Dec. 13, 1949 S. P. HUNT 2,491,110

APPARATUS FOR RECORDING INTERMITTENT OPERATION OF A MACHINE

Filed July 1, 1947 4 Sheets-Sheet 1

Fig. 1.

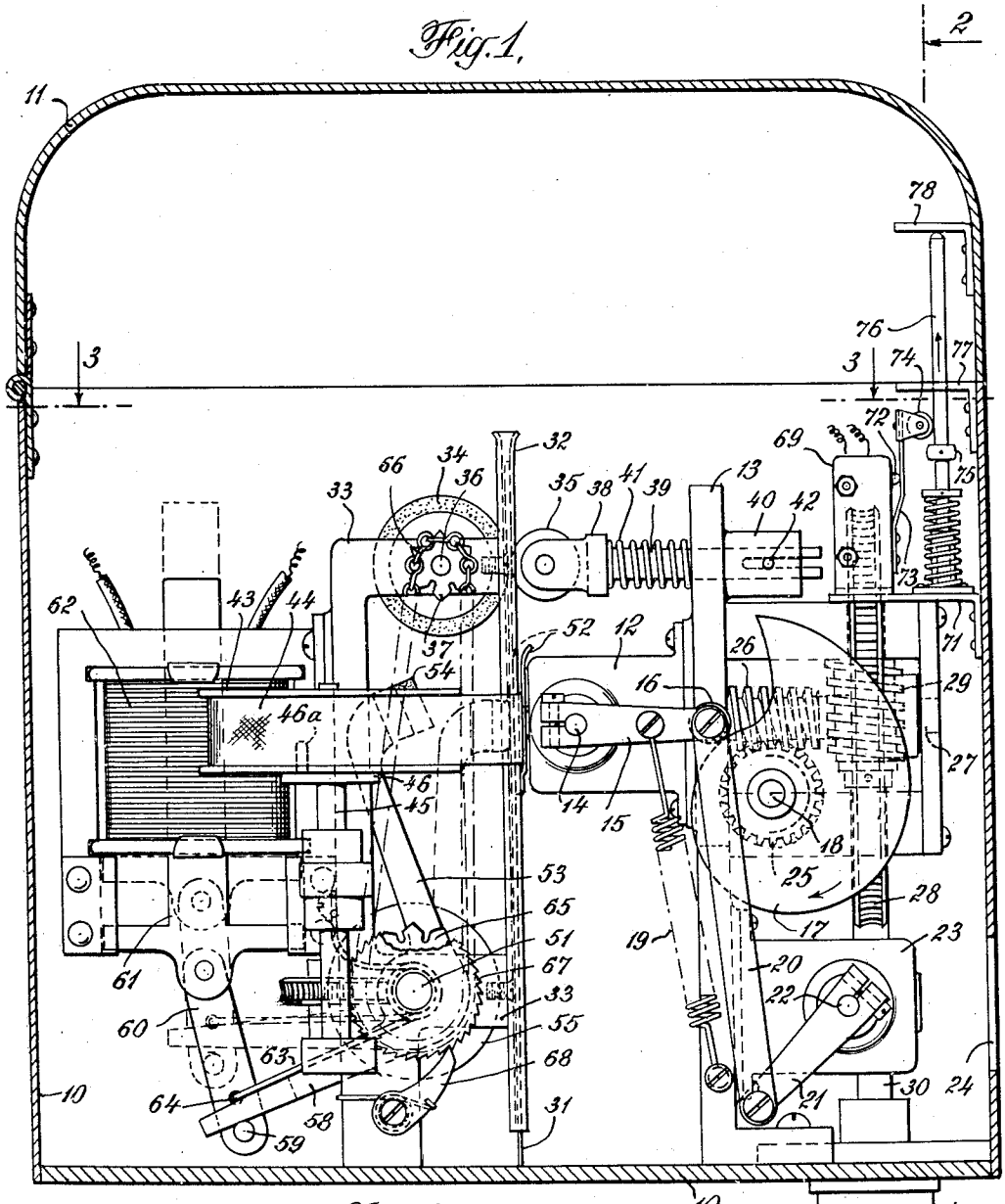
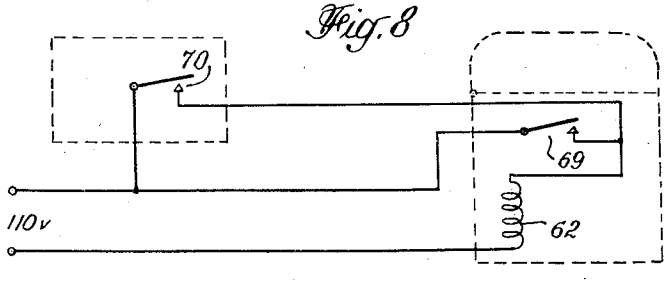


