V. T. BOREHAM.

COUNTING APPARATUS.

APPLICATION FILED JAN. 11, 1916.

1,208,465.

Patented Dec. 12, 1916.

2 SHEETS—SHEET 1.

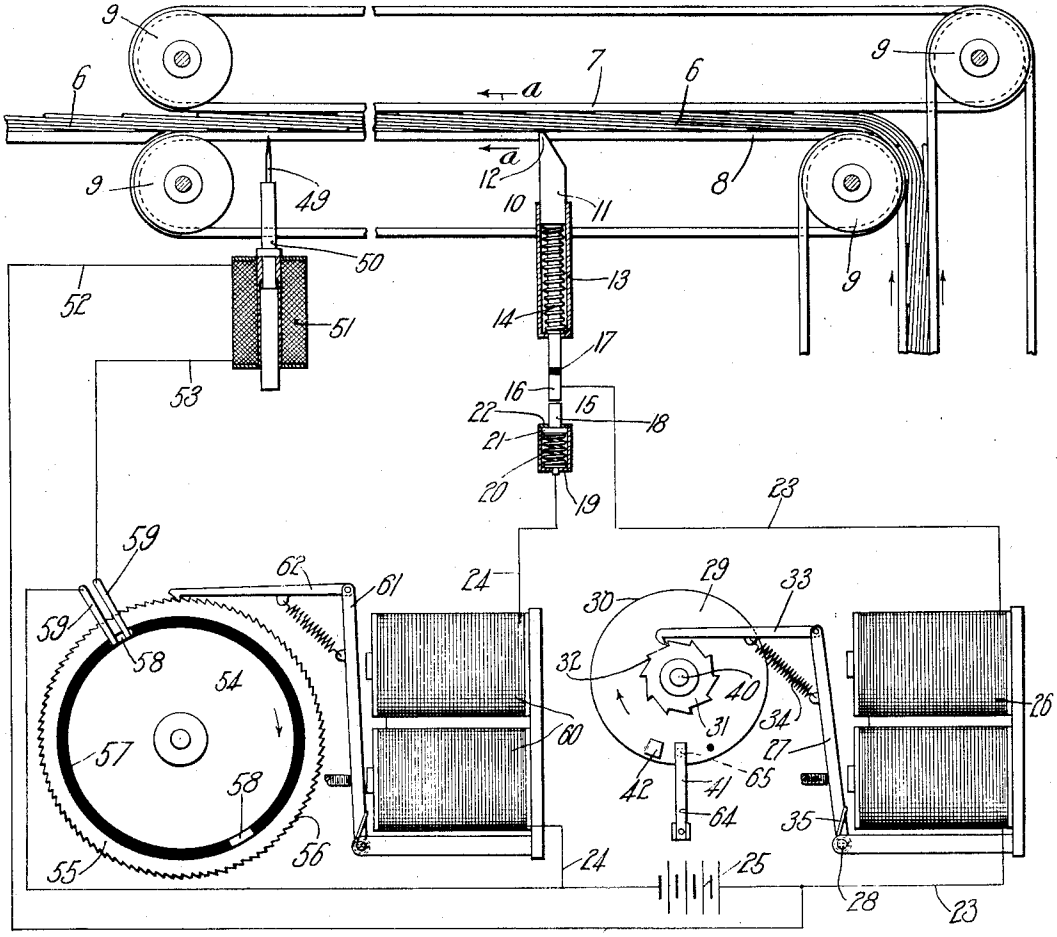


Fig. 1.

