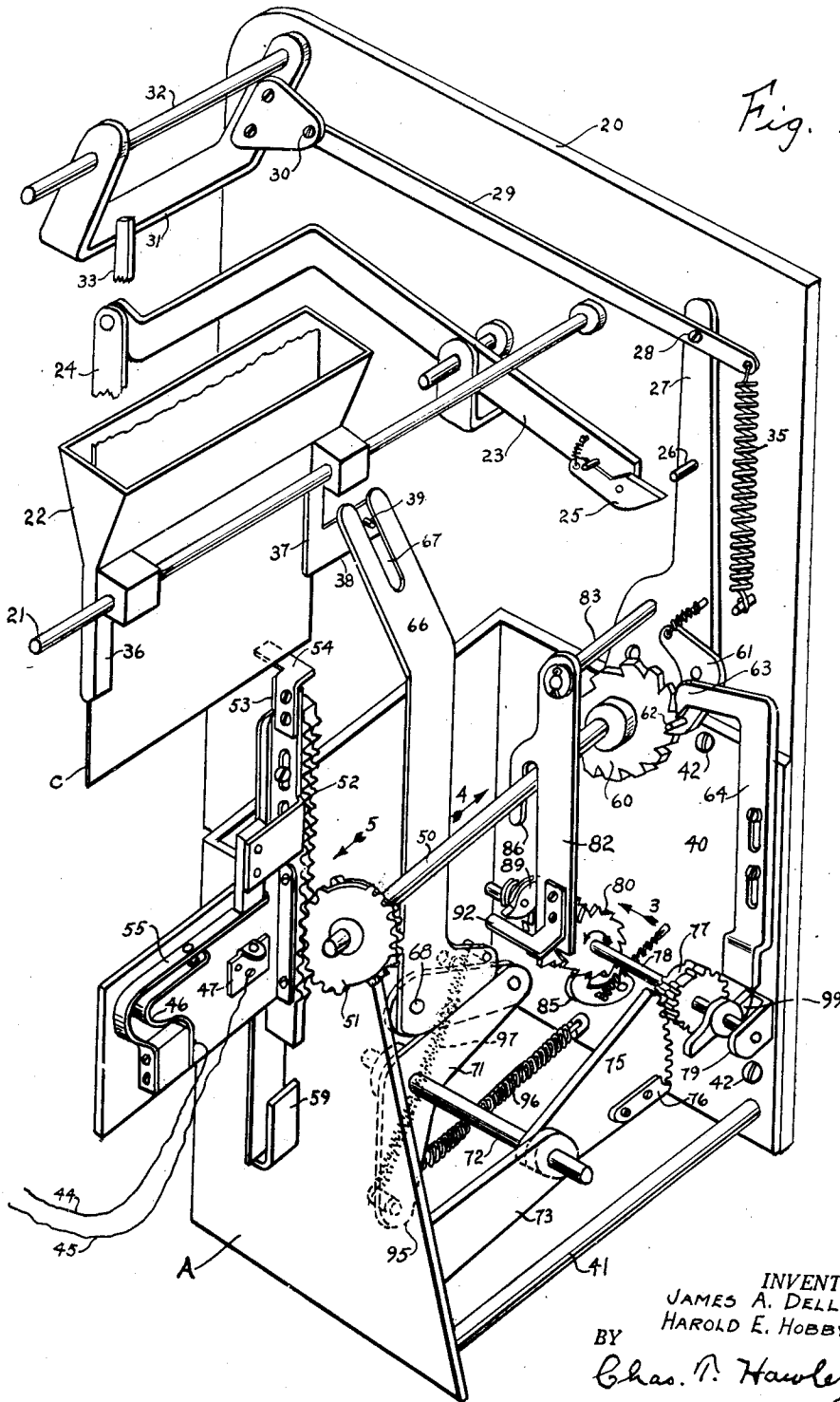


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CARD TIME RECORDER
Filed June 17, 1944

4 Sheets-Sheet 1



Nov. 20, 1945.