Fig. 8



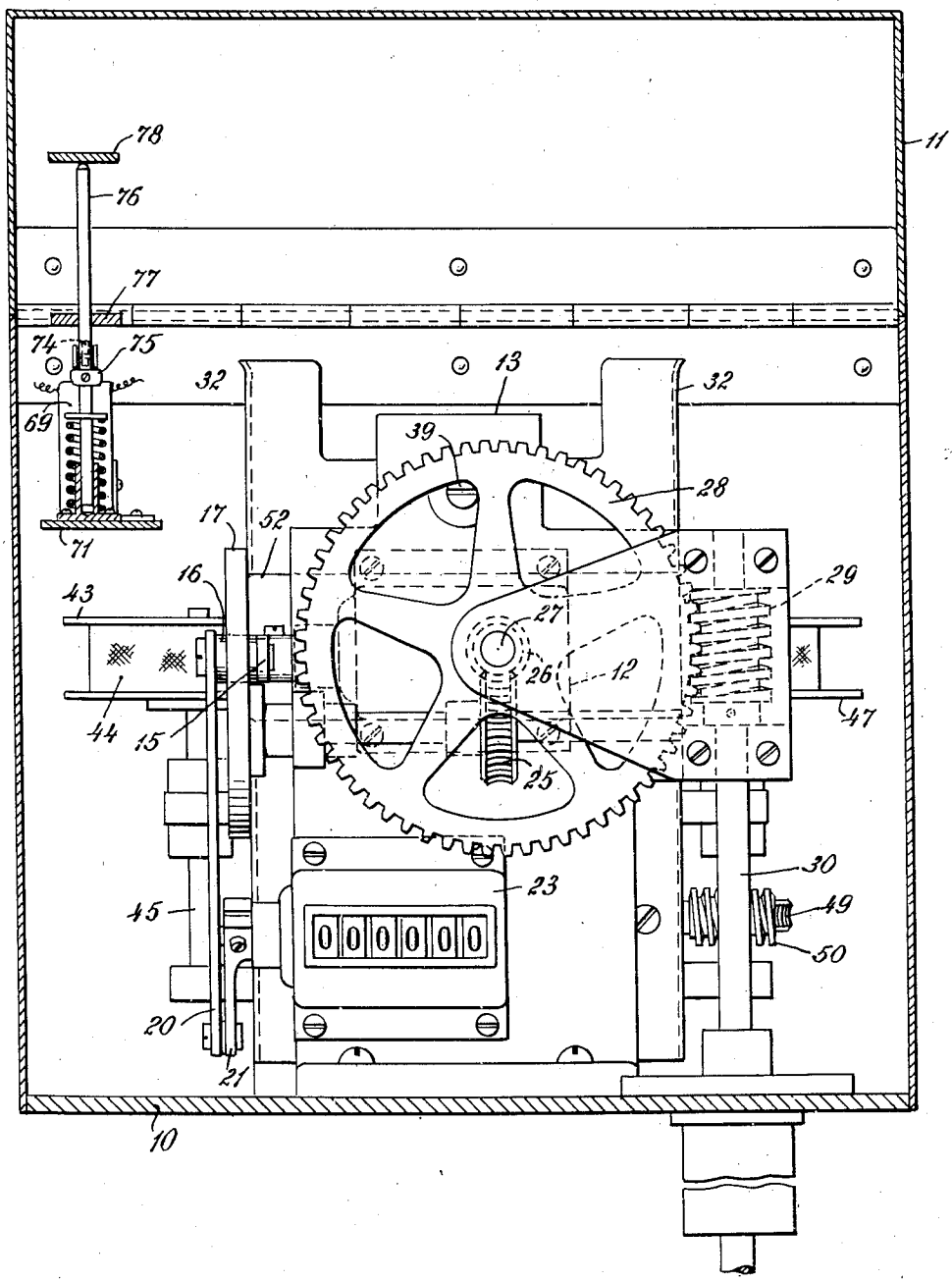
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APPARATUS FOR RECORDING INTERMITTENT OPERATION OF A MACHINE