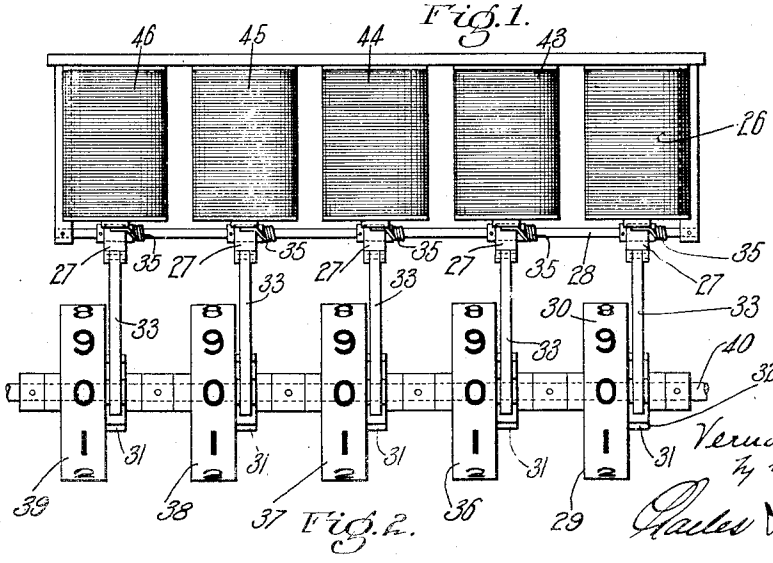


Fig. 2.

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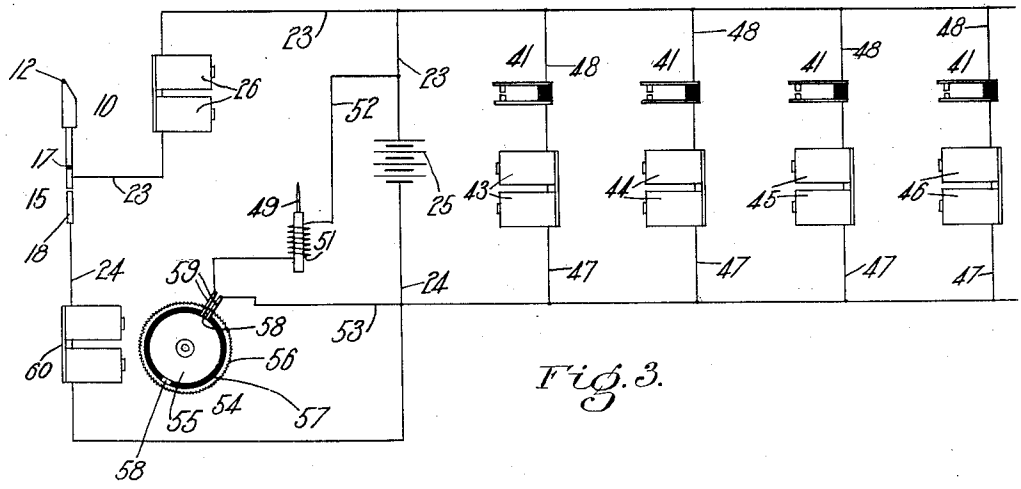


Fig. 3.

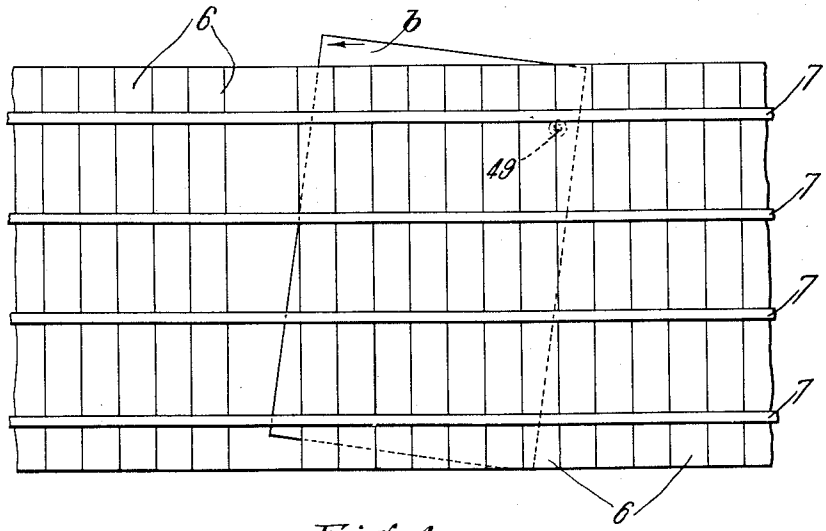


Fig. 4.

