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C. F. BLACHER

CALCULATING MACHINE

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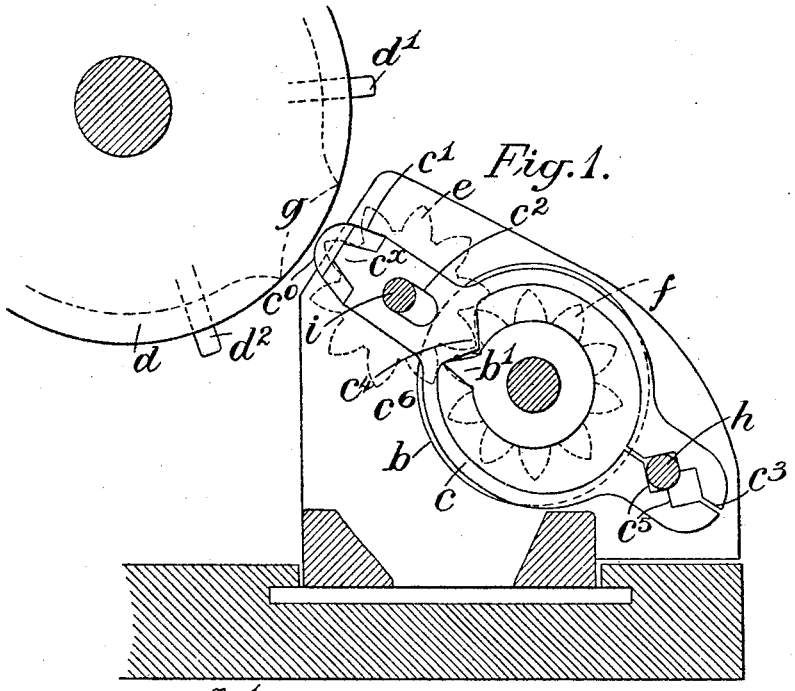

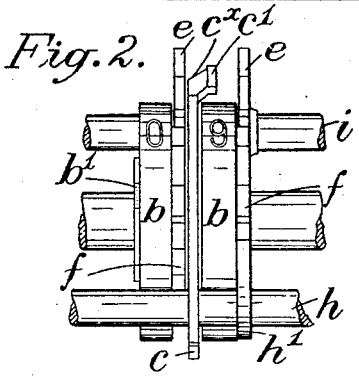

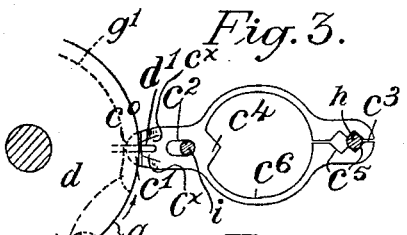

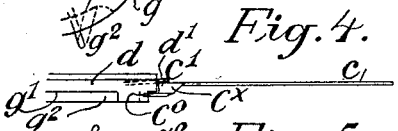

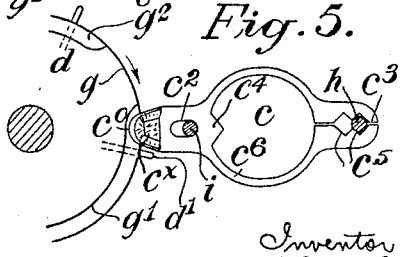

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UNITED STATES PATENT OFFICE.

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CALCULATING MACHINE.

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To all whom it may concern:

Be it known that I, CHARLES FELICIEN BLACHER, a subject of the King of England, residing at Barnet, Hertfordshire, England, have invented certain new and useful Improvements in Calculating Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to calculating machines of the pin wheel and cam disc type, and has for its object to provide an improved form of transfer mechanism for effecting the carry-over to a higher denomination in the lower numeral drums or totalizer counters of such apparatus.

In calculating machines of the above mentioned type it is well known to actuate the counting wheel through a ten-carrying slider adapted to project into the path of transfer pin teeth upon the pin wheel, the slider being slotted to move upon guiding shafts and being returned by a cam upon the pin wheel. Such sliders, however, have hitherto required separate detent or retaining devices and in some cases the slider and detent occupy so much space when interposed between adjacent numeral drums or recording wheels, that it is impossible to provide a compact carriage.

