Oct. 25, 1966 T. A. RICHMAN ET AL 3,281,855

APPARATUS FOR MONITORING THE OPERATION OF A MACHINE

Filed Feb. 27, 1964 3 Sheets-Sheet 1

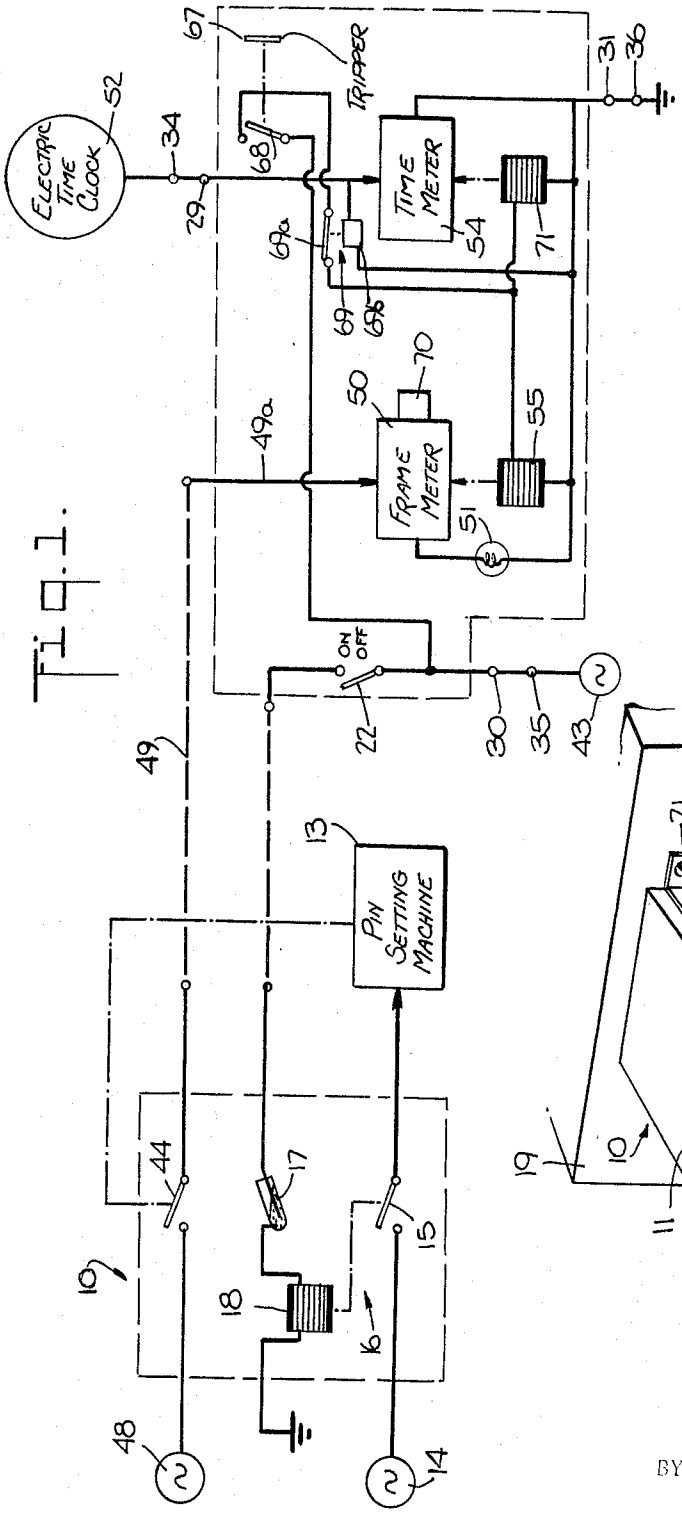


Fig. 1.

Fig. 2.

