for actuating the units-wheel, a series of retaining-pawls for the wheels, means for throwing them out of operation simultaneously, a yielding stop for each wheel, a pinion connected to each wheel, and a weighted lever having segmental rack-teeth intermeshing with each pinion.

5. In a counting-machine, the combination of a series of numeral-bearing wheels representing different orders of value, and means for carrying from one wheel to the wheel of the next higher order of value, the same comprising a ratchet connected to the last-mentioned wheel, a pivoted lever, a pawl pivotally mounted on the end of said lever and normally out of engagement with said ratchet-wheel, and means for periodically raising said lever, whereby said pawl is brought into engagement with said ratchet before said lever reaches the limit of its movement.

6. In a counting-machine, the combination of a series of numeral-bearing wheels representing different orders of value, and means for carrying from one wheel to the wheel of the next higher order of value, the same comprising a ratchet connected to the last-mentioned wheel, a pivoted lever, a pawl mounted in one end thereof and normally disengaged from said ratchet, and a pin connected to the first-mentioned wheel and adapted to engage said lever, whereby said pawl is caused to engage said ratchet, said lever being provided with a slot, whereby said pin will pass out of engagement with said lever when the latter has reached the limit of its movement.

7. In a counting-machine, the combination of a series of numeral-bearing wheels representing different orders of value, and means for carrying from one wheel to the wheel of the next higher order of value, the same comprising a ratchet connected to the last-mentioned wheel, a pin connected to the first-mentioned wheel, an independently-pivoted lever lying in the path of said pin and arranged to be lifted a predetermined distance thereby, a pawl pivoted upon the end of the lever and adapted to engage said ratchet, said pawl having a weighted end, and a stop to engage said end and hold the pawl out of engagement with the ratchet when the lever is at rest.

8. In a counting-machine, the combination of a series of numeral-bearing wheels representing different orders of value, means for carrying from one wheel to the wheel of the next higher order of value, the same comprising a ratchet, a pawl normally out of engagement with the ratchet, and means for moving the pawl into initial engagement with the ratchet, and mechanism for holding the ratchet against movement when the pawl is initially engaged therewith.

9. A counting-machine comprising a series of numeral-bearing wheels, devices for carrying from one of said wheels to the other, an electromagnet, means for energizing the same, a pivoted lever carrying an armature for said magnet, an elongated pawl pivoted in the end of said lever and arranged to rotate the ratchet-wheel, said pawl having its free end bent downwardly, a stud upon which said end rests, and an inclined stop arranged to engage the bent end of said pawl.

10. In a counting-machine, the combination of a series of numeral-bearing wheels representing different orders of value, means for carrying from one wheel to that of the next higher order of value, the same comprising a ratchet connected to the last-mentioned wheel, a pin connected to the first-mentioned wheel, an overhanging pivoted lever lying in the path of said pin and arranged to be lifted a predetermined distance thereby, said lever having a depending arm, and a pawl mounted in said depending arm and adapted to engage said ratchet.

11. In a counting-machine, the combination of a series of numeral-bearing wheels representing different orders of value, means for carrying from one wheel to that of the next higher order of value, the same comprising a ratchet connected to the last-mentioned wheel, a pin connected to the first-mentioned wheel, an overhanging lever lying in the path of said pin and arranged to be lifted a predetermined distance thereby, said lever having a depending arm, a pawl mounted in said depending arm and adapted to engage said racthet, a disk located adjacent each ratchet and having a series of pins projecting therefrom, and a spur on said overhanging lever adapted to engage said pins.

12. In a counting-machine, the combination of a series of numeral-bearing wheels representing different orders of value, means for carrying from one wheel to that of the next higher order of value, the same comprising a ratchet connected to the last-mentioned wheel, a pin connected to the first-mentioned wheel, an overhanging lever lying in the path of said pin and arranged to be lifted a predetermined distance thereby, said lever having a slot or opening to allow said pin to pass, the same being normally out of the path of said pin, and a pawl carried by said lever for engaging said ratchet.

13. In a counting-machine the combination of a series of numeral-bearing wheels representing different orders of value, means for carrying from one wheel to that of the next higher order of value, locking-levers for said wheels provided with weighted members holding them normally out of engagement, and means for automatically bringing said locking-levers into engagement with said wheels.

14. In a counting-machine the combination of a series of numeral-bearing wheels representing different orders of value, means for carrying from one wheel to that of the next higher order of value, pivoted locking-levers having weighted members, pins carried by said wheels, and arms formed on said locking-levers and projecting into the path of said pins.

15. A counting-machine comprising a series of numeral-bearing wheels, devices for carrying from one wheel to the other, means for actuating the units-wheel, a pinion connected to each wheel, a weighted rack intermeshing with said pinions and adapted to be raised by the rotation of the latter, ratchets carried by said wheels, retaining-pawls for the wheels, and a spring-pressed arm arranged to simultaneously disengage all of said pawls.

16. A counting-machine comprising a series of numeral-bearing wheels, devices for carrying from one wheel to the other, means for actuating the units-wheel, a pinion connected to each wheel, a weighted rack intermeshing with said pinions and adapted to be raised by the rotation of the latter, ratchets carried by said wheels, a rock-shaft, retaining-pawls for said ratchets mounted on said rock-shaft, a lug formed on said rock-shaft, and a spring-pressed arm adapted to engage said lug and rock said rock-shaft.

In testimony whereof I have affixed my signature in presence of two witnesses.

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