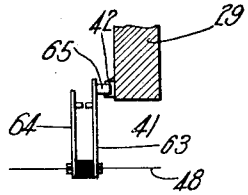


Fig. 5.

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UNITED STATES PATENT OFFICE.

VERNON T. BOREHAM, OF ROXBURY, MASSACHUSETTS.

COUNTING APPARATUS.

1,208,465. Specification of Letters Patent. Patented Dec. 12, 1916.

Application filed January 11, 1916. Serial No. 71,479.

To all whom it may concern:

Be it known that I, VERNON T. BOREHAM, a subject of King George V, residing at Roxbury, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Counting Apparatus, of which the following is a specification.

This invention relates to improvements in counting apparatus and is especially adapted for counting newspapers and the like while they are being delivered all folded and in overlapped relation from the printing and folding apparatus.

The object of the invention is to provide a simple apparatus adapted to accurately count and register the number of advancing newspapers as they are moved past said counting device.

Another object of the invention is to provide means for bunching or grouping a predetermined number of said sheets of material.

The invention consists in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the claims.

Referring to the drawings: Figure 1 is a somewhat diagrammatic view of a counting apparatus embodying my invention, as shown in connection with the feeding instrumentalities for said newspapers and the like. Fig. 2 is a detail plan view of the group of numeral wheels and their operating magnets. Fig. 3 is a diagrammatic view of the electric circuits through which the electric currents are conducted to the several magnets for operating said numeral wheels and said bunch-instrumentalities. Fig. 4 is a plan view illustrating a series of sheets of material being advanced along suitable guides in overlapped relation, with one of the sheets of said series shown displaced to illustrate the manner in which the several bunches of sheets of material are separated and distinguished from each other. Fig. 5 is a detail view of one of the electric circuit make and break devices.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 6, 6 represent sheets of material such as newspapers arranged in overlapped relation to each other which are being advanced along a prescribed path by instrumentalities preferably consisting of endless belts 7 and 8 arranged above and below the sheets of material 6. The belts 7 and 8 are adapted to engage opposite faces of said sheets to advance the same in the direction of the arrows *a*, Fig. 1, said belts being preferably guided by pulleys 9 which receive their motion from any suitable source of power not shown in the drawings.

The instrumentalities herein shown comprise the usual conveying instrumentalities as employed in connection with newspaper printing presses which convey the newspapers from the folding instrumentalities to the delivery table of the press. A feeler 10 is disposed in the path of the papers 6 so as to be engaged by each of said papers as they pass along between the belts 7 and 8. The feeler 10 preferably embodies in its construction a plunger 11 provided with a reduced end 12 adapted to engage the under faces of the papers 6.

The plunger 11 is arranged to reciprocate in a suitable support 13, a spring 14 being provided beneath said plunger to yieldingly retain the same in contact with said papers, but being very light and sensitive in construction so as to permit said sheets of paper to depress said plunger each time one of said sheets passes the end 12 thereof. A switch 15 is operatively connected with said feeler 10 so as to be operated each time the plunger 11 of said feeler is depressed, preferably to close an electric circuit including said switch 15.