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3 Sheets-Sheet 2

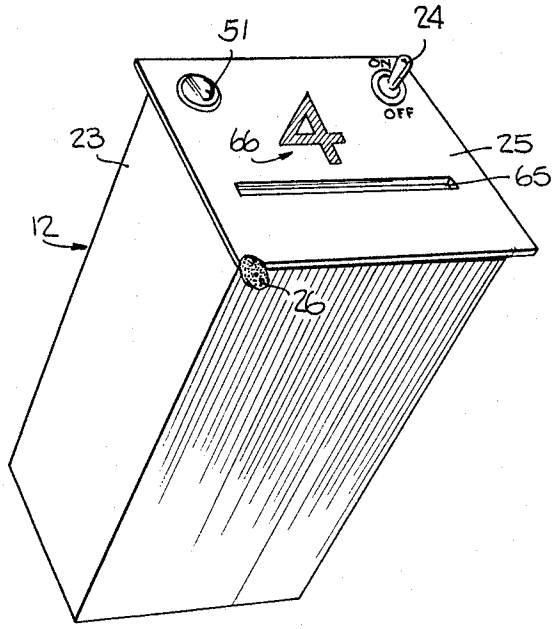


Fig. 3.

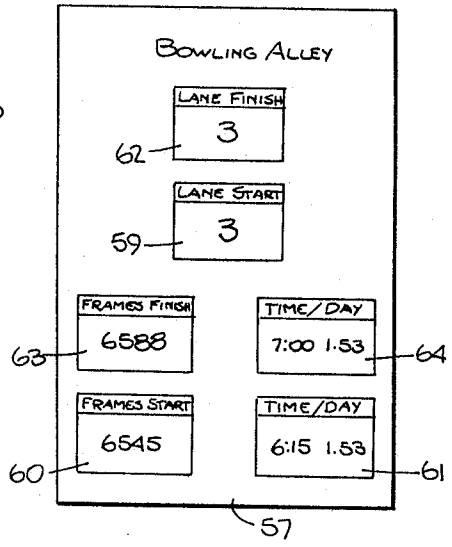


Fig. 7.

Fig. 4.

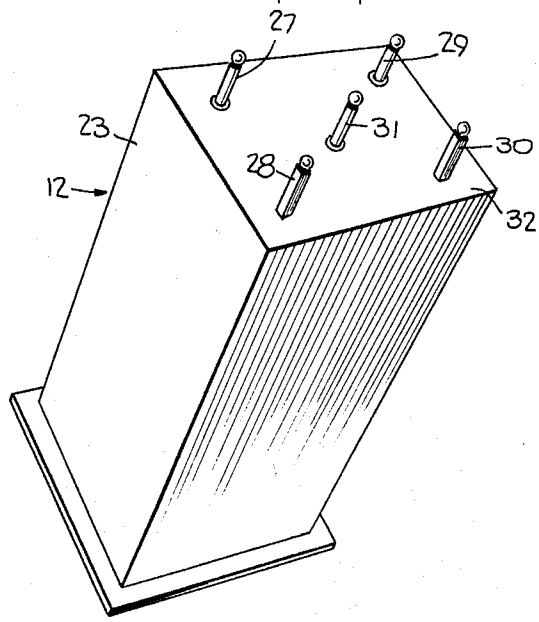
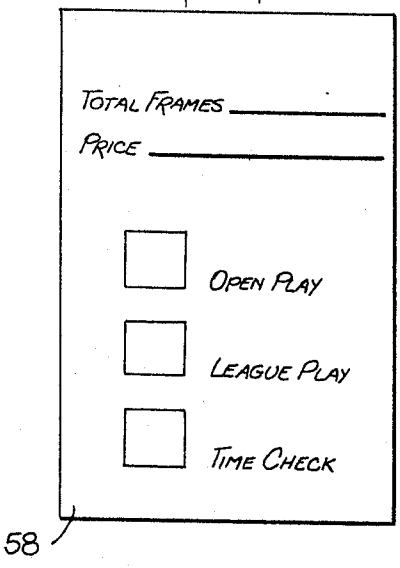


Fig. 8.