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Fig. 2,



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APPARATUS FOR RECORDING INTERMITTENT OPERATION OF A MACHINE

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Fig. 3,

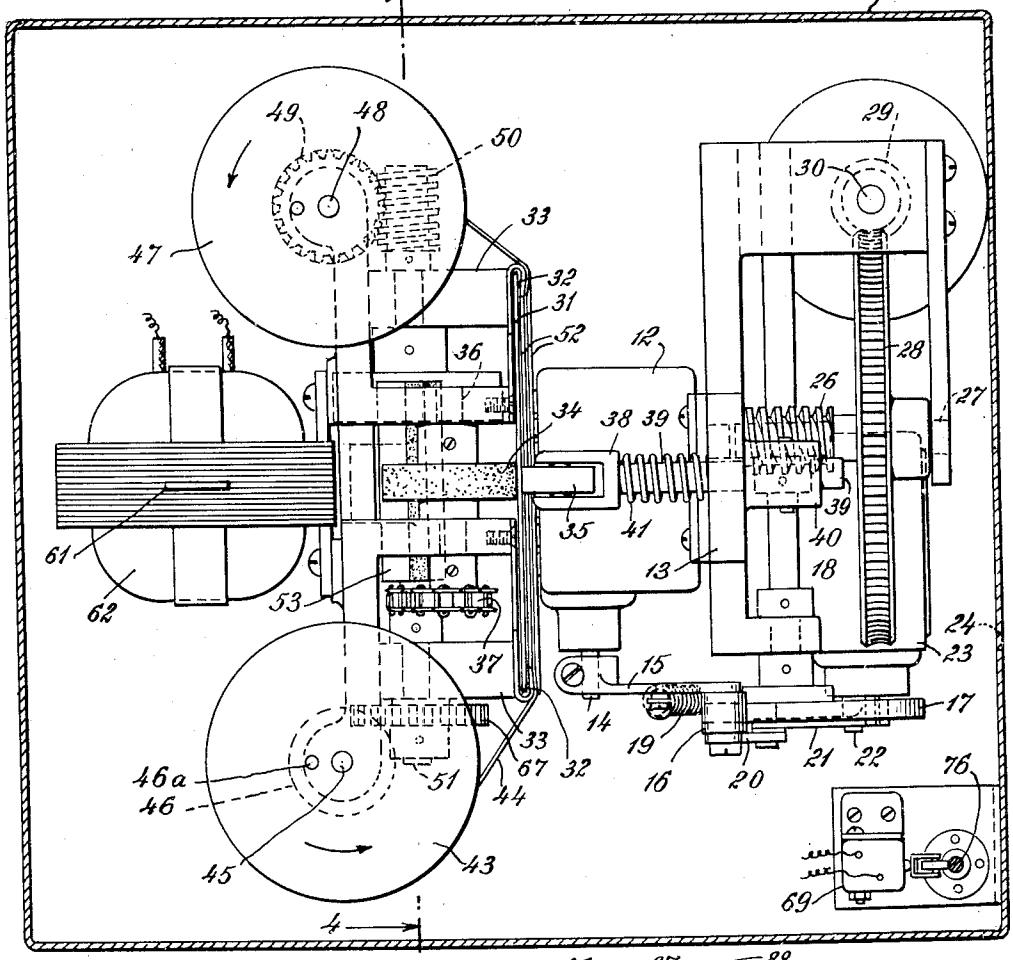
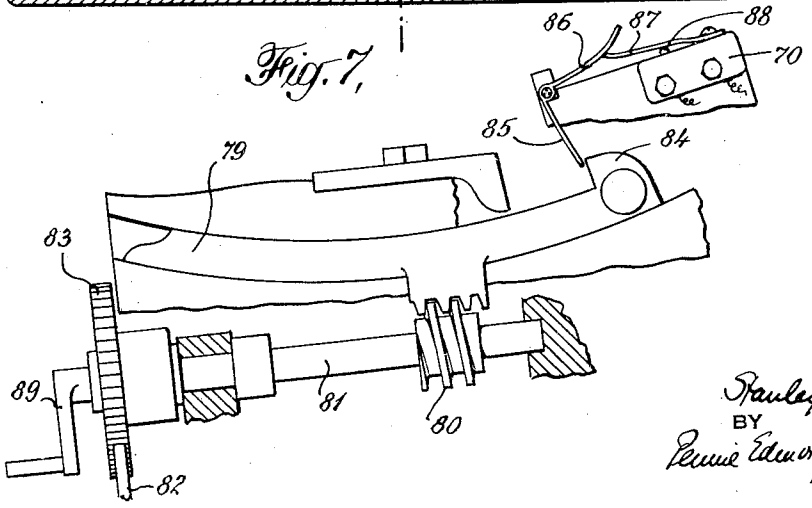