The switch 15 preferably consists of a contact member 16 attached to the lower end of the plunger 11 and insulated therefrom by insulating material 17. Another contact member 18 is yieldingly mounted in a suitable support 19 so as to insure a perfect contact between said contact members 16 and 18. A spring 20 preferably engages said second named contact member 18 and normally retains a shoulder 21 formed thereon in contact with the end 22 of the support 19. The electric circuit including said switch 15 and adapted to be closed thereby, also includes conductors 23 and 24, a source of energy, preferably a battery, 25, and an electromagnet 26, said magnet being adapted to be energized each time the circuit is closed by the switch 15. An armature 27 is pivotally arranged at 28 adjacent to said magnet 26 so as to be attracted thereby when said magnet is energized. A numeral wheel 29, preferably consisting of the numerals 0 to 9 inclusive, uniformly disposed about the peripheral face 30 of said wheel, is arranged

adjacent to the magnet 26. A ratchet 31 is attached to said wheel 29 and is provided with teeth 32 which correspond in number with the numerals disposed about the face of said wheel. A pawl 33 is pivotally attached to the free end of the armature 27 and in operative engagement with the teeth of said ratchet. A spring 34, preferably disposed between said pawl and said armature, normally retains said pawl in contact with said teeth, while another spring 35 is adapted to normally retain the armature 27 out of contact with the cores of the magnet 26, but near enough to said cores to be attracted thereby when said magnet is energized, said pawl being so arranged in connection with the teeth of said ratchet that each successive movement of said pawl, due to the energizing of said magnet, will cause said numeral wheel 29 to be rotated step by step, each movement of which is preferably equivalent to the distance between consecutive numerals on said wheel.

The numeral wheel 29 is the first wheel of the series or group of coöperating numeral wheels, 36, 37, 38, 39, etc., five of which are illustrated in Fig. 2 of the drawings. The wheels referred to are all preferably rotatably mounted upon a common shaft 40 and are of the same diameter and with like numerals distributed about their peripheries, which numerals, when properly alined, register from 0 to 99,999 or higher, according to the number of numeral wheels contained within said group.

The numeral wheel 29 is the only wheel directly connected with the feeler 10, all of the other numeral wheels being preferably actuated by electrical instrumentalities rendered operative by make and break devices 41 whose movements are controlled by contact members 42 carried by the numeral wheel preceding the wheel to be operated. To accomplish this, the numeral wheel 36 which follows the numeral wheel 29 in the set and the successive wheels 37, 38, 39, etc., are each provided with a ratchet 31, a pawl 33, and an armature 27, preferably similar in every respect to the like parts for the numeral wheel 29, the armatures 27 thereof being, in turn, operated by electromagnets 43, 44, 45, and 46 respectively.

The magnets 43, 44, 45 and 46 are connected by conductors 47 and 48 to the conductors 23 and 24, leading to the poles of the battery 25, said magnets being arranged in multiple relation with respect to each other, the individual circuits for each of said magnets including one of the make and break devices 41, which make and break devices are arranged in operative relation to the contact 42 upon the numeral wheel preceding that which is to be operated by the energizing of the electromagnet connected with said make and break devices.

As hereinbefore stated, one of the objects of the invention is to provide means for displacing a predetermined one of the sheets as they are fed along between the endless belts 7 and 8. To accomplish this result a needle or perforating instrument 49 has been provided adjacent to one side of said sheets, to be operated to perforate one of said sheets adjacent to the rear corner thereof, and to hold said sheet for a limited period sufficient to cause said sheet to be swung at an angle to the other sheets passing along said belts and thus cause a corner of the displaced sheet to protrude beyond the edges of the other sheets. The reason for displacing said sheet is to divide said sheets into groups containing predetermined numbers thereof. In the present instance each group is to contain 50 sheets. Consequently after each 49 consecutive depressions of the feeler 10, the needle 49 must be operated to perforate the fiftieth sheet when the same has been moved into a position above said needle and to displace said sheet, in which condition it will be conveyed to the discharging table and the operator of the machine will be enabled to remove the group so designated without having to count them. The operation of the needle 49 is preferably accomplished by electrical instrumentalities rendered operative by the specified number of depressions of the feeler 10. In carrying out this feature of the invention, the needle 49 is preferably mounted on a plunger 50 constituting the armature of a solenoid 51, the coils of which are preferably connected by conductors 52 and 53 with the conductors 23 and 24 of the main electric circuit hereinbefore described.