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Fig. 5.

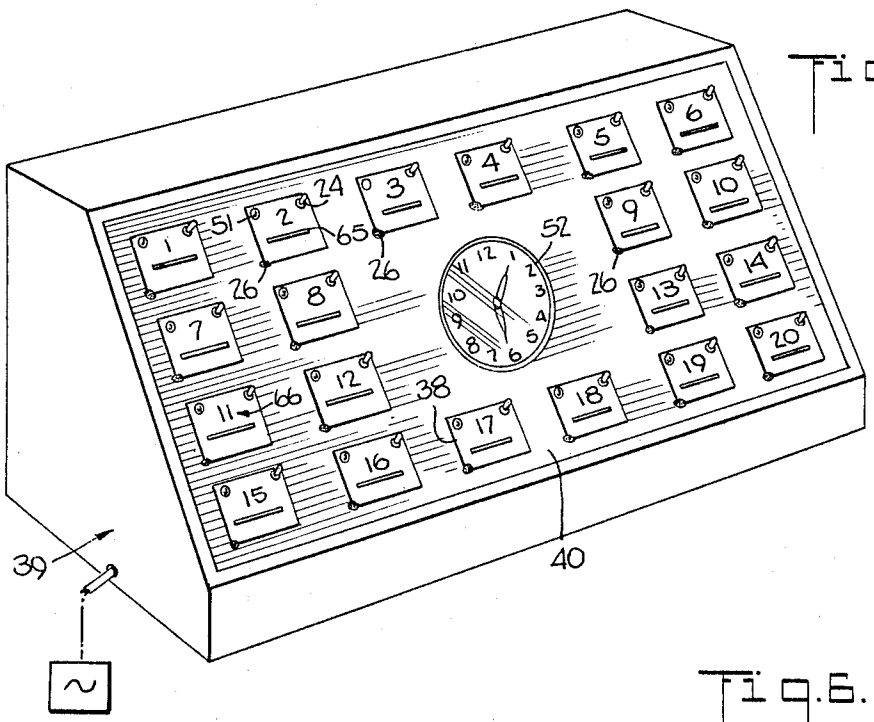
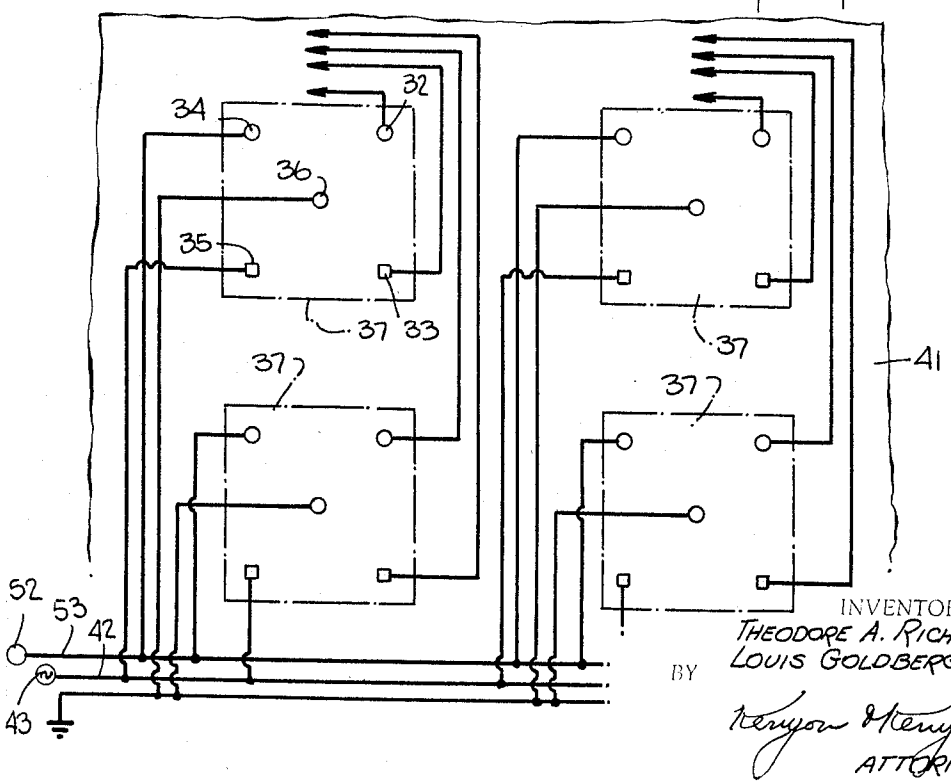