Fig. 7,



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APPARATUS FOR RECORDING INTERMITTENT OPERATION OF A MACHINE

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Fig. 4,

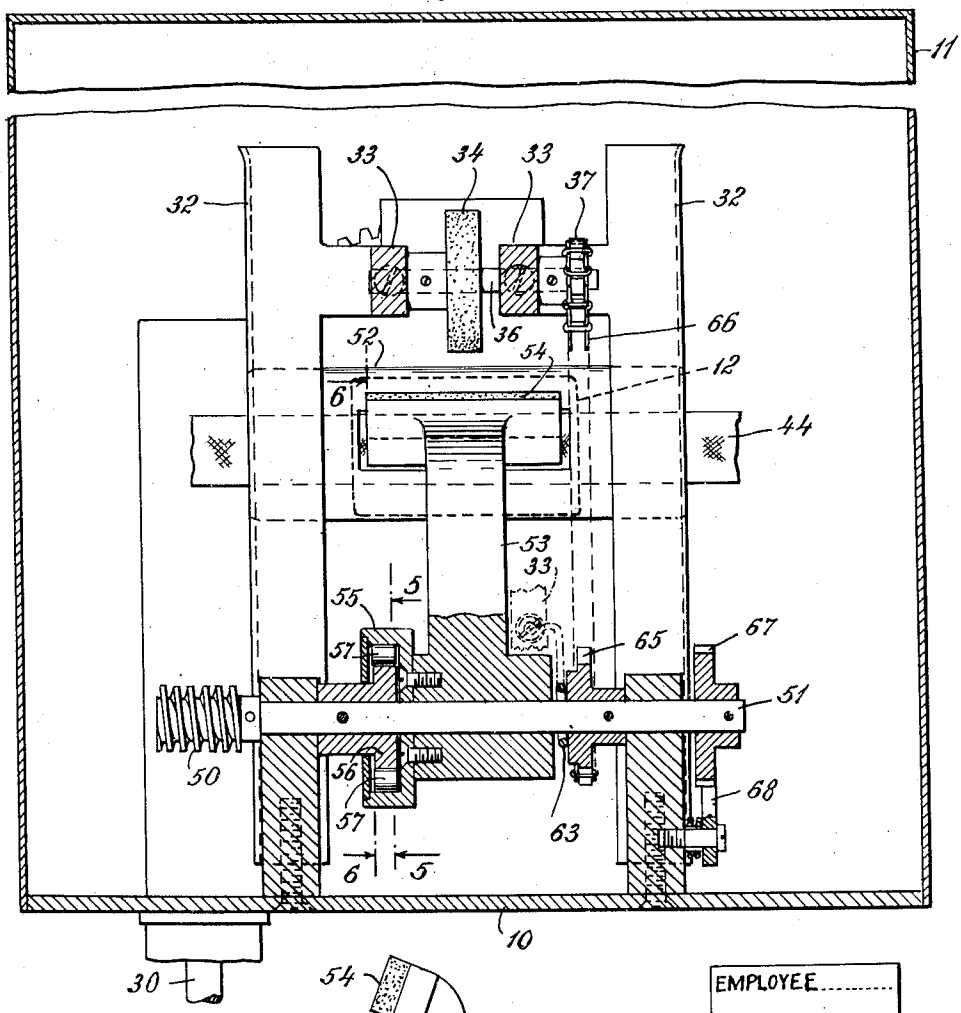


Fig. 5,

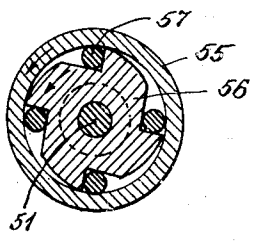
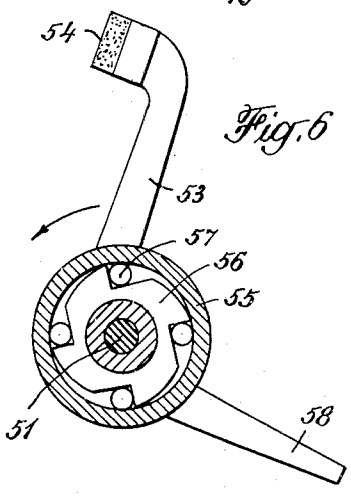