Another make and break device 54 is provided for automatically opening and closing the circuit including the solenoid 51. The make and break device 54 preferably consists of a rotatable disk 55 having teeth 56 formed in its periphery, the number of said teeth varying in accordance with the number of papers to be contained in each of the groups of papers as hereinbefore referred to. In the present instance the disk 55 is provided with 100 teeth. Secured to one side of the disk 55 is a ring 57 constructed of insulating material, preferably fiber. Contact plates 58, preferably two in number and disposed 180° apart, are secured to said ring 57. A pair of brushes 59 are arranged to engage the ring 57 and likewise the contact plates 58 during the rotations of said disk, said brushes being arranged to both contact with each of the plates 58 at the same time to complete the electric circuit including the solenoid 51, that is to say, at each 180° rotation of said disk, the circuit, including said solenoid, will be completed for a limited period to cause the needle 49 to be moved to penetrate one corner of one of the papers and retard that corner of said paper only

long enough to cause the paper to be slightly displaced and one corner thereof to protrude beyond the other papers.

To accomplish the step by step rotation of the disk 55, an electromagnet 60 has preferably been inserted in the main electric circuit including the conductors 23 and 24 so as to be energized simultaneously with the solenoid 26 each time the switch 15 is closed by the feeler 10. An armature 61 is operatively arranged adjacent to the electromagnet 61 and adapted to be attracted by said magnet when the same is energized. A pawl 62 is arranged in substantially the same relation to the armature 61 as is the pawl 33 in connection with the armature 27, said pawl 62 engaging the teeth 56 of the disk 55 to rotate said disk.

The make and break device 41 hereinbefore referred to, consists preferably of two contact members 63 and 64. The contact member 63 is provided with a projection 65 which is arranged to be engaged by the contact member 42 on the numeral wheel to which the contact members 63 and 64 are exposed and when enaged by said contact member 42 the contact member 63 which is moved by the member 42 will be moved against the member 64 and complete the electric circuit containing said members.

The general operation of the apparatus hereinbefore specifically described is as follows: The papers 6 arranged substantially in the manner illustrated in Fig. 1 are conveyed to the delivery table of the press by the belts 7 and 8 transversely of the end 12 of the feeler 10, and said feeler will thereby be moved upwardly and downwardly by the irregularities in the under surface of the string of papers. The downward or depressing movement of said feeler causes the switch 15 to be closed, thereby permitting a current of electricity to pass through the electric circuit including the magnet 26 which consequently energizes said magnet. The armature 27 thereof will then be attracted, which movement causes the pawl 33 to rotate the ratchet 31 one tooth for each consecutive energizing of said magnet. This movement of said ratchet 31 causes the numeral wheel 29, which is connected with said ratchet and representing the unit column of numerals for the group of numeral wheels, to be rotated a distance sufficient to bring the numeral 1 into the position now occupied by 0, each consecutive movement of said ratchet causing said numeral wheel to advance one unit. Upon a complete rotation of the numeral wheel 29, the contact member 42 on said numeral wheel is moved to engage the contact member 63 at the time when the numeral wheel 29 is moving from the point 9 to the point 0. The closing of the circuit by means of the contact member 42 on the unit wheel energizes the magnet 42 of the next numeral wheel 36 in the set, the numerals thereon constituting the 10's column of the group. The instrumentalities operatively connected with said magnet are then operated to advance the numerals on said wheel 36 one point for each complete rotation of the unit wheel 29 and so on throughout the set, each numeral wheel being adapted, upon a complete rotation thereof, to close the electric circuit whereby the next wheel in the set may be advanced one step. By means of this portion of the apparatus each paper, as it passes the feeler 10, will be counted and registered by the counter just described. The bunching or grouping apparatus is operated by instrumentalities rendered operative upon the closing of the switch 15 as hereinbefore described, this being accomplished by the energizing of the magnet 60 which causes the disk 55 to be rotated one tooth each time said magnet is energized while the contact plates 58 thereon arranged in the present case 180° apart which 180° of circumference on said disk is divided into 50 teeth requiring 50 consecutive depressions of the feeler 10 before the electric circuit containing the solenoid 51 will be completed by the contact plates 58 and brushes 59. Upon the energizing of the solenoid 51 the needle 49 will be forced into the paper immediately above said needle, at the rear corner thereof and hold said rear corner for a short space of time until the unrestricted edge of said paper is advanced sufficiently to swing said paper into a position with one corner thereof protruding as at *b*, Fig. 4, thus indicating at a glance the separation between one group or bunch of papers and the next, and permitting said bunch to be readily removed by the operator of the device without necessitating the counting of the papers.