Fig. 6.



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United States Patent Office 3,281,855 Patented Oct. 25, 1966

3,281,855

APPARATUS FOR MONITORING THE OPERATION OF A MACHINE

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Filed Feb. 27, 1964, Ser. No. 347,892
10 Claims. (Cl. 346—33)

This invention relates to a system for monitoring the operation of a machine and more in particular to a system for monitoring the operation of an automatic bowling pin-setting machine.

The great increase of interest in bowling in recent years has lead to the general use of automatic bowling pin-setting machines and to the erection of bowling alleys having a great number of lanes each equipped with a pin-setting machine. In addition the popularity of bowling has lead to around-the-clock operation of a great number of the larger type of bowling alleys. Consequently, the bowling business which at one time comprised alleys having several manually operated lanes are now commonly large establishments containing upwards to 100 lanes. As the size of the operation of a given bowling alley increases, it becomes more important to have data related to all aspects of the business, especially data related to the operation of the pin-setting machines since the cycles of operation of the pin-setting machine has a direct bearing upon the rental to be paid by the operator of the bowling alley to the owner of the machines when they are rented, the maintenance of the machines, the maintenance of the bowling pins used in the machines, and all aspects of accounting and control for the proper operation of the business.

The need of data for accounting purposes is one of the most important factors in the successful operation of a bowling alley, especially one of the larger type. The basic revenue of the operation is that resulting from the charge per game that is paid by each of the players. Consequently the proper billing of the player is dependent upon the accurate determination of the number of games played by him. This determination is made more complicated by the fact that the game is often played by groups or teams of players. Thus at the conclusion of a series of games by a group of players, the clerk must rapidly determine the number of games played by each player, and draw up bills based upon this information. Purely manual techniques in keeping track of the number of games played are obviously dependent upon the care and accuracy of the clerk and therefore can result in errors which deny the business revenue which it would otherwise receive. Errors in tallying the number of games played can lead to undesirable disputes and arguments between the clerk and the player. In addition, a general lack of accounting and control procedures can be a lure for an unscrupulous employee to attempt to cheat the employer. Consequently attempts to maintain records of the number of games played by purely manual techniques has been generally unsuccessful because of the human element involved and because of the time consumption resulting from manual techniques.

In connection with the rental charged to the operator for use of a bowling machine, devices have been provided for counting the number of frames or lines of bowling which have been played on a given machine. Such devices conventionally record the cycles of operation on a digital counter device. Efforts to derive data from such counters for use in monitoring the business operation or in determining charges to be made to the players have not been successful because the information from the counters is often unreliable and in any event is not readily

available to the clerk in determining the charge to be made. Such information has often been made unreliable either by the inability of the sensing unit at the machine to count the cycles of operation of the machine accurately or by unscrupulous persons tampering with the sensing device in order to interfere with the sensing function for dishonest purposes.

It is therefore one of the objects of the invention to provide an apparatus for monitoring data related to the number of cycles of operation of a machine and the time corresponding thereto. It is another object of the invention to provide an apparatus for monitoring a bowling pin-setting machine with respect to its number of cycles of operation and the time corresponding thereto.