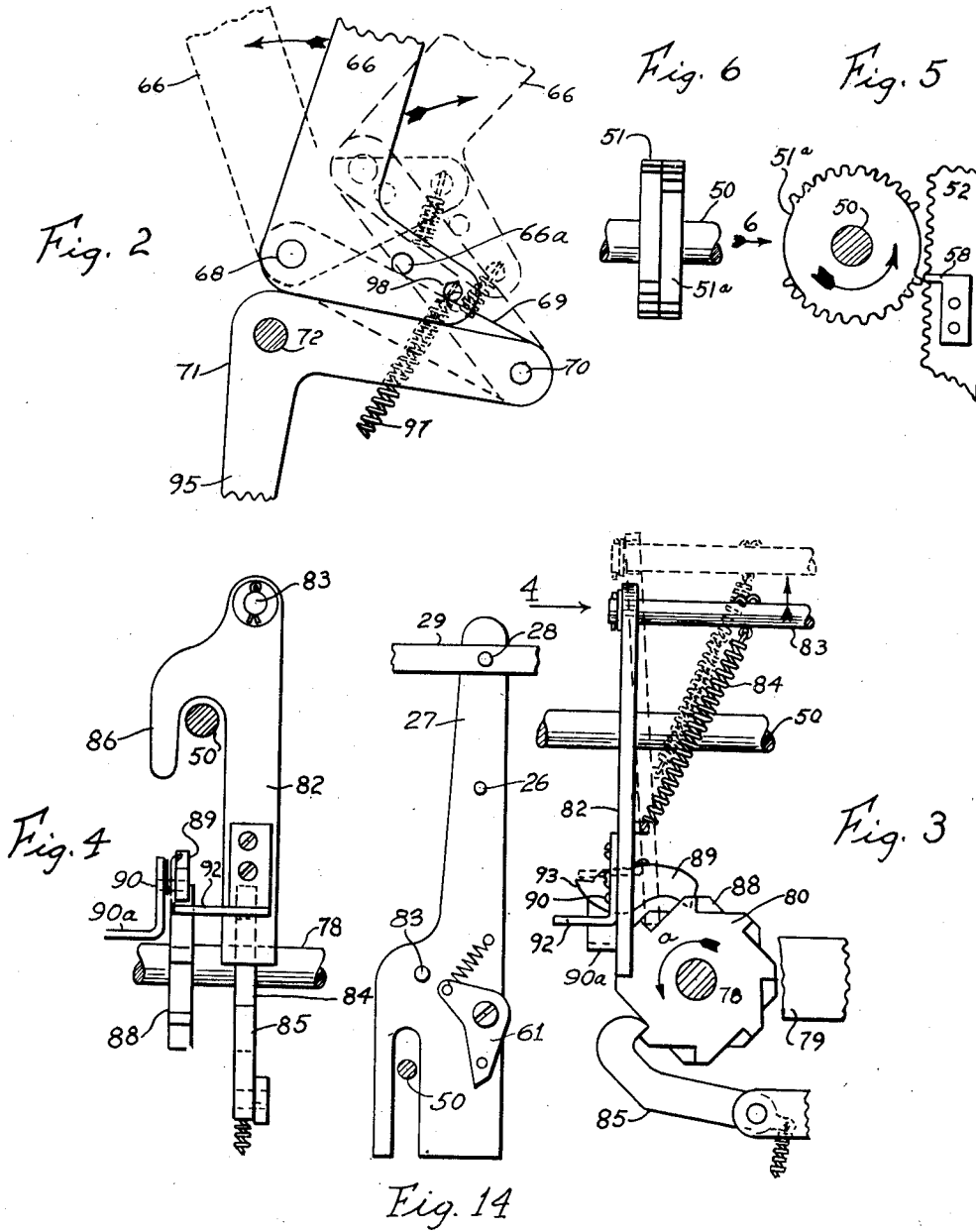
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2,389,345