Fig. 6



EMPLOYEE.....
NO. HANKS
03134
03166
03198
03211

Fig. 9

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Patented Dec. 13, 1949

2,491,110

UNITED STATES PATENT OFFICE

2,491,110

APPARATUS FOR RECORDING INTERMITTENT OPERATION OF A MACHINE

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Application July 1, 1947, Serial No. 758,239

3 Claims. (Cl. 346—78)

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This invention relates to apparatus for recording the performance of machines and is concerned more particularly with a novel mechanism, by which a record can be kept of the total output of a machine, the number of interruptions in its operation, and the length of the intervals, in terms of output, between such interruptions. The new recorder is especially adapted for use with machines which must be stopped from time to time under normal operating conditions, as, for example, in order to dispose of the product, to provide a new supply of raw material, or for like reasons. Examples of such machines are the spinning, roving, and drawing frames employed in the textile industry, and, since the new recorder in a form suitable for use with a spinning frame affords all the advantages of the invention, such an embodiment of the invention will be illustrated and described in detail for purposes of explanation. It will be apparent, however, that the utility of the invention is not limited to that specific application.

The productivity of a spinning frame is measured in units of length, such as hanks of 840 yards, and the frame must be stopped at intervals for doffing, that is, removing the full bobbins from the spindles and replacing them with empty ones. It is customary to provide the frames with an indicating device called a hank clock, which is driven from the delivery rolls of the frame and indicates the total output of the frame in hanks of yarn produced, and the doffers, who tend spinning frames, are ordinarily paid on the basis of the output measured in hanks. However, if a doffer is paid solely on the basis of the number of hanks produced during his shift, he is tempted to let the frames run as long as possible without stopping for doffing, and a skillful doffer can operate his spinning frames with long doffs and throw most of the doffing on the succeeding shift. The doffers of the following shift then earn less pay because of the decreased output of the frames resulting from the necessity of more doffing during that shift. This situation can not be corrected by basing the pay scale on the number of doffs made per shift, because the temptation is then to operate with short doffs and the total output of the frames is reduced by the increased idle time.

The practices above referred to not only cause trouble among the employees working on different shifts, but also reduce the efficiency of operation. As a consequence, many mills have adopted a combination pay scale, which takes into account both the number of hanks produced and

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the number of doffs made per shift. The ordinary hank clock, however, does not give all the information required for computing the compensation of a doffer paid according to such a combination pay scale.

The present invention is directed to the provision of a recording apparatus, which can be used with a spinning frame to make a record of the total output of the frame per shift, the number of doffs per shift, and the output in hanks between successive doffs. In the new apparatus, the records are made on a record sheet, preferably in the form of a card, and, at the beginning of the shift, a card assigned to the particular doffer is inserted in the apparatus. The recorder is enclosed in a casing and the closing of the casing after insertion of the card causes the reading of a counting device to be printed on the card. The counting device is driven from a moving part of the frame, such as one of the delivery rolls, and, when the frame is in operation, the counting device counts the output of the yarn in terms of hanks. Whenever the frame is stopped for doffing, the resetting of the builder motion of the frame by the doffer causes the reading of the counting device at that time to be printed upon the card. At the end of the shift, when the doffer's card is to be removed, the opening of the casing causes a reading of the counting device to be printed on the card. Each card thus bears a record of the reading of the counting device in hanks at the beginning and end of the shift and records of the intermediate readings of the device at the doffs. With such a record, accurate computation of the doffer's pay is an easy matter.

For a better understanding of the invention, reference may be had to the accompanying drawings, in which

Fig. 1 is a view in side elevation of one form of the new recorder with part of the casing removed;

Fig. 2 is a vertical sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a horizontal sectional view on the line 3—3 of Fig. 1;

Fig. 4 is a vertical sectional view on the line 4—4 of Fig. 3;

Figs. 5 and 6 are vertical sectional views on the lines 5—5 and 6—6, respectively, of Fig. 4;

Fig. 7 is a view in side elevation of a portion of the builder motion of a spinning frame;

Fig. 8 is a wiring diagram of the recorder; and

Fig. 9 is a plan view of a record card suitable

for use in the recorder and bearing typical records made thereby.