It is still another object of the invention to provide an apparatus for recording the cycles of operation of a bowling pin-setting machine which is substantially tamper-proof.

It is an additional object of the invention to provide an apparatus for recording the number of frames through which a bowling pin-setting machine is operated in conjunction with the time of day corresponding thereto.

It is a further object of the invention to provide a system for producing a printed record of the number of frames through which a bowling-pin-setting machine has operated and the time of day at the time of printing.

In one embodiment of the apparatus of the invention for recording data related to the operation of a machine means are provided which are actuated in response to the operation of the machine for counting its cycles of operation. The apparatus further includes means for indicating the time of day. In addition the apparatus comprises means for producing a record of the count of the cycles of operation and the time of day. With this arrangement, upon demand, a record of the operation of the machine and related time can be obtained.

In another embodiment of the invention the recording apparatus is adapted to count the cycles of operation and the time of day corresponding thereto of a bowling pin-setting machine.

In still another embodiment of the invention the apparatus for maintaining the operation of a bowling pin-setting machine includes means for connecting the pin-setting machine to a source of energy only when the connecting means is disposed in a predetermined position. This interlocking arrangement prevents operation of the machines after the connecting means has been disturbed from its predetermined position by tampering or for other causes.

In an additional embodiment of the invention means are provided for printing the number of cycles of operation of a bowling pin-setting machine and the corresponding time of day on a receiving surface in order to record this data permanently.

In a further embodiment of the invention there is provided a control console having a plurality of units for recording the number of frames of operation and the time of day for each of a plurality of bowling pin-setting machines.

Other objects and features of the invention will become apparent in the following specification and claims and in the drawings in which;

FIG. 1 is a schematic representation of the system of the invention for monitoring data related to the operation of a bowling pin-setting machine;

FIG. 2 is a perspective view of the interlocking and sensing unit of the invention which is mounted adjacent to the bowling pin-setting machine;

FIG. 3 is a fragmentary perspective view of the upper portion of one of the controlling and recording units of the system of the invention;

FIG. 4 is a fragmentary perspective view of the lower

portion of one of the controlling and recording units of the system of the invention;

FIG. 5 is a perspective view of a console containing a plurality of the controlling and recording units of the invention;

FIG. 6 is a fragmentary schematic view of the printed circuitry of the console;

FIG. 7 is a plan view of the front side of the record card;

FIG. 8 is a plan view of the reverse side of the record card.

The means for interlocking and sensing the operation of an automatic bowling pin-setting machine, that is unit **10**, includes sealed housing **11** which is adapted to be mounted in a predetermined position adjacent to a portion of the pin-setting machine (FIG. 2). Unit **10** is used in conjunction with the means for controlling and recording data related to the operation of the pin-setting machine, that is control unit **12** (FIGS. 3 and 4). In accordance with the invention units **10** and **12** are provided for each pin-setting machine and consequently in a bowling alley having a number of lanes, there is provided a plurality of combinations of units **10** and **12**.

Automatic bowling pin-setting machine **13** is connected to a source of electrical energy **14** by switching means or switch **15** of relay **16** mounted within housing **11** (FIG. 1). Thus upon closure of switch **15** the pin-setting machine is energized. The means mounted within housing **11** for connecting machine **13** to source **14** when the connecting means is disposed in a predetermined position includes position-responsive switch or mercury switch **17** which is connected in circuit with relay winding **18** of relay **16**. Mercury switch **17** is mounted in the predetermined position by the proper positioning of housing **11** on support member **19** of machine **13** (FIG. 2). Bracket **20** of the housing is secured to support **19** of the pin-setting machine by screw **21**. With this arrangement, it can be seen that the mercury switch serves as an interlocking device which can prevent operation of the machine if tampering with housing **11** disturbs the switch from its predetermined position in which it is closed.