CARD TIME RECORDER

Filed June 17, 1944

4 Sheets-Sheet 2



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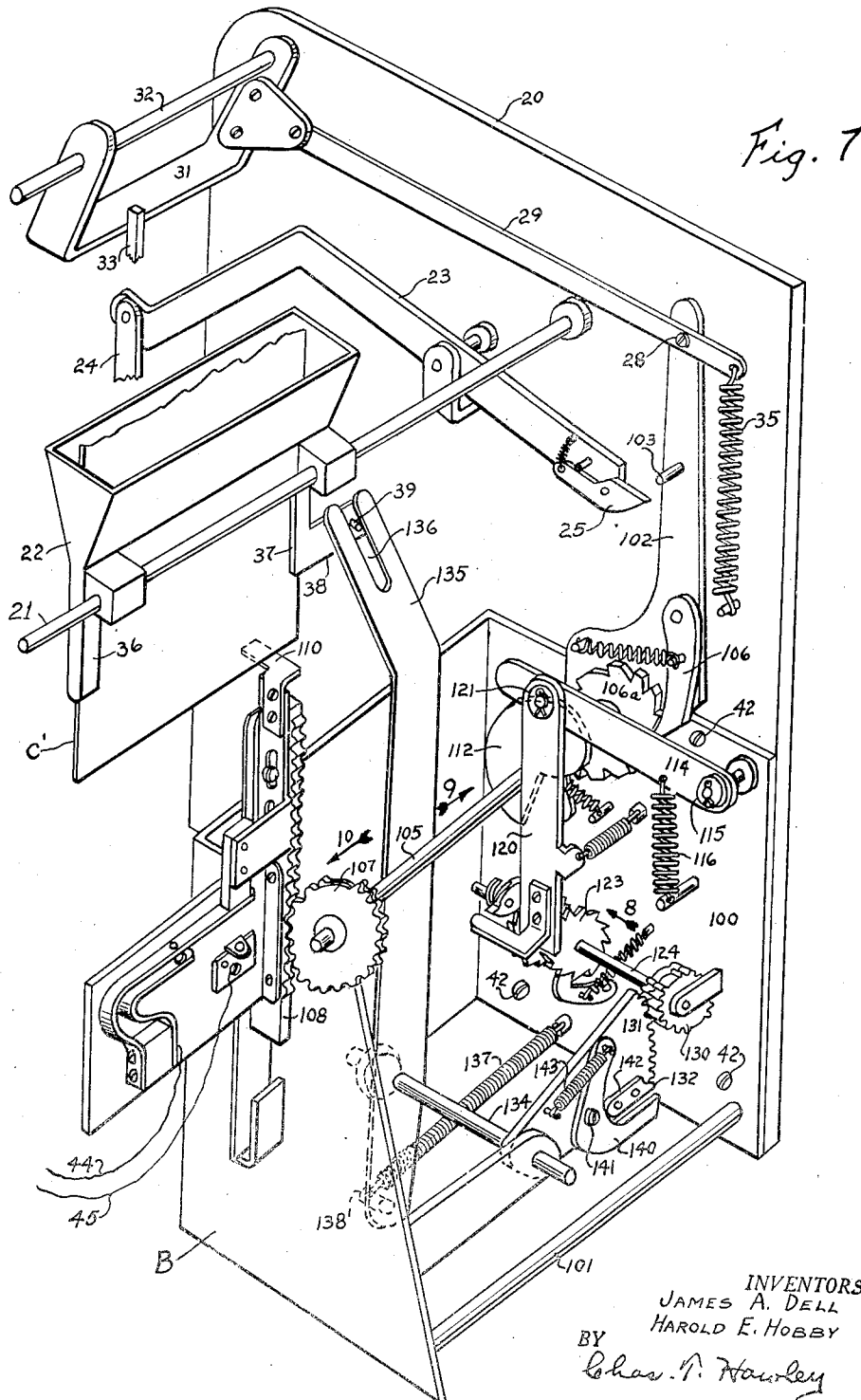
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CARD TIME RECORDER

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4 Sheets-Sheet 4

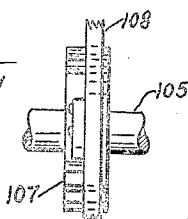
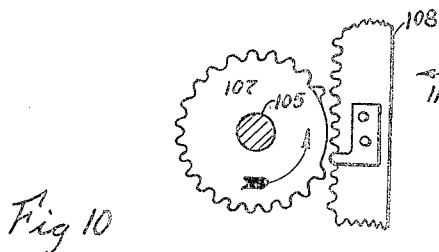
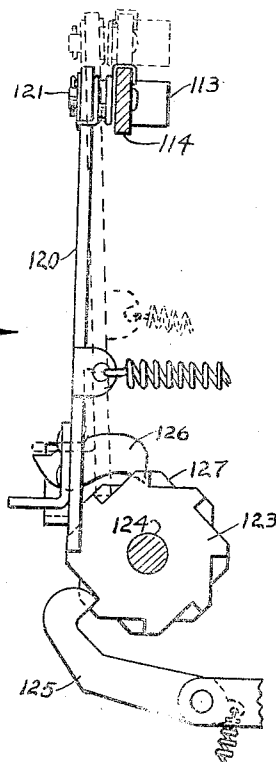
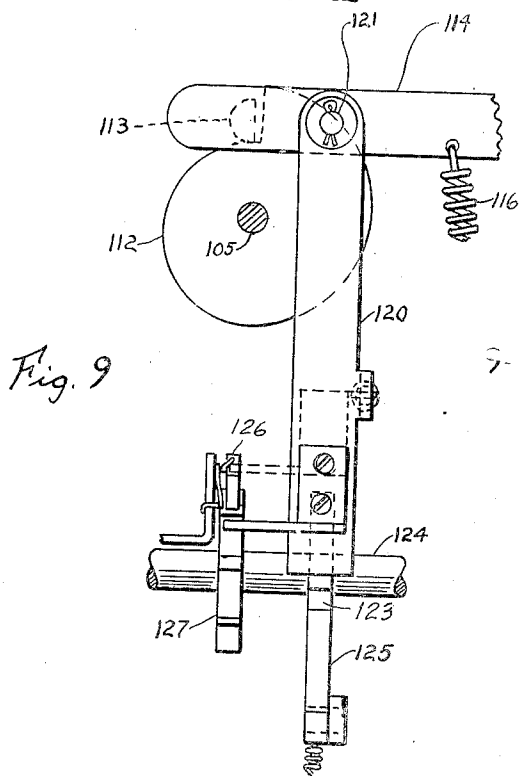
Fig. 12