The new recording apparatus in the form illustrated includes a casing 10, which may be mounted at any convenient place with respect to the machine, with which it is to be used, and has a hinged cover 11. A counting device 12 of standard construction is mounted on an upright 13 secured to the bottom wall of the casing, and the device includes number wheels having raised numerals. The case of the device has a front opening, through which an impression may be taken from the wheels to provide a printed record. The device is of the ratchet-operated type and the pawl shaft 14 projects through the case of the device and carries an arm 15 having a roller 16 at its free end. The roller runs on the surface of a cam 17 on a shaft 18 mounted in suitable bearings attached to standard 13 and the arm is acted upon by a spring 19 to maintain roller 16 in contact with the edge of the cam. The free end of arm 15 is connected by a link 20 to an arm 21 attached to the pawl shaft 22 of a second standard ratchet-operated numbering device 23. This device is mounted on standard 13 opposite a window 24 in casing 11, so that the reading of the device can be noted through the window.

The shaft 18 carries a worm gear 25, which is driven by a worm 26 on a shaft 27. Shaft 27 carries a large worm gear 28 driven by a worm 29 on a drive shaft 30, which extends out of the casing 10 and is connected to a moving part of the machine, with which the recorder is to be used. Such moving part should rotate continuously during the operation of the machine and at a uniform speed related to the output of the machine. When the recorder is used with a spinning frame, the drive shaft 30 may be connected to be driven from one of the delivery rolls of the frame.

The printing counting device 12 and cam 17 are of such construction that once per revolution of the cam, the lowest order number wheel of the device advances one digit and, in a recorder used with a spinning frame, the digits of the lowest order number wheel may represent tenths of a hank, or 84 yards each. The driving connections, including the worms and worm wheels between shaft 18 and the delivery rolls of the frame, are then chosen, so that cam 17 makes one revolution for each 84 yards of yarn delivered.

The record sheet used in the new apparatus is preferably a card 31 insertable in guides 32 attached to an upright frame member 33 secured to the bottom of casing 10. The guides 32 are spaced apart to expose the central part of the card between them and the card is inserted in the guides from above and passed between a rubber-treaded roller 34 and a metal roller 35. Roller 34 is mounted on a shaft 36 in bearings in extensions of frame 33 and the shaft is provided with a sprocket wheel 37. Roller 35 is mounted in a fork 38 having a stem 39, which passes through a bore through upright 13 and a boss 40 extending therefrom. The stem of the fork is encircled by a spring 41, which bears at one end against upright 13 and at the other against the head of the fork and tends to force the fork and roller 35 toward the card. The free end of the stem 39 is slotted and a pin 42 extending through the boss 40 and the slot holds the fork in proper position with roller 35 rotating in a vertical plane.

A let-off spool 43 for an inked ribbon 44 is mounted on a vertical shaft 45 supported in bearings on the frame 33. The spool rests on a disc 46 encircling the shaft and is keyed thereto by a pin 46a on the disc, which enters an opening in the barrel of the spool. The ribbon extends from the spool around guides 32 to a take-up spool 47 mounted on and keyed to a disc fast on a vertical shaft 48 supported in bearings attached to frame member 33. Shaft 48 is provided with a worm gear 49 meshing with a worm 50 on a horizontal shaft 51 supported in bearings on the frame 33. The central portion of the ribbon between the spools is supported in guides 52 attached to the faces of guides 32 and the portion of the ribbon between guides 52 lies in front of the opening in case 12, through which the number wheels are exposed, and between the wheels and the card.

A bell crank lever mounted on shaft 51 includes a vertical arm 53 with a lateral extension at its end faced with a resilient pad 54. The lever is connected with shaft 51 to move therewith in one direction only. For this purpose, the lever is formed with an enlarged hub 55 encircling toothed disc 56 fast on the shaft and formed with spaced recesses in its periphery for cooperation with the inner surface of hub 55 to provide recesses, in which balls 57 are mounted. When the lever, as shown in Fig. 1, is moved clockwise, the hub 55 passes freely over balls 57 but, when the lever moves counter-clockwise, the balls are pinched between the walls of the recesses and the hub and the lever and shaft 51 move in unison.

The horizontal arm 58 of the bell crank lever overlies a pin 59 on a link 60 connected to the plunger 61 of a solenoid 62 secured to frame member 3. Arm 58 is kept in contact with the pin at all times by means of a spring 63, which has one end secured to the frame member 33 and extends about shaft 51 with its other end lying along the top of lever arm 58 and entering an opening 64 in link 60 above pin 59.

