May 22, 1951 J. W. CADE 2,554,323

RECORDING CYCLOMETER

Filed April 14, 1948 2 Sheets-Sheet 1

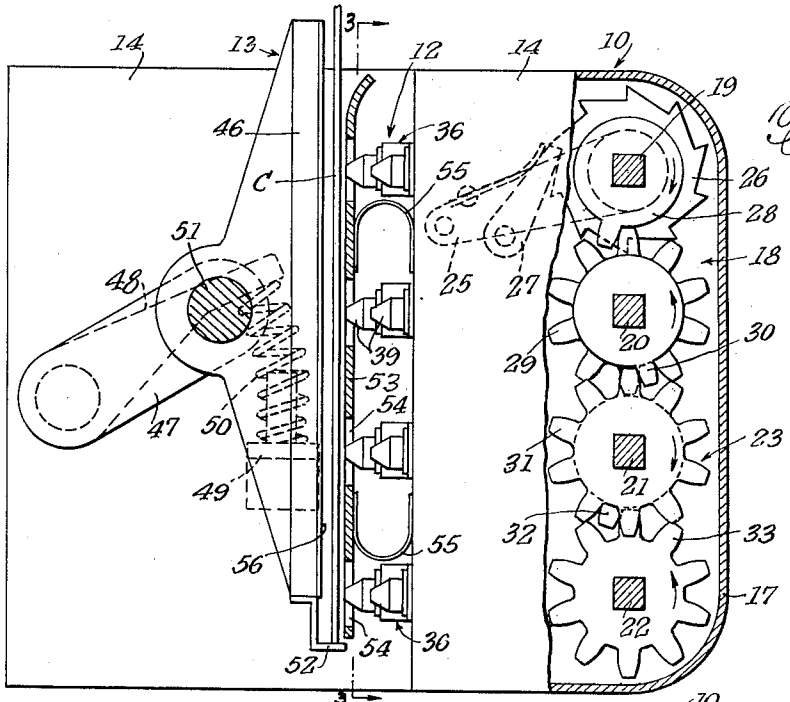


Fig. 1.

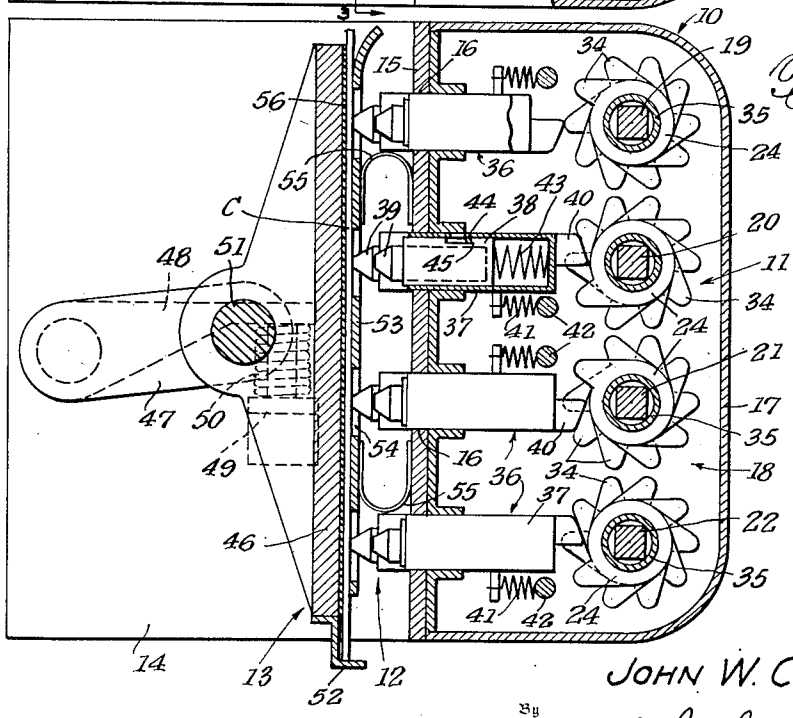


Fig. 2.

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Fig. 3.