No.											
NAME											
S	MAN.	NOON	NOON	NIGHT	EXTRA	EXTRA	TIME				
	IN	OUT	IN	OUT	IN	OUT					
M											
T											
W											
T											
F											
S											
S											

No.

NAME

MON	TUE	WED	THU	FRI	SAT	SUN



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UNITED STATES PATENT OFFICE

2,389,345

CARD TIME RECORDER

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Application June 17, 1944, Serial No. 540,859

8 Claims. (Cl. 234—43)

This invention relates to a workman's time recorder of the type in which a plurality of records are printed on a time card each day for a predetermined period, such as a weekly period of seven days or a bi-weekly or semi-monthly period of fourteen to sixteen days. In such recorders, it is customary to shift the card relative to the printing point in both vertical and horizontal directions and these shifts are usually automatically effected and controlled.

With one type of card, the shift is horizontal during the working period and vertical from day to day. With another type of card, the shift is vertical during the working period and horizontal from day to day. With either type of card, the card may be either raised or lowered at each vertical shift.

It is the general object of our invention to provide a card time recorder so constructed that it may be readily adapted to use cards with many different record arrangements. Some eighteen such different arrangements are in more or less common use.

In the carrying out of our invention, we have constructed our improved recorder in two easily combined units. The main unit contains the printing and impression devices, the ribbon mechanism, the program control devices, if any, and the time-controlled actuating mechanism for the printing and program devices; also the card chute and the supports on which the chute is horizontally slidable.

The second or auxiliary unit commonly contains the card lift or abutment, a member connected to move the card chute horizontally, and mechanical means to shift the abutment and to move the card chute in a definite and predetermined relationship.

Furthermore, we make the auxiliary units interchangeable in the main unit, so that a recorder may be readily adapted to use any desired card and to assemble records thereon according to any desired system. This result is attained by selecting any appropriate auxiliary unit and installing it in the main unit, the recording mechanism of which latter unit remains unchanged for all different cards and for different distributions of records.

Another feature of our invention relates to an improved construction which permits the card chute to be manually shifted horizontally out of normal recording position when necessary but which promptly returns the card chute to normal position as soon as released.

Our invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

Parts of the main unit of a time recorder, together with two different auxiliary units, are shown in the drawings, in which

Fig. 1 is a perspective view of parts of a recorder, together with an auxiliary unit for use with a card in which the shifts are horizontal during a working period and in which the card is raised at the end of such working period;

Fig. 2 is a rear elevation of certain parts which connect the card chute with its positioning mechanism;

Fig. 3 is a sectional rear elevation of certain intermittent driving mechanism, looking in the direction of the arrow 3 in Fig. 1;

Fig. 4 is a side elevation thereof, looking in the direction of the arrow 4 in Figs. 1 and 3;

Fig. 5 is a detail view of a card lift rack and mutilated pinion, looking in the direction of the arrow 5 in Fig. 1;

Fig. 6 is a side elevation of the pinion, looking in the direction of the arrow 6 in Fig. 5;

Fig. 7 is a perspective view similar to Fig. 1 but showing an auxiliary unit constructed to lift the card at predetermined intervals during a working period and to shift the card sidewise at the end of such working period;

Fig. 8 is a sectional rear elevation of certain intermittent driving mechanism, looking in the direction of the arrow 8 in Fig. 7;

Fig. 9 is a side elevation, looking in the direction of the arrow 9 in Figs. 7 and 8;

Fig. 10 is a detail view of a mutilated pinion and a portion of the card lift rack looking in the direction of the arrow 10 in Fig. 7;

Fig. 11 is a front elevation, looking in the direction of the arrow 11 in Fig. 10;

Fig. 12 is a front view of a time card adapted for use in the auxiliary unit shown in Fig. 1 but drawn to a reduced scale;

Fig. 13 is a similar view of a time card adapted for use in an auxiliary unit such as is shown in Fig. 7; and

Fig. 14 is a detail view of a feeding member to be described.