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

1. In combination, instrumentalities for advancing sheets of material in overlapped relation, means having feeling contact with said sheets, constructed and arranged to be moved by the overlapped portion of successive sheets, an electric circuit including an electromagnet and a switch included in said electric circuit operatively connected with said feeling means and adapted to be closed by the movement of said means, whereby said magnet may be energized.

2. In combination, instrumentalities for advancing sheets of material in overlapped relation, a feeler arranged in the path of said sheets, adapted to engage and be moved by the overlapped portion of each of said sheets, an electric circuit, an electromagnet included in said circuit and a switch for said circuit adapted to be closed by each consecutive movement of said feeler in one

direction, whereby said electromagnet may be energized.

3. A counting apparatus having, in combination, instrumentalities for feeding sheets, a feeler constructed and arranged to be operated by said sheets, a switch operatively connected with said feeler, an electric circuit including said switch, an electromagnet included in said electric circuit adapted to be energized by the closing of said switch, a numeral wheel, means rendered operative by the energizing of said magnet constructed and arranged to impart a step by step rotary movement to said numeral wheel, a make and break device adapted to be operated at a predetermined point in the rotation of said numeral wheel to close said electric circuit, a second numeral wheel and electrical instrumentalities rendered operative upon the closing of said electric circuit by said make and break device adapted to impart a step by step movement to said second numeral wheel.

4. A counting apparatus having, in combination, instrumentalities constructed and arranged to advance sheets of material in overlapped relation to each other, a feeler disposed in the path of said sheets of material and adapted to be moved by each of said sheets, an electric circuit, a switch operatively connected with said feeler constructed and arranged to be closed by successive movements of said feeler in one direction, an electromagnet included in said electric circuit, a perforating instrument arranged in the path of said sheets and instrumentalities rendered operative by the energizing of said electromagnet adapted to move said perforating instrument to perforate predetermined sheets.

5. A counting apparatus having, in combination, instrumentalities constructed and arranged to advance sheets of material in overlapped relation to each other, a feeler disposed in the path of said sheets of material and adapted to be moved by each of said sheets, an electric circuit, a switch operatively connected with said feeler constructed and arranged to be closed by successive movements of said feeler in one direction, an electromagnet included in said electric circuit, a needle arranged in the path of said sheets adjacent to one side thereof, electrical instrumentalities constructed and arranged to move said needle to engage a predetermined one of said sheets and retard the movement thereof with respect to its adjacent sheets and means rendered operative by the energizing of said electromagnet adapted to set said needle operating means into operation.

6. A counting apparatus having in combination, instrumentalities constructed and arranged to advance sheets of material in overlapped relation, a feeler disposed in the path of said sheets of material adapted to be moved by each of said sheets, a needle disposed in the path of said sheets of material and instrumentalities rendered operative by a predetermined number of movements of said feeler adapted to move said needle into engagement with one of said sheets to displace said sheet with respect to other sheets of material.

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

VERNON T. BOREHAM.

Witnesses:
CHARLES S. GOODING,
SYDNEY E. TAFT.