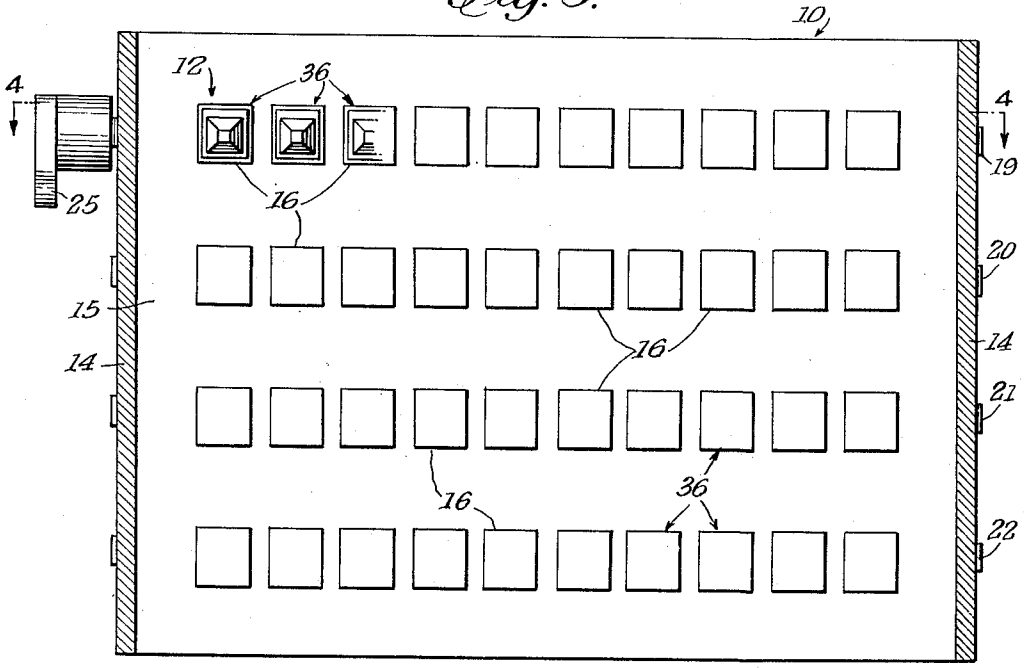


Fig. 4.

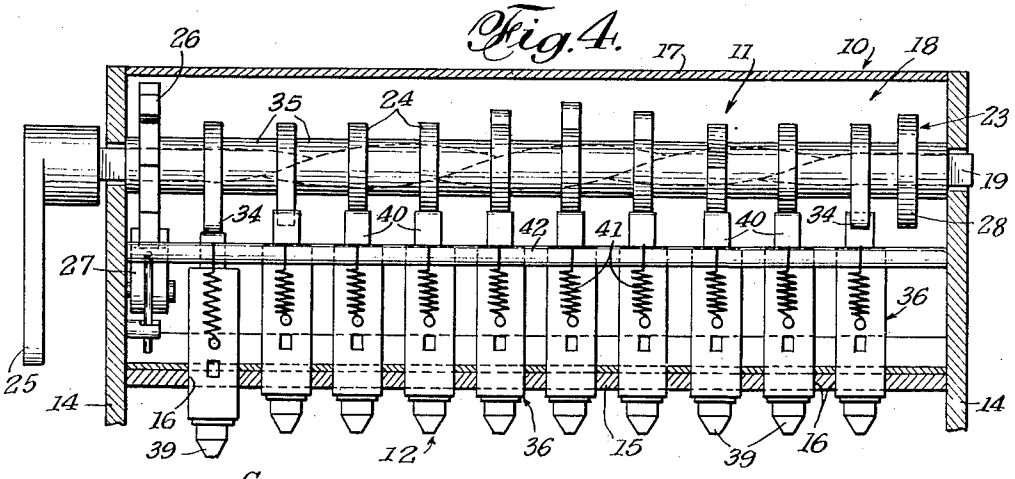
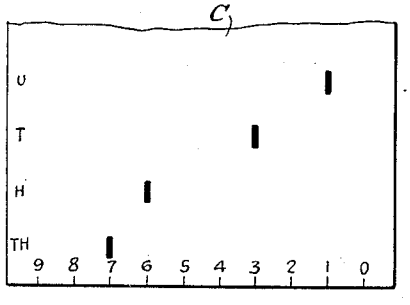


Fig. 5.



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RECORDING CYCLOMETER

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10 Claims. (Cl. 346—104)

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This invention relates to recording devices and deals more particularly with a recording counter or cyclometer such as may be used in connection with watt meters, gas meters, water meters, etc. As will later be apparent, this invention has other applications of use in a variety of fields.

The present invention contemplates producing a record of the reading of a cyclometer, said record, for each such reading, consisting of marks on a card that are so positioned relatively that when said card is placed in a suitable business machine, the machine will translate said marks into a number that is represented by the marks. By providing said marks with electrical conductivity, the machine will react and function according to the pattern of arrangement of the marks to produce, for instance, a bill for electric current, a gas bill, a water bill, etc.

An object of the present invention, therefore, is to provide novel means for a record of the reading of a cyclometer or like device, that is adapted to be placed in a business machine for translation into a bill or the like.