Referring to Figs. 1 to 6, we have shown parts of the main unit of our improved time recorder including a side frame member 20, a fixed cross rod 21 on which a card chute 22 is horizontally slidable, an actuating lever 23 pivotally mounted on the frame 20 and connected by a link 24 to any suitable actuating mechanism by which the lever 23 is given a rocking movement once each minute or other predetermined and regular time interval. This actuating movement may be produced by any usual time-controlled mechanism such as a solenoid, the circuit of which is closed once each minute.

A latch 25 is pivoted to the end of the lever 23 and normally clears a pin 26 on an upright and vertically sliding member 27 forming a part of the auxiliary unit. The upper end of the slide 27 is detachably connected as by a screw 28 to a link 29 pivoted at 30 to a U-shaped member 31

which in turn is pivoted on a fixed cross rod 32. The member 31 may be engaged by the upper end of an arm or lever 33 actuated by any suitable program mechanism to swing the member 31 clockwise in Fig. 1 and thus draw the slide 27 and pin or stud 26 forward into the path of the latch 25. A spring 35 tends to move the slide 27 downward and also to swing it rearward out of the path of the latch 25. At its lower end the slide 27 is slotted as shown in Fig. 14 and embraces and is guided by a cross shaft to be described.

The card chute 22 has side portions 36 and 37 to receive the edges of a card C of the type shown in Fig. 12, and also has an offset projection 38 with a stud 39 inserted therein.

All of the parts thus far described, with the exception of the stud 26 and slide 27, are parts of the main unit of our improved time recorder and the details of such parts per se form no part of our present invention.

The auxiliary unit A shown in Figs. 1 to 6 comprises a sub-frame 40, preferably of sheet metal and U-shaped in horizontal cross section and open at the top and bottom thereof. A cross rod 41 rigidly connects the spaced rear edges of the sub-frame 40 and the sub-frame is secured to the end frame 20 by a plurality of screws 42. Two such screws are shown in Fig. 1 and additional similar screws are shown in Fig. 7 but are covered or concealed by other parts in Fig. 1.

By removing the screws 42 and the screw 28 previously described, and by disconnecting a pair of wires 44 and 45 from certain circuit-closing contact members 46 and 47 to be described, the entire auxiliary unit A may be removed from the time recorder and may be replaced by a corresponding but different unit, such as is shown for instance in Fig. 7.

Further describing the unit shown in Figs. 1 to 6, a cross shaft 50 is rotatably mounted in the ends of the sub-frame 40 and is provided at one end with a mutilated pinion 51 which engages a rack 52 carrying a slide 53, which in turn supports a card rest or abutment 54. A resilient contact member 55 yieldingly supports the slide 53 and abutment 54 and when depressed by the card, the contact member 55 first engages the contact member 46 previously described and thereafter engages the contact member 47, thus completing the connection between the wires 44 and 45 which control the impression mechanism of the recorder. This mechanism may be of the type shown in the prior patent to Watkins, No. 2,102,771.

The mutilated pinion 51 is preferably made in two parts as shown in Fig. 6, with the omitted teeth in the two parts staggered to the extent of two teeth, as clearly shown in Fig. 6. The rack 52 has an auxiliary tooth 58 (Fig. 5) secured at one side thereof and adapted to engage the teeth of the pinion portion 51a when the rack is released by the mutilated pinion and falls to the bottom of its path of travel.

For a more complete description of the coaction of this type of rack and pinion, reference is made to the prior patent of Deane and Dell, No. 2,286,902.

A stop 59 (Fig. 1) fixed to the sub-frame 40 determines the lower position of the rack 52 and abutment 54 when the rack is released.

The shaft 50 is provided with a ratchet wheel 60 engaged by a feed pawl 61 pivotally mounted on the vertically movable slide 27 previously described. The pawl 61 is, however, held inopera-

tive in this type of unit until the end of the twenty-four hour or working period by a stud 62 thereon which is engaged by a cam 63 formed on the offset arm of a slide 64 having a screw-and-slot connection to one end of the sub-frame 40. So long as the slide 64 is in its normal or lowered position, the cam 63 engages the stud 62 and withdraws the pawl 61 as it is lifted, so that it cannot move in and engage the next higher tooth of the ratchet wheel 60.

At the end of the working period, however, the slide 64 is raised by mechanism to be described and permits such engagement, whereupon the shaft 50 and pinion 51 are angularly advanced one space.