The means for activating switch **15**, that is switch **22**, is disposed in housing **23** of unit **12** (FIGS. 3 and 5) which is adapted to be located at a distance from unit **10**. Thus unit **12** is normally located at the counter area of the bowling alley when the clerk is stationed for assigning lanes, collecting charges, etc. Handle **24** for operating switch **22** extends through an opening in cover **25** of housing **23**. Terminals or plugs **27–31** extend from bottom **32** of housing **23** (FIG. 4) and are adapted to engage jacks **32–36**, respectively (FIG. 6). The jacks are disposed in socket **37** which is mounted at the bottom of well **38** within console **39** (FIG. 5). Console **39** contains a well **38** for each of the control units **12** which are to be employed for controlling each of the plurality of pin-setting machines. Thus as shown in FIG. 5, console **39** contains twenty control units **12** which are identified by the numerals **1–20**. When mounted in the console, covers **25** of control units **12** are substantially coplanar with panel **40** of the console which contains an opening in alignment with each of wells **38**. In order to prevent anyone from removing unit **12** from console **39**, cover **25** is connected to panel **40** by seal device **26**.

As shown in FIG. 4, plugs **27–31** are polarized with respect to jacks **32–36**, respectively. Thus several of the plugs and jacks are provided with different forms, such as circular or rectangular in cross-section, in order to insure that control unit **12** is properly inserted and connected to the circuitry extending from the jacks in socket **37**. In order to prevent anyone from completing connections through the jacks in socket **37** by means of jumper wires or the like, the plugs to be used can be of the type known as telephone plugs which are provided with an internal conductor. Each of these plugs can be employed with a corresponding telephone-type jack.

In order to simplify fabrication of the console, sockets **37** can be formed in a laminated board **41** of insulating material which is adapted to receive printed circuitry. Thus, for example, track **42** extending along board **41** is connected to power source **43** and to each of jacks **35** for the various sockets. As shown in FIG. 1, switch **22** when closed connects power source **43** through mercury switch **17** and relay winding **18** to the ground connection. Power source **43** can be selected to be of reduced voltage as compared to that of source **14** for the pin-setting machine.

With this arrangement it can be understood that with control unit **12** plugged into the console and switch **22** closed by actuation of handle **24** to the "on" or closed position of the switch, relay **16** is activated to close switch **15** if mercury switch **17** is closed as a result of being mounted in the predetermined position. Following the closing of relay switch **15** the initial cycle of operation of the pin-setting machine can take place.

The switching means mounted within housing **11** of unit **10** which is adapted to be actuated in response to the cycle of operation of the pin-setting machine includes switch **44**. This switch can be a sensitive mechanical switch such as a microswitch. Switch **44** is actuated by an element, shown as element **45** in FIGS. 1 and 2, of the pin-setting machine which moves in response to a cycle of operation of the machine such as that corresponding to one frame of bowling. By way of example element **45** for actuating switch **44** can comprise the moving deck cam on a machine of the type manufactured by the Brunswick Corporation or the tripper on the backboard of a machine manufactured by American Machine & Foundry. As shown in FIG. 2, element **45** (shown schematically) of machine **13** such as the moving deck cam or the tripper is adapted to actuate switch **44** by engaging it through face **46** in extension **47** of housing **11** or by brushing or touching face **46** when switch **44** is adjacent thereto.