Another object of the invention is to provide a recording cyclometer which produces, on a card, mutually interrelated marks that have electrical conductivity for controlling a machine sensitive thereto, whereby said machine translates said marks into a number and/or the charge for the units of a commodity represented by said number.

A more specific object of the invention is to provide a cyclometer or like device for producing on a card a pattern of marks formed of graphite whereby said marks have electrical conductivity of subsequent use as above indicated.

My invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawings merely show and the following description merely describes one embodiment of the present invention, which is given by way of illustration or example only.

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In the drawings, like reference characters designate similar parts in the several views.

Fig. 1 is an end view, partly broken away, of a recording cyclometer embodying features of the present invention.

Fig. 2 is a cross-sectional view, parallel to the plane of Fig. 1, and taken through an intermediate part of the device.

Fig. 3 is a vertical sectional view as taken along the plane of line 3—3 of Fig. 1.

Fig. 4 is a plan sectional view as taken on the plane of line 4—4 of Fig. 3.

Fig. 5 is a face view to a reduced scale, of a portion of a card bearing markings as produced by the present device.

The recording cyclometer that is illustrated comprises, generally, a suitable housing 10; cyclometer means 11, within said housing and operatively controlled by a meter or like device; marking means 12 controlled by the means 11; and manually movable platen means 13 for pressing a card C or the like into operative engagement with the means 12 to mark said card with a pattern of marks according to the position of said means 12.

The housing 10 comprises end walls 14 that are extended to mount the platen means 13, a front wall 15 formed with four horizontal rows of ten holes 16, and a cover 17 that, together with walls 14 and 15, encloses a chamber 18. While four rows of holes 16 are shown, it will be evident that there may be only one, or two, three or more rows, as desired.

The means 11 is mounted within chamber 18 and comprises four transverse shafts 19, 20, 21 and 22 that are vertically aligned, carry over gearing 23 that interconnect the shafts, a plurality of similar cams 24 on each shaft, and an operating lever 25 on the shaft 19 for either continuously or intermittently rotating the same, or oscillating the same.

As shown, shaft 19 has affixed thereto a ratchet wheel 26, and a dog 27 is associated with the teeth of said wheel so that the same can rotate in one direction only regardless of the rotation and/or oscillation of lever 25, the latter effecting drive of shaft 19 in said one direction.

Referring more particularly to Fig. 1, shaft 19 is shown as being driven in a clockwise direction. Said shaft is provided, as part of carry

over gearing 23, with a single toothed gear element 23 that, for each revolution of shaft 19, engages, one tooth of a ten-toothed gear 29 on shaft 20. Thus, shaft 20 rotates intermittently in a counter-clockwise direction and completes one revolution for each ten revolutions of shaft 19. A single toothed gear element 30 on shaft 20 successively engages the ten teeth of a gear 31 on shaft 21 to intermittently rotate the latter shaft one full revolution in a clockwise direction for each ten revolutions of shaft 20. A single toothed gear element 32 on shaft 21 successively engages the ten teeth of a gear 33 on shaft 21 to intermittently rotate the latter shaft one full revolution in a counter-clockwise direction for each ten revolutions of shaft 21.

The carry over gearing 23 above described is generally typical for obtaining suitable ten-fold rotation of each successive shaft of the group comprising shafts 19 to 22.

Each of said shafts is provided with a group of ten cams 24 and the cams on each shaft are similar and similarly arranged. Each cam is provided with a lobe 34 and said lobes of each group are uniformly angularly disposed through 360°. Thus, the angular difference between adjacent cam lobes is 36°. The cams of each group are spaced along each respective shaft and held in spaced relation by spacing collars 35 as best seen in Figs. 4 and 5.

A convenient manner, obviating keys, splines or set screws, for angularly positioning the cam lobes entails forming each shaft of stock having a square or rectangular cross-section and imparting a 360° twist to each shaft. However, the ten cams of each group include nine spaces. Accordingly, the end cams will be relatively displaced 324°. It is thus a simple matter to form the cams with rectangular clearance holes for the shafts and to alternate them with spacers to make up each shaft assembly with the cam lobes progressively and uniformly angled at 36° increments.

The means 12 comprises forty similar units 36, one projecting through each hole 16 in wall 15. Each unit 36 comprises a tubular rectangular outer casing 37 that has a closed end, a holder 38 slidably mounted in said casing, a pointed piece of graphite or marker 39 or the like fixed in said holder, a lug 40 on the closed end of casing 37 for engagement by a cam 24, and a spring 41 connecting said casing with a fixed rod 42 for urging said lug into engagement with said cam. The holder 38 is resiliently mounted in the casing, an expansion spring 43 in the latter normally projecting said holder and the piece of graphite outwardly as limited by an inturned abutment 44 on the casing and a shoulder 45 on the holder. Thus, the piece of graphite is cam-projected, spring-retracted, and yieldingly mounted.