The means for shifting the card chute 22 horizontally to successive "in" and "out" positions during the day comprises an upwardly extending arm 65 (Fig. 1) having a slot 67 to receive the stud 39 on the offset projection 38 of the card chute.

At its lower end, the arm 66 (Fig. 2) is pivoted at 68 to a link 69, which in turn is pivoted at 70 to the horizontal arm of a bell crank 71. The bell crank 71 is fixed to a cross shaft 72 (Fig. 1) which is supported in fixed bearings 73 in the sub-frame 40 and which has a segment gear or circular rack 75 also fixed thereto.

The gear 75 has a starting tooth 76 at one side thereof and engages a double mutilated pinion 77 mounted on a second cross shaft 78. The shaft 78 is supported in bearing brackets 79 fixed to one end portion of the sub-frame 40 and the shaft is provided with a ratchet wheel 80 (Figs. 3 and 4) which is engaged and intermittently fed in the direction of the arrow *a* (Fig. 3) by a vertically disposed feed pawl 82. The upper end of the pawl 82 is loosely pivoted at the outer end of a stud 83 which is fixed in the vertically movable slide 27 (Fig. 1) previously described.

A tension spring 84 is connected at one end to the pawl 82 and at its other end to the stud 83 and tends to swing the pawl 82 from the full line to the dotted line position in Fig. 3 as the slide 27 is raised. A spring-pressed holding latch 85 prevents rearward rotation of the ratchet wheel 80 and cross shaft 78. An offset depending lug 86 (Fig. 4) loosely embraces the shaft 50 previously described and thus prevents lateral displacement of the feed pawl 82.

A reversed ratchet wheel 88 (Figs. 3 and 4) is mounted on the cross shaft 78, and the teeth thereof are normally engaged by a locking pawl 89 mounted on a fixed pivot 90 on a bracket 90a secured to the sub-frame 40. An offset arm 92 on the latch 82 engages the tail 93 of the pawl 89 as the ratchet wheel 80 is advanced but clears the pawl before the next tooth on the reversed ratchet wheel 88 has reached locking position. Unauthorized advance of the chute-moving shaft 72 is thus prevented.

By the operation of the feeding mechanism above described, the ratchet wheel 80 and cross shaft 78 will be advanced one space each time the slide 27 is swung to the left in Fig. 1 by the program connection. The stud 26 is then positioned in the upward path of the latch 25 on the regularly-actuated lever 23. Such advance movement of the shaft 78 rotates the mutilated pinion 77 and swings the segment gear 75 downward and the slotted arm 66 to the right in Fig. 1.

The downwardly extending arm 95 of the bell crank 71 has a tension spring 96 connected at one end thereto and connected at the other end to one end portion of the sub-frame 40. A second

spring 97 is connected at its lower end to the bell crank arm 95 and at its upper end to a stud 98 (Fig. 2) in an offset portion of the arm 66. The action of the spring 97 is to seat a stud 66a therein against the upper edge of the link 69 and to seat the lower edge of the arm 66 firmly against the horizontal arm of the bell crank 71, with which it swings back and forth to shift the card chute 22.

If however, it is necessary to move the card chute backward to make an "in" record after an "out" shift, the card chute may be pushed manually to the left in Fig. 1, thus swinging the arm 66 about its pivot 68 to the left or dotted line position shown in Fig. 2 and against the tension of the spring 97, which will immediately restore the arm and card chute to normal position when released. If, on the other hand, it is necessary to shift the card forward one space so as to make an early "out" record, the card chute is shifted to the right in Fig. 1 and the arm 66 moves therewith to the right to the broken line position in Fig. 2, which movement is permitted by angular movement of the arm 66 and link 69 as a unit about the pivot 70, such movement also being yieldingly resisted by the spring 97.

A double cam 99 (Fig. 1) is mounted on the shaft 78 and engages and lifts the slide 64 at the end of each working period. This releases the stud 62 (Fig. 1) and permits the pawl 61 to engage and advance the ratchet wheel 60, thus raising the card abutment 54 one space. At the same time the segment gear 75 is released by the mutilated pinion 77 and swings upward to its highest position, thus shifting the card chute to the extreme left in Fig. 1.

It will thus appear that the auxiliary unit A, permanently assembled in the sub-frame 40, comprises effective mechanism for shifting the card chute to present successive "in" and "out" columns at the printing point and also for raising the card one space at the end of each working period.

It will be noted that the segment pinions 51 and 77 have teeth omitted on opposite sides thereof, so that they will release the rack 52 and segment gear 75 after each half revolution, and the cam 99 is made double for the same reason. For a two-week card, however, the pinion 51 will be cut away on one side only, so as to provide double the number of abutment shifts before return of the abutment to its lowest position.

