

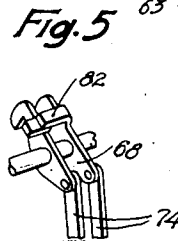
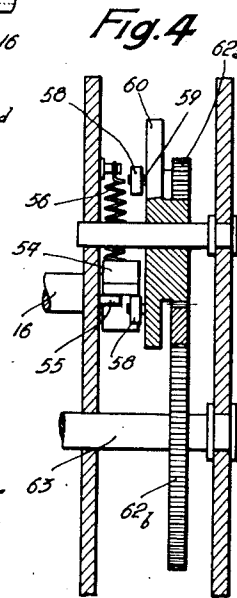
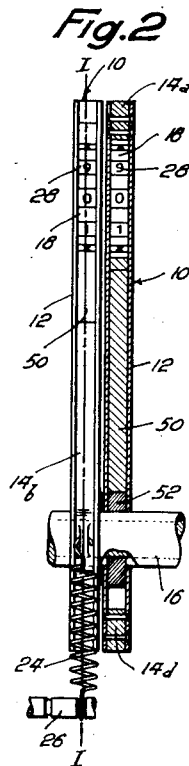
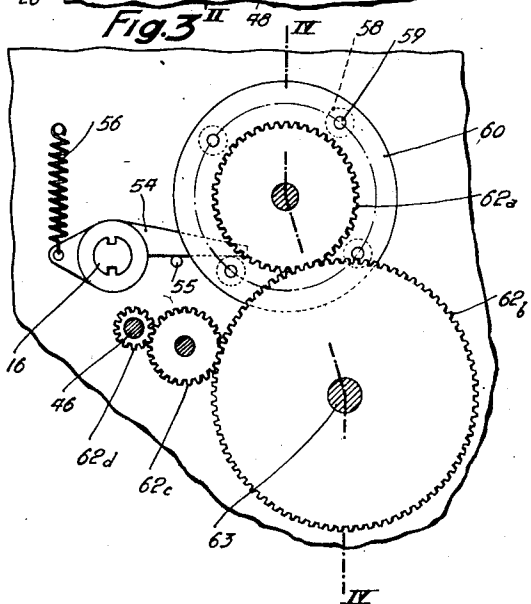
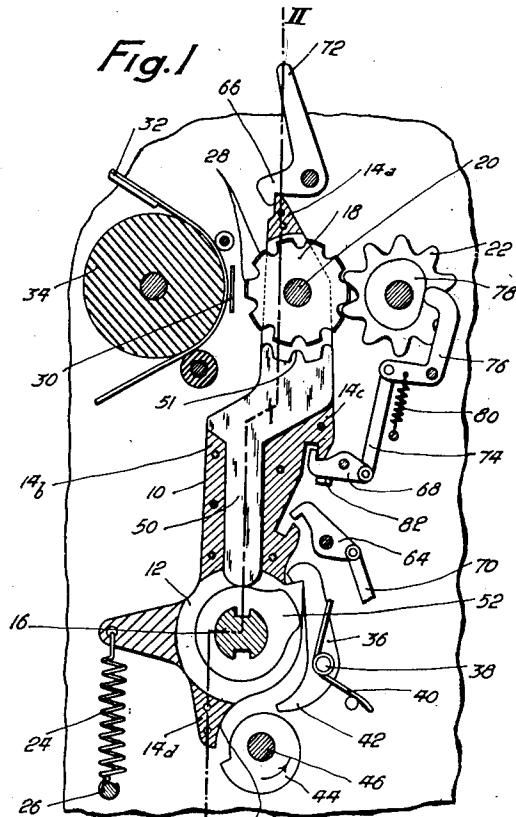
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PRINTING DEVICE FOR CALCULATING MACHINES

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PRINTING DEVICE FOR CALCULATING
MACHINES

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The present invention relates to the devices adapted to print the data and results of mathematical operations carried out by calculating machines, and more particularly by such calculating machines which comprise rotating totalizer wheels placed side by side on a common shaft.

This application is a continuation-in-part of the United States application of Pierre Louis Couffignal, Serial No. 766,271, filed August 5, 1947, now abandoned.

Printing devices of this kind are already known, which comprise wheels bearing printing types on their outer periphery, said wheels, which are each connected by gears to one of the totalizer wheels of the machine, being rotatably mounted on arms pivoted on a shaft parallel to the axes of said wheels and being adapted to cooperate with a sheet on which the calculation data and results are to be printed. In these devices, the gearing connection between the totalizer wheels and the printing wheels is disengaged during the pivoting movement which brings the types carried by said wheels to strike on the printing sheet. On another hand, the relative positions of each totalizer wheel and of the corresponding printing wheel must always be the same, considering that, for a given position of a totalizer wheel, the printing type of the corresponding printing wheel, which is brought to the striking position, must always be the same. It is therefore necessary to provide means for maintaining each printing wheel at a fixed position during the whole time where the gearing relation between said wheel and the corresponding totalizer wheel is interrupted. Such blocking means are generally relatively cumbersome, which leads to complicated arrangements resulting from the fact that the printing wheels must be placed side by side at a distance corresponding to that which should exist between two signs printed on the printing sheet.