It is evident that each unit 36 is operatively associated with one of the cams 24 for projection to card-marking position by the lobe 34 of said cam. As seen in Fig. 4, the end cam at the left is the "zero" cam and the others, successively, are the 1, 2, 3, 4, 5, 6, 7, 8 and 9 cams. The upper shaft 19 is the "units" shaft, the shaft 20, the "tens" shaft, the shaft 21, the "hundreds" shaft and the shaft 22, the "thousands" shaft. As set up in the drawings, the four "zero" cam lobes are shown projecting the left-hand unit 36 of each row of said units. Accordingly, should a card C be pressed with a slight downward wiping movement against the graphite pieces 39 of

said projected units, said graphite pieces will form four aligned graphite marks on said card. A card thus marked, when placed in a suitable machine sensitive to the conductive properties of the marks, will result in translation to 0000.

Now, as lever 25 is actuated, shaft 19 will rotate clockwise to move the leftmost cam lobe 34 out of projecting engagement with the uppermost unit 36 at the left and the spring 41 will retract said unit. The lobe of the next cam, which is the 1 cam, on the shaft 19 will project its unit 36. Since the three other shafts will be unaffected, a translation of the marks obtained with this setting of the units will be 0001.

When shaft 19 has made a complete revolution, gear element 28 will engage gear 29 to rotate the same an increment of one tooth. The marks now obtained will translate to 0010. And so it will be seen that the device has a capacity to 9999 when it automatically returns to the initial zero setting.

As seen in Fig. 5, the marks have a pattern which varies first along the "unit" now and then, as the number increases, along the "tens" row, etc. The number set up on the card shown is 7631.

The platen means 13 comprises a platen 46 arranged parallel to and spaced from the marking ends of the projected markings 39, a pivoted lever 47 mounting said platen on the extensions of walls 14, an operating handle 48 for tilting said lever, an abutment bracket 49, and a spring 50 between said bracket and the end of the handle for elevating the latter and normally positioning the platen in a raised position relative to the markers. The lever 47 is so arranged that its free end 51, that has rotational engagement with the platen, moves in an arc that is both forward and downward, said movement being limited by the abutment bracket. The platen 46, at its lower end is provided with a ledge 52 for a card C.

Between the housing 10 and the platen 46 there is arranged a guide plate 53 that, together with said platen, forms a card-receiving chute or housing. Said plate is provided with suitable holes 54 through which the marks 39 are adapted to project, and flexible means such as springs 55 mount said plate resiliently.

In practice, that face of plate that is directed toward the platen is preferably polished so that a card will slide freely when in contact therewith. However, the complementary face of the platen, as indicated by a liner 56, is formed to frictionally grip the card. Said face may comprise a sheet of suitable fabric, a coating of rough material or the same may be knurled.

When a reading is to be taken to record the accumulated actuations of lever 25 as reflected by the cams 24 and the projected markers 39, a card C is dropped into the card chute and handle 48 is pressed. The first movement of said handle will bring the platen face 56 into contact with the card and then press the card against plate 53. The final movement of said handle will result in said card being both pressed against the projected markers and wiped therealong to cause the markers to produce the elongated marks shown in Fig. 5. Upon release of handle 48, the markers will again wipe against the card as the same moves upwardly to strengthen the marks.

It will be noted that plate 52 obviates the card, as it passes into the chute, being inadvertently marked by the markers, and that the markers, as urged by springs 43, resiliently press against the card. Also, wear on the markers is compensated

for by the mentioned projection thereof by springs 43.

A variation of the above-described cyclometer may embody manual setting of each shaft 19 to 22 with means to clear the setting to zero.

While I have illustrated and described what I now regard as the preferred embodiment of my invention, the construction is, of course, subject to modifications without departing from the spirit and scope of my invention. I, therefore, do not wish to restrict myself to the particular form of construction illustrated and described, but desire to avail myself of all modifications that may fall within the scope of the appended claims.

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

1. A recording cyclometer comprising a row of markers, a row of cams each operatively associated with a marker, means for moving said cams to project said markers successively, and means mounted for movement both toward a sheet positioned in front of the markers and relative to the face of said sheet for pressing said sheet against the projected markers and simultaneously sliding the same with respect to the markers to be marked thereby.