As previously stated, the entire unit A may be removed from the recorder by taking out the screw 28 which connects the link 29 to the feed slide 27 and by taking out the screws 42 which secure the auxiliary unit A in the main frame 20 and by disconnecting the wires 44 and 45 which form part of the operating circuit for the impression mechanism of the recorder.

The auxiliary unit B shown in Figs. 7 to 11 is interchangeable with the unit A shown in Figs. 1 to 6, and the parts of the main recorder unit which appear in Fig. 7 are identical with those shown in Fig. 1 and are similarly numbered.

The second auxiliary unit B comprises a sub-frame 100, U-shaped in horizontal cross section and having its front edges connected by a cross rod 101. This unit B may be secured in the main frame 20 by inserting the screws 42 in the same threaded holes in the frame 20 as were used for the unit A previously described.

A slide 102 is detachably connected at its upper end by the screw 28 to the link 29, as previously described, and the slide is provided with a stud

103 which may be swung to the left in Fig. 7 into the path of movement of the regularly actuated pawl 25.

At its lower end, the slide 102 is slotted to embrace a shaft 105 and the slide is provided with a feed pawl 106 to intermittently advance the shaft 105 and a mutilated pinion 107 which engages a card lift rack 108. A card abutment 110 is mounted on the rack 108 and supports a card C' in the card chute 22. The connections between the rack 108 and abutment 110 and the electrical connections to the wires 44 and 45 are identical with those previously described, as is also the coaction of the mutilated pinion 107 and card lift rack 108, but the pinion 107 is cut away at one side only. The card lift rack 108 and the card abutment 110 are thus released only at their extreme upper limit of travel, and such release is followed immediately by a lateral shift of the card chute to bring a different day column on the card in record-receiving position. The details of construction of these parts are as shown in Figs. 5 and 6 and previously described.

A scroll cam 112 is fixed on the shaft 105 and rotates therewith. The cam 112 underlies a cam follower block 113 (Fig. 9) on an arm 114 pivoted on a fixed stud 115 (Fig. 7) and yieldingly pulled downward by a tension spring 116. A vertically disposed feed pawl 120 is loosely pivoted at 121 (Figs. 7 to 9) to the arm 114 and at its lower end engages a ratchet wheel 123 on a cross shaft 124. A locking pawl 125 prevents reverse movement of the ratchet wheel 123 and shaft 124, and overfeed is prevented by a hold-back pawl 126 engaging a reversed ratchet wheel 127.

A mutilated pinion 130 (Fig. 7) is mounted on the cross shaft 124 and engages a segment gear plate 131 having a starting tooth 132, also as previously described. The segment gear 131 is mounted in a cross shaft 134, to which a swinging upright arm 135 is rigidly secured. At its upper end, the arm 135 has a slot 136 to receive the stud 39 and to thereby actuate the card chute 22.

A tension spring 137 is connected to a stud 138 in the lower end of the arm 135 and acts to move the segment gear plate 131 upward and to return the card chute 22 to its left-hand or initial position when the plate 131 is released by the mutilated pinion 130.

This type of unit is used with a card C' such as is shown in Fig. 13, in which the horizontal shift is from one day-column to the next, and in which it is not desirable that the card chute be manually shifted to any other day-column.

Consequently, we provide a locking latch 140 (Fig. 7) pivoted at 141 on the gear plate 131 and yieldingly held against the rear end of the extra tooth plate 142 by a spring 143. When the segment gear plate 131 is released and swings upward, the latch 140 engages a tooth of the pinion 130 and thus locks the pinion 130 from reverse rotation and the gear plate 131 from upward movement until the teeth thereof are again engaged by the teeth of the pinion 130. Undesired shifting of the card chute to change the daily column is thus avoided.

Having briefly described the construction of this second form of auxiliary unit, the operation thereof will be readily apparent. At the end of each desired program interval, as for instance at the end of each half hour, the slide 102 and stud 103 will be shifted forward for engagement by the pawl 25, which is ordinarily lifted once each minute by the same mechanism which advances the minute type wheel. The lever 23 is

almost immediately released and returns to its initial position, and the slide 102 moves downward, advancing the ratchet wheel 106a fixed to the shaft 105 and thus correspondingly advancing the pinion 107 to lift the card lift rack 108 and abutment 110 one vertical space. The scroll cam 112 is also advanced.