According to the present invention, a slider of the above type is made integral with a locking and localizing device; the latter is so formed that the forward and return strokes of the slider are completed and stopped by spring jaws which can be sprung apart but which positively grip one of the guide shafts at the end of each stroke. Thus the slider is definitely located in each position. The slider is preferably so shaped that the guiding slots are on opposite sides of the shaft carrying the numeral drums, so that the slider is guided at each end of its length.

The invention is hereafter described with reference to the accompanying drawings, in which:—

Figure 1 is a sectional elevation showing the improved transfer mechanism.

Figure 2 is a detail as viewed from the right of Figure 1.

Figures 3, 4 and 5 represent the slidable member employed to effect the transfer.

A calculating machine of the pin-wheel and cam disc type comprises as is well known to those skilled in the art a plurality of pin-wheel and cam disc pairs arranged side by side upon a supporting shaft; it also comprises a plurality of numeral drums or totalizer counters, also arranged side by side and usually at a lower level for convenience in reading off the product or dividend. In the drawings, I have not illustrated the complete sets of pin wheel and cam disc members, nor of numeral drums, but for the sake of simplicity I have shown only sufficient for explaining the transfer or carry-over from one digit to another by means of my improved mechanism.

A pin wheel d is shown in Figure 1 with two transfer teeth d^1 d^2 and the cam or swell g lying between them. On one lateral face of each pin wheel member there is formed a part-annular recess or shoulder g^1, the extremities of which are curved outwardly at g^2, so as to terminate at the periphery of the pin wheel; the curved surfaces g^2 together with the part-cylindrical surface comprised between the points at which they merge into the periphery of the pin wheel d constitute the swell or cam g. The angular extent of the cam g varies in successive pin wheels in accordance with the setting of the transfer teeth on the particular pin wheel. One or other of these transfer teeth comes into operation as required during the rotation of the pinwheel in the forward or the backward direction, for multiplication or addition or for division or subtraction respectively, as is well known.

One of the numeral drums is shown at b, this drum being revolved in the usual manner by the intermeshing pinions e and f, when operated by the rotation of the pin wheel, according to the setting of the cam disc.

A stationary spindle h, which may carry the pawls h^1 controlling the totalizer pinions f, is located diametrically opposite to the spindle i of the intermediate pinions, in relation to the numeral drums.

The slider c, as seen in Figure 2, is mounted between the numeral drum b and the pinions e f of next higher denomination; at one end this member is provided with a cam nose c^1 and it is guided at that end by means of a longitudinal slot c^2 through which the spindle i of the intermediate

pinions is passed, while its other end is guided in the same longitudinal direction by means of the stationary spindle h. To produce a definite location in either of its two positions, this end of the slider is shown formed with spring jaws c^3 having two pairs of notches c^5 adapted to grip the guide-bar h but adapted to be sprung apart to allow the sliding movement when the transfer mechanism is to be actuated.

The cam nose c^1 of the slider is shaped as represented in Figures 3, 4 and 5, to provide laterally bevelled faces c^x over which the transfer tooth d^1 or d^2 rides as the pin wheel rotates, and a rounded end c^0 which is engaged by the swell g upon the pin wheel, so as to push the slider back to its lower position, as hereafter described.

Between the spring jaws and the slotted portion which carries the cam-nose c^1, the slider is formed in a loop c^6 having its sides bowed outwards concentrically with the numeral drums; the junction of the bows with the slotted portion is provided with a V-shaped cam c^4 projecting towards the spindle of the numeral drum. A similar cam b^1 is mounted on the side of the drum, so as to engage the inwardly projecting cam c^4 on the slider at the correct point in its rotation: the slider will thus be advanced to its operative position (see Figures 3, 4 and 5), in which it is held by the spring jaws, registering with the stationary rod h, and the bevelled cam c^4 is thus brought into the path of the transfer tooth d^1 or d^2 on the pin-wheel. When the pin wheels are next rotated this tooth encounters the bevelled face c^x of the projecting cam (see Figures 3 and 4), and it is moved aside so as to engage the intermediate pinion e of the adjacent pair thereby rotating the numeral drum b of higher denomination through the required fraction of a revolution. After the transfer tooth has thus operated the pinion e, it moves clear of the cam nose upon the slider (see Figure 5), and the curved surface g^2 of the cam g comes into engagement with the rounded end of the slider, pushing the latter back to the position shown in Figure 1.