The object of my invention is to provide a printing device occupying only a very small space although it answers the above mentioned required conditions.

My invention is described hereafter with reference to the appended drawings in which:

Fig. 1 is a vertical sectional view of an embodiment of a printing device according to the invention taken on line I—I of Fig. 2;

Fig. 2 is a front elevational view of part of said printing device, one of the printing arms being shown in section along line II—II of Fig. 1;

Fig. 3 is a side elevational view of the gear-

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ing mechanism driving the printing device, with the outer side plate of said mechanism removed;

Fig. 4 is a section through said gearing mechanism along broken line IV—IV of Fig. 3; and

Fig. 5 is a perspective view of two neighbouring catches in said device.

Referring to the drawings, the printing device comprises a plurality of arms 10, each formed of two side members 12 fast with spacing members 14a, 14b, 14c and 14d, said arms being mounted on a common shaft 16 so as to freely oscillate about said shaft. At the upper part of each arm 10 and between members 12, a printing wheel 18 is rotatably mounted on a shaft 20. Said wheel 18 is shaped as a gear adapted to mesh with one of the totalizer wheels 22 of the calculating machine when the corresponding arm is rocked clockwise as seen in Fig. 1 against the action of a spring 24 one end of which is attached to said arm and the other end of which is attached on a bar 26 extending across the whole device.

Each printing wheel has the same number of teeth as the corresponding totalizer wheel, the ends of said teeth being shaped flat or substantially flat, so as to carry types 28 which, when an arm 10 is urged by its spring 24, cooperate with an inked printing ribbon 30 for printing on a work sheet 32 trained around a platen or cylinder 34. Supposing that the calculating machine operates in the decimal system, each totalizer wheel 22 therefore having ten teeth, the printing wheels 18 shall also have ten teeth carrying types representing the digits 0 to 9.

Normally, the arms 10 are held in retracted non-printing position, in which each printing wheel 18 engages the corresponding totalizer wheel 22 in such a manner that the type 28 presented in front of sheet 32 is that bearing the figure indicated by the position given to the corresponding totalizer wheel 22, by a catch 36 oscillating about a shaft 38, urged by a spring 40 and having a catch releasing beak 42. A cam 44, fast with a shaft 46 and extending the whole length of the device, is arranged to release the catches 36 by cooperating with the beaks 42 at each rotation of shaft 46. Said cam 44 is also adapted to coast with an arm restoring beak 48 on each arm 10 for rocking said arm against the urge of spring 24, back in the position where wheel 18 engages the corresponding wheel 22.

Between side members 12 and spacing members 14b and 14c of each arm 10 is slidably mounted a latch bolt 50 one end of which is shaped as a three-pronged fork 51 capable of

engaging the teeth of wheel 18, and the other end of which cooperates with a cam 52 arranged between side members 12 and fast with shaft 16. These slidable latch bolts 50 are of sufficient mass to insure the gravitation thereof against the cams 52 when the cams 52 are rocked back clockwise for returning the forks 51 to non-engaging position with respect to wheels 18.

On the end of shaft 16 and fast with said-shaft is mounted a lever 54 urged clockwise towards an abutment member 55 by a spring 56 and adapted to cooperate with roller projections 58 carried by trunnions 59 on a rotating disk 60. Said disk 60 and shaft 46 are driven by a gearing 62a, 62b, 62c, 62d, receiving its motion from a shaft 63 adapted to be connected to the motor of the machine, not shown. The shaft 63 provides a common driving means for the cams 52, the catch releasing beaks 42, and the arm restoring beaks 48. The connections driven by the shaft 63 operate in such a manner that cams 52 urge latch bolts 50 upwards in engagement with printing wheels 18 immediately before cam 44 releases catches 36 and maintain said locking members in said position until cam 44 rocks arms 10 back in the position where the wheels 18 are engaged with wheels 22.

Associated with each of the arms 10 is a catch 64 for effecting non-printing control, and two catches 66-68 adapted respectively to act as locks to prevent printing of decimals and of zeros to the left of a number to be printed.