These operations will continue until the rack 108 reaches its upper limit of travel, whereupon the rack will be released and the card abutment will fall to starting position. At the same time, the lever 114 will be released by the scroll cam 112 and the latch 120 will advance the ratchet wheel 123 and thus shift the card chute 22 to the next space to the right.

This cycle will be repeated automatically until the end of the seven-day working period, when the segment gear plate 131 will be released and the card chute will return to initial position. Records may thus be made in desired spaces on a time card such as is shown in Fig. 13, with the records for each day spaced downward along a single vertical column.

As previously explained, this unit may be removed from the main recorder unit by taking out the screw 28 which connects the link 29 to the feed slide 102 and by taking out the screws 42 which secure the auxiliary unit B in the main frame 20 and by disconnecting the wires 44 and 45 which form part of the operating circuit of the impression mechanism of the recorder. The unit A shown in Fig. 1 or any other desired auxiliary unit may then be substituted and made operative by inserting the screws 28 and 42 and making the connections to the wires 44 and 45.

As stated in the introduction, there are some eighteen more or less standard arrangements of card records. It is easily and economically possible to have a supply of auxiliary units for each of these combinations on hand, while the main units of the recorder can be made up in quantity and also kept on hand ready to receive any selected auxiliary unit as called for by a particular sale and order.

Having thus described our invention and the advantages thereof, we do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what we claim is:

1. In a card time recorder including a main frame and a card chute slidable horizontally therein, the feature of an auxiliary unit having mounted therein, a plurality of devices comprising a card abutment, means to move said abutment vertically step-by-step, a connection to the card chute, means to move said connection and card chute horizontally step-by-step, and means to coordinate said vertical and horizontal movements in predetermined order, and said auxiliary unit and said devices mounted therein being removable together from said main frame.

2. In a card time recorder having a main frame and a card chute slidable horizontally in said frame, in combination, an auxiliary unit having mounted therein, a plurality of devices comprising a card abutment, means to move said abutment vertically step-by-step, an easily separable connection to the card chute, means to move said connection to shift the card chute horizontally step-by-step, and means to coordinate said vertical and horizontal movements in predetermined order, and said auxiliary unit and said devices mounted therein being removable and replaceable together relative to said main frame.

3. In a card time recorder, a main unit comprising a main frame having a card chute slidable

transversely therein, and an auxiliary unit comprising a sub-frame, a card abutment mounted therein, an easily separable connection to the card chute, and means to move said abutment and card chute in predetermined relation, said auxiliary unit and associated devices being readily removable and replaceable as an integral unit in said main frame.

4. In a card time recorder, a main unit comprising a main frame having a card chute slidable transversely therein, and an auxiliary unit comprising a sub-frame in which are mounted a plurality of devices comprising a card abutment, a separable connection to the card chute, and means to intermittently move said abutment vertically and said card chute horizontally in predetermined relation, said auxiliary unit and said devices mounted therein being readily removable and replaceable as an integral unit in said main frame.

5. In a card time recorder, a main unit comprising a main frame, a card chute slidable horizontally therein, an intermittently operated actuating device, and an auxiliary unit comprising a sub-frame and a plurality of devices mounted therein which comprise, a card abutment mounted therein, an operative connection to the card chute, and means to move said abutment and said card chute intermittently and in predetermined relation, said auxiliary unit and said devices mounted therein being readily removable and replaceable as an integral structure in said main frame.

6. In a card time recorder, a main unit comprising a main frame, a card chute slidable horizontally therein, an intermittently operated actuating device, and an auxiliary unit comprising a sub-frame and a plurality of devices mounted therein which comprise, a card abutment mounted therein, a connection to the card chute, and means including a feeding device effective to move said abutment and card chute intermittently in predetermined relation, said auxiliary unit and said devices mounted therein being readily removable and replaceable as an integral structure in said main frame, and said main unit having a control element detachably connected to said feeding device in said auxiliary unit and operative to move said device into and out of the path of movement of said intermittently operated actuating device.

7. In a time recorder having a horizontally shiftable card chute, in combination, an intermittently actuated shaft, an arm on said shaft, a second arm connected to said card chute, a link connecting said two arms, and a tension spring connected to an offset projection on said second arm and operative to seat said offset projection against said first arm but permitting yielding and temporary displacement of said second arm and card chute from normal position in either horizontal direction.

8. In a card time recorder having a main frame, a card chute slidable horizontally in said frame and a card abutment vertically shiftable in said card chute, in combination, means to periodically shift said abutment vertically, means to periodically shift said card chute horizontally, means to effect a predetermined relation between said vertical and horizontal shifting movements, and a single selectively and intermittently operated actuating member for both shifting means.

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