The slider may be made of thin spring metal, such as steel, so that the bows, cam and jaws can conveniently be fitted between the numeral drum and the pinion of the next drum and the projecting end c^1 which engages the transfer teeth thickened up for example by hollow-pressing to provide for the bevelling of the edges c^x, and if desired for the slotting of the guide portions. The extremity c^0 which is engaged by the swell g on the pin wheel is offset from the plane of the loop c^6, and brought towards the centre line of the numeral drum as seen in Figure 2. Thus the transfer teeth normally rotate in a plane lying between the nose c^0 and the adjacent pinion e, but when the slider is advanced to effect the transfer, the bevelled faces c^x move into the path of the transfer teeth in this same plane, and cause a lateral deflection into the plane of the pinion e of the next higher denomination.

Transfers to or from several higher denominations take place successively owing to the helical or spiral setting of the several transfer teeth on the respective pin wheels, in the well known way.

Having thus described my invention, what I claim is:—

1. In a calculating machine of the pin wheel and cam disc type, a longitudinally movable transfer slider which is provided integrally with means for locking and localizing said movable slider in either of its extreme positions.

2. In a calculating machine of the pin wheel and cam disc type, the combination of a slotted longitudinally movable slider, a counting wheel and means for actuating said wheel by the rotation of said pin wheel, said slider being adapted to project into the path of the transfer pin teeth upon said pin wheel, and guiding shafts for said slider, which pass transversely through the slots in said slider, said slider having one end formed with spring jaws adapted to grip a guiding shaft in each of the extreme positions of the sliders.

3. In a calculating machine of the pin wheel and cam disc type, a longitudinally movable, slotted transfer slider, a counting wheel and means for actuating said wheel by the rotation of said pin wheel, guide shafts for said slider which pass through slots in said slider, one of said slots being formed with pairs of angular notches to embrace one of the said guide shafts.

4. In a calculating machine of the pin wheel and cam disc type, a longitudinally movable transfer slider, means for advancing said slider towards the pin wheel, a cam upon the pin wheel thereafter moving back said slider, and means for positively locking the slider in its extreme positions, said locking means being integral with the said transfer slider.

5. In a calculating machine of the pin wheel and cam disc type, a longitudinally movable one-piece slider, comprising a loop frame, a cam nose at one end of the slider, a cam projecting inwardly of the loop frame and in the same plane as the loop frame, outwardly directed spring arms at the opposite end of the loop frame, notched jaws upon the faces of the spring arms, said spring arms being in the plane of the loop portion, means for guiding said slider in its longitudinal movements, said means including a transversely arranged guiding shaft, and said shaft being adapted to be embraced by said notched jaws upon the spring arms.

6. In a calculating machine of the pin wheel and cam disc type, a spindle-mounted numeral drum, a cam projection upon the side of said drum, a one-piece transfer slider having a loop frame adapted to encircle said spindle, a cam nose at one end of said transfer slide adapted to engage an external cam on the pin wheel periphery, laterally bevelled faces upon said cam nose, said faces adapted to engage a transfer tooth on the pin-wheel, a slot between said cam nose and said loop frame, said spring jaws formed at the other end of said transfer slider, said jaws adapted to locate and hold the transfer slider in either of two positions, the interior of said loop frame having an inwardly directed cam adapted to cooperate with said cam projection upon the side of the numeral drum to displace the transfer slider from one extreme position to the other extreme position.

7. In a calculating machine of the pin wheel and cam disc type, a longitudinally movable transfer slider, said slider comprising a loop frame, means for advancing said slider towards the pin wheel periphery, a cam upon the pin wheel thereafter moving back said slider, a cam nose at one end of said slider, a guiding slot between said cam nose and said loop frame, notched spring jaws at the opposite end of said slider, and parallel spindles arranged transversely of said slider, said guiding slot and notched spring jaws engaging said parallel spindle to guide and localize said transfer slider.

In testimony whereof I affix my signature.

CHARLES FELICIEN BLACHER.