Shaft 51 is provided with a sprocket wheel 65 connected by chain 66 to the sprocket wheel 34 on shaft 36. Shaft 51 is also provided with a ratchet wheel 67, which is engaged by a spring-pressed pawl 68 preventing movement of shaft 51 in one direction. When shaft 51 is moved counter-clockwise, as shown in Fig. 1, by the counter-clockwise swinging of lever 53 caused by spring 63, the rotation of worm 50 on the shaft causes rotation of shaft 48 to advance the inked ribbon 44 by one step past the number wheels. The movement of shaft 51 also causes a movement of shaft 36, so that roller 34 raises card 31 by one line.

The energization of solenoid 62 causes bell crank 53 to be swung to strike the card and cause a reading of the number wheels to be printed thereon. In the device described, the energization of the solenoid is effected by a pair of switches designated 69, 70 in the wiring diagram. The switch 69 is mounted within the casing 10 on a bracket 71 and includes an operating button 72, which is engaged by a leaf spring 73 having a roller 74 at its free end. The roller is engageable by a collar 75 on a spring-pressed rod 76, which projects through an opening in a bracket 77 attached to the casing wall. Rod 76 projects upwardly beyond the top of the main body of the casing and into the cover, where it is engageable by a bracket 78 attached to the cover. When the cover is raised, rod 76 rises until the

collar 77 is stopped by the underside of bracket 77. During this movement of the rod, collar 75 passes by wheel 74 and bends spring 73, so that the latter pushes in the button 72 and closes the switch to energize the solenoid momentarily. When the cover is again closed, bracket 78 strikes the top of rod 76 and depresses it. In the downward movement of the rod, collar 75 again displaces roller 74 and switch 69 is again closed momentarily while collar 74 is passing beyond roller 74.

Switch 70 is installed for operation by a part of the machine, the performance of which is to be recorded, and the part of the machine selected for the purpose will depend on the nature of the record to be made. Thus, if it is desired to record the stoppage of the machine for any particular reason, switch 70 is installed to be operated by a part of the machine, which moves when the specific stoppage occurs. When the recorder is employed with a spinning frame to record the doffs, switch 70 may be conveniently mounted to be actuated by part of the builder motion, which must be reset before the frame can be started again after being stopped for doffing.

One common form of builder motion includes a segment 79 which is advanced by a worm 80 on a shaft 81 during the operation of the frame. Shaft 81 is rotated stepwise by a pawl 82 acting on a ratchet wheel 83 attached to the shaft. The segment is provided at one end with a boss 84, which is engageable with one arm 85 of a bell crank lever. The other arm 86 of the lever makes contact with leaf spring 87, which can be flexed to move the operating button 88 of switch 70. When the bobbins on the frame have been filled, segment 79 has moved to the position illustrated in Fig. 7. In such movement, boss 84 has passed beneath arm 85 of the bell crank and swung the bell crank counter-clockwise. Arm 86 of the bell crank has thus been raised free of leaf spring 87, and has not operated the switch. When the builder motion is to be reset, the doffer rotates shaft 81 by the hand crank 89 to move segment 79 to the left (Fig. 7). In such movement of the segment, boss 87 engages arm 85 of the bell crank and swings the latter clockwise. In this movement, arm 86 of the bell crank flexes spring 87 to push button 88 inwardly and close switch 70. When the segment 79 has been moved to full reset position, the boss 84 moves past arm 85 and spring 87 is released and switch 70 again opened.

In the operation of the recorder for use with a spinning frame, the foreman opens the cover of the casing and inserts the doffer's card in guides 32 at the beginning of each shift. When the cover is closed, switch 69 is closed and solenoid 62 is energized. The raising of the plunger of the solenoid swings the bell crank on shaft 51, so that the pad 54 on arm 53 of the bell crank strikes the card, and the number wheels of the counter 12 print a reading thereon. As soon as the reading has been made and solenoid 62 deenergized, the bell crank is swung counter-clockwise by spring 63 and, in this movement, it rotates shaft 51. The rotation of shaft 51 causes the take-up spool 47 to advance the ribbon 44 one step to bring a fresh area of the ribbon opposite the number wheels. Rotation of shaft 51 also causes roller 34 to advance a step and raise the card one line.