Catches 64 are controlled through links 70, by means of a common key, not shown, in a manner known per se. Catches 66 are provided with beaks 72 which may be hand controlled. As for catches 68, they are each acted upon by links 74 attached to a lever 76 which cooperates with a cam 78 fast with the corresponding totalizer wheel 22 and arranged to act upon said lever 76 to release catch 68 against the action of a spring 80 when said wheel 22 occupies a position other than that corresponding to a zero. The catches 68 are so combined with each other, by means of ears 82 (Fig. 5), as to work together in such a manner that unlocking of the catch 68 in the leftmost order in which the value of the totalizer is other than zero, unlocks all of the catches 68 situated to its right, but does not prevent the successive locking of these catches as other figures are entered in the several decimal orders.

As above mentioned, the printing wheels 18 are normally in mesh with the totalizer wheels 22. When said totalizer wheels 22 have been set by the operation of the machine in positions corresponding for instance to the result of a calculation carried out by said machine, the wheels 18 have been set in such position that the types 28 in front of the work sheet 32 are those bearing the digits which correspond to the result marked by the totalizer wheels. The cyclically operating shaft 63 is then set into motion and as a result, all the latch bolts 50 are driven upwards, thus maintaining the wheels 18 in their position by means of the forks 51. Immediately after, the cyclically operable cam 44 acts upon the beaks 42 of catches 36, thus releasing the arms 10. The types 28 of the wheels 18, which are in front of work sheet 32 strike said sheet through the printing ribbon 30 and thus print the corresponding digits on sheet 32. Cam 44 pursuing its rotation acts upon the beaks 48, thus returning the arms 10 to their initial position, after which cams 52 are rocked back clockwise (Fig. 1) thus releasing the latch bolts 50 the forks

51 of which then disengage the corresponding wheels 18.

By manually setting the catches 66 it is possible to hold back a certain number of arms 10 so as not to print more than the required decimals. On the other hand, as above described, the action of the catches 68 is such that the arms 10 the wheels 18 of which occupy positions corresponding to the printing of zeros on the left of the first significative figure of the number to be printed are also held back. Finally, if a result is not to be printed, all the catches 64 may be set in engaging position by means of the corresponding key.

The above described embodiment of my invention should by no means be considered as limitative and it is possible to make numerous modifications without departing from said invention as claimed hereafter.

What I claim is:

1. In a printing device for calculating machines, a first shaft, totalizer wheels arranged side by side on said first shaft, a second shaft, a plurality of arms, means mounting said arms side by side on, and for oscillation about, said second shaft and spaced at intervals from said totalizer wheels, rotatable printing wheels on said arms provided peripherally with printing types and formed as gears adapted respectively to engage the totalizer wheels, means adapted to receive a work sheet with which said printing types of said wheels can cooperate, spring means urging said arms towards positions in which said printing types strike said work sheet, catch means adapted to restrain said arms against the action of said spring means, means for releasing said catch means to enable said spring means to move said arms with the printing wheels thereon to printing positions, restoring means for moving said arms from printing position against the action of said spring means to engage said printing wheels in mesh with said totalizer wheels, latch means slidably arranged respectively on said arms and adapted to cooperate with the corresponding printing wheels to engage said printing wheels and latch them against rotation, a plurality of cams arranged on said second shaft and each cooperating with one of said latch means to effect engagement of said latch means with, and disengagement of said latch means from, the corresponding printing wheel, common driving means for said cams, said catch releasing means and said restoring means, driving connections between said common driving means and said cams for operating said cams cyclically to effect engagement of said latch means with the corresponding printing wheels, and driving connections between said common driving means and said catch releasing means and between said common driving means and said restoring means for operating said catch releasing means cyclically after said cams have been operated, and for operating said restoring means cyclically after said catch releasing means have been operated.

2. A printing device for calculating machines as set forth in claim 1 in which the latch means are movable upwardly by said cam means, the mass of said latch means being sufficient for moving said latch means downwardly by gravity for disengaging said latch means from said printing wheels when said cams are out of latch operating position.

3. A printing device for calculating machines as set forth in claim 1 in which said catch means

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comprise pivoted members provided respectively with beaks, and said catch releasing means comprises a rotating cam means common to all said beaks and adapted to both release said catch means and to operate said restoring means to rock said arms to positions in which said printing wheels are in mesh with said totalizer wheels.

4. A printing device for calculating machines as set forth in claim 1 in which the driving connections between said common driving means and said cams comprises a lever on said second shaft, a disk operable by said common driving means, and a plurality of projections on said disk engageable with said lever for rocking said second shaft and the cams thereon.

5. A printing device for calculating machines as set forth in claim 1 in which the driving connections between the common driving means and the catch releasing means and between said common driving means and said restoring means

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comprise a third shaft driven by said common driving means and cam means on said third shaft engageable with said catch releasing means and said restoring means.

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