2. A recording cyclometer comprising plural rows of markers, a row of cams associated with each row of markers, each cam being associated with a marker, means interconnecting the rows of cams to move the same whereby the cams of each row successively project the markers associated therewith, and means mounted for movement both toward a sheet positioned in front of the markers and relative to the face of the sheet for pressing said sheet against the projected markers to be marked thereby.

3. A recording cyclometer comprising plural rows of markers, a row of cams associated with each row of markers, each cam being associated with a marker, means interconnecting the rows of cams to move the same whereby the cams of each row successively project the markers associated therewith, a sheet-receiving chute having openings through which said markers are adapted to project, and means for pressing the chute and a sheet therein in a direction to press said sheet against the projected markers, said means being mounted to engage and slide the sheet relative to the markers to thereby provide said sheet with elongated marks.

4. A recording cyclometer comprising two shafts, means for rotating one of said shafts, means operatively connecting the shafts whereby a full revolution of the driven shaft effects a partial revolution of the other shaft, a plurality of similar cams on each shaft, said cams each being differently angularly arranged on their respective shafts, a marking unit associated with each cam and adapted to be projected by the cams of each shaft successively and means for slidingly pressing a sheet against the projected marking units to receive a separate elongated mark from each projected marking unit, each marking unit including a graphite marker whereby the elongated mark made thereby has electrical conductivity.

5. A recording cyclometer comprising two shafts, means for rotating one of said shafts, means operatively connecting the shafts whereby a full revolution of the driven shaft effects a partial revolution of the other shaft, a plurality of similar cams on each shaft, said cams each being differently angularly arranged on their respective shafts, a marking unit associated with each cam and adapted to be projected by the cams of each

shaft successively and means for slidingly pressing a sheet against the projected marking units to receive a separate elongated mark from each projected marking unit, each marking unit including a resiliently mounted graphite marker, whereby the elongated mark made thereby has electrical conductivity, and whereby the pressure of the resiliently mounted marker on the sheet results in a considerable transfer of graphite to the sheet to form the mentioned mark.

6. A recording cyclometer comprising two shafts, means for rotating one of said shafts, means operatively connecting the shafts whereby a full revolution of the driven shaft effects a partial revolution of the other shaft, a plurality of similar cams on each shaft, said cams each being differently angularly arranged on their respective shafts, a marking unit associated with each cam and adapted to be projected by the cams of each shaft successively, a resiliently mounted plate having openings into which the projected marking units are adapted to extend, a movable platen associated with said plate to form a sheet-receiving chute to bring one face of a sheet in front of the projected marking units, and means for moving the platen, both toward said marking units and also downward with respect thereto to press the sheet with a sliding motion against the units to be marked thereby.

7. In a device of the character described, a plurality of shafts each having a polygonal cross-section, one end of each shaft being rotated through 360° with relation to the other end whereby the shaft is uniformly twisted throughout its length, a plurality of similar cams having holes corresponding to the sectional form of the shaft and mounted on each shaft, means spacing said cams of each shaft whereby the same are successively and uniformly angularly offset with respect to each other, means for rotating said shafts, and a marking unit associated with each cam and adapted to be projected thereby to marking position.

8. In a device of the character described, a plurality of shafts each having a polygonal cross-section, one end of each shaft being rotated through 360° with relation to the other end whereby the shaft is uniformly twisted throughout its length, a plurality of similar cams having holes corresponding to the sectional form of the shaft and mounted on each shaft, means spacing said cams of each shaft whereby the same are successively and uniformly angularly offset with respect to each other, means for rotating said shafts, a marking unit associated with each cam and adapted to be projected thereby to marking position, and resilient means urging said units against each respective cam whereby said units are retracted under control of the cams.

9. A recording cyclometer comprising a sheet-receiving chute, a series of marking elements arranged on one side of the chute, means for projecting said elements sequentially in a direction toward one face of a sheet residing in the chute, and means engageable with the opposite face of the sheet to press said sheet against the projected marking elements and simultaneously slide said sheet relative to said elements to receive elongated marks therefrom.

10. A recording cyclometer comprising a sheet-receiving chute, a series of marking elements arranged on one side of the chute, means for projecting said elements sequentially in a direction toward one face of a sheet residing in the chute,

and means engageable with the opposite face of the sheet to press said sheet against the projected marking elements and simultaneously slide said sheet relative to said elements to receive elongated marks therefrom, said latter means comprising a flat platen having a friction liner on that face thereof which engages the sheet, and manually movable means connected to the platen to move the same in an arcuate path both toward said sheet and relative to the face thereof.

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