The casing 10 remains closed throughout the shift and, if desired, the cover may be provided with a lock, so that the casing cannot be opened except by the foreman. Whenever the spinning

frame, with which the recorder is used, is doffed and the builder motion reset for a new run, switch 70 is momentarily closed to energize solenoid 62 and print a reading of the number wheel upon the card. At the end of the shift when the foreman opens the cover, switch 69 is closed and the final reading for the shift is printed upon the card. When the card of the doffer of the succeeding shift is placed in the guides and the cover again closed, a reading of the number wheels at the beginning of the shift is printed upon the card.

The form of recorder described is particularly suited for use with spinning, roving, or drawing frames, the performance of which is to be recorded in terms of total output, number of doffs, and length of intervals, in terms of output, by the doffs. It will be apparent, however, that the recorder may be used with machines of various other kinds, which are operated intermittently under normal conditions or are stopped for various reasons, as, for example, to avoid a defect in the product. When used with a machine other than a textile frame, the switch 70 will be installed for actuation by a part of the machine, which is moved upon the occurrence of stoppages of the kind which the apparatus is to record. Thus it may be desirable to record the performance of a machine equipped with stop motions causing the machine to stop for different reasons. In that case, switch 70 of the recorder may be actuated by the appropriate stop motion or a number of switches similar to switch 70 may be used, each actuated by a particular stop motion.

I claim:

1. An apparatus for recording the performance of a machine operating intermittently, which comprises a counting device having printing number wheels and a rock shaft operable, when rocked in one direction, to advance the wheels stepwise, an arm fast on the rock shaft, a cam shaft adapted to be connected to a moving part of the machine for continuous rotation, when the machine is operating, a cam on the cam shaft acting to swing the arm and rock the rock shaft, as the cam shaft rotates, guide means for guiding a record sheet past and in proximity to the wheels of the device, a roller adapted to engage a sheet in the guide means and advance it past the wheels, a drive shaft connected to the roller, a lever on the drive shaft having an end operable to engage a sheet in the guide means and force it against the wheels to receive an impression therefrom, when the lever is swung in one direction, a solenoid for swinging the lever in said direction, means operable by a part of the machine, which must be moved, when the machine is to be restarted, for energizing the solenoid, a spring for moving the lever in the opposite direction, and a clutch connecting the lever to the drive shaft during movement of the lever in said opposite direction only.

2. An apparatus for recording the performance of a machine operating intermittently, which comprises a counting device having printing number wheels and a rock shaft operable, when rocked in one direction, to advance the wheels stepwise, an arm fast on the rock shaft, a cam shaft adapted to be connected to a moving part of the machine for continuous rotation, when the machine is operating, a cam on the cam shaft acting to swing the arm and rock the rock shaft, as the cam shaft rotates, guide means for guiding a record sheet past and in proximity to the

wheels of the device, a roller adapted to engage a sheet in the guide means and advance it past the wheels, an inking ribbon movably supported between the guide means and the wheels, a take-up spool for the ribbon, a drive shaft connected to the roller and spool, a lever on the drive shaft having an end operable to engage a sheet in the guide means and force it against the wheels to receive an impression therefrom, when the lever is swung in one direction, a solenoid for swinging the lever in said direction, means operable by a part of the machine, which must be moved, when the machine is to be restarted, for energizing the solenoid, a spring for moving the lever in the opposite direction, and a clutch connecting the lever to the drive shaft during movement of the lever in said opposite direction only.

3. An apparatus for recording the performance of a machine operating intermittently, which comprises a housing having a movable door, a counting device within the housing having printing number wheels and a rock shaft operable, when rocked in one direction, to advance the wheels stepwise, an arm fast on the rock shaft, a cam shaft within the housing, means connected to the cam shaft and extending out of the housing, said means being adapted to be connected to a moving part of the machine for continuously rotating the cam shaft, when the machine is operating, a cam on the cam shaft engaging the arm and rocking the rock shaft, as the cam shaft rotates, guide means within the housing for guiding a record sheet past and in proximity to the wheels of the device, a roller adapted to engage a sheet in the guide means and advance it past the wheels, a drive shaft connected to the roller, a lever on the drive shaft having an end operable to engage a sheet in the guide means and force it against the wheels to receive an impression therefrom, when the lever is swung in one direction, a solenoid for swinging the lever in said direction, a circuit including the solenoid and a source of energy, a switch in the circuit closable by a part of the machine, which must be moved, when the machine is to be restarted, a second switch in the circuit closed by the door, when the latter is both opened and closed, a spring for moving the lever in the opposite direction, and a clutch connecting the lever to the drive shaft during movement of the lever in said opposite direction only.

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