One side of switch **44**, as shown in FIG. 1, is connected to power source **48**. Power source **48** can be a portion of the power supply of machine **13** which is at a voltage lower than that of source **14**. Line **49** extending from switch **44** connects the switch to the printed circuitry of board **41** which in turn is connected to jack **32** in console **39** corresponding to sensing unit **10**. From jack **32** the circuit extends through plug **27** of control unit **12** to the means for producing a record of the count of the cycles of operation such as frame meter **50**. Frame meter **50** can comprise a mechanism similar to that of electric time stamp clocks in which members adapted to print digits are periodically positioned to indicate the current time by a numerical value. Thus, for example, frame meter **50** includes digital members capable of printing four digits. With this arrangement it can be seen that during the operation of the pin-setting machine for any particular lane in the bowling alley and upon the completion of each frame in the cycle of operation of the machine, switch **44** is momentarily closed in response to the operation of the machine and connects power source **48** to frame meter **50**. The momentary energizing of the frame meter thereby causes it to advance one digit. The impulse from switch **44** cannot only be connected to frame meter **50** but can also be applied to indicator lamp **51** mounted in cover **25** of control unit **12**. Thus the lighting of the indicator lamp shows that a given control unit and consequently the frame meter therein is receiving an impulse for each frame of operation of the bowling machine related thereto. In addition the lighting of lamp **51** shows that frame meter **50** is in proper working order. In the alternative, light **51** can be connected in circuit with switch **22** in order to indicate whenever a control unit has its switch in the closed or "on" position.

In addition to frame information, control unit **12** receives time information from electric clock **52** which is disposed in panel **40** of console **39**. In each of the plurality of sockets **37**, jack **34** is connected to track

53 of the printed circuitry in the console which in turn is connected to clock 52. Through jack 34 and plug 29 the clock is connected to time meter 54 which can be a mechanism similar as that described with respect to frame meter 50, that is to say, a mechanism similar to that of an electric time stamp device. Thus at predetermined intervals of time, the time clock actuates the time meter which is the means for producing a record of the time of day from the clock device. Clock 52 in addition to indicating the time of day can also indicate the date or the number of the day as defined by its numerical order within the year. With this arrangement it can be understood that control unit 12 while continually receiving time information, receives frame information only when the pin-setting machine controlled thereby is in operation.

The means within control unit 12 for producing a record of the count of the cycles of operation of the counting means includes solenoid 55 which is adapted to actuate the counting means or frame meter 50 in order to produce or print a record of the number of frames at the time of actuation. As shown in FIGS. 7 and 8 the receiving member or receiving surface is that of record card 56 having front side 57 and reverse side 58. The front side of the card is adapted to receive printed data corresponding to the start and finish of the operation of a particular pin-setting machine. Boxes 59–61 receive the starting information of lane number, frame number, and time value, respectively. Boxes 62–64 are adapted to receive printed information concerning the finishing lane number, frame number and time value, respectively.

Prior to play at a particular lane such as lane 2, switch 22 is actuated to the "on" position and card 56 is inserted into slot 65 in cover 25 which is adjacent to indicia 66 of the lane number. At the start the card is inserted to its maximum depth. Means responsive to the engagement therewith of the receiving surface or card 56 such as tripper 67 disposed within control unit 12 actuates switch 68. The closing of switch 68 connects source 43 to solenoids 55 and 71 which actuate the recording or printing elements of frame meter 50 and time meter 54, respectively. Thus in response to the operation of the solenoids the lane number, the starting frame number, and the time and date are printed in boxes 59, 60 and 61, respectively of the card. The lane number is printed by die 70 attached to frame meter 50.

Since at this point, switch 22 has been actuated to the "on" position, the pin-setting machine is energized provided that monitoring and sensing unit 10 remains undisturbed upon support 19 of the pin-setting machine. Thus if unit 10 has been tampered with in order to disengage switch 44 from being operated by element 45 of the machine, unit 10 causes switch 17 to open and thereby prevent the pin-setting machine from being energized by source 14. Unit 10 similarly as unit 12 is sealed by its housing construction so that tampering with the internal elements of unit 10 is prevented.

Upon completion of the game the player returns to the clerk at the console. The clerk then selects card 56 which corresponds to the lane upon which the player has been bowling and inserts the card into slot 65 of unit 12. Because of the positioning of boxes 62–64 at a point above those of boxes 59–61, card 56 is inserted only part way into slot 65. To assure that the partial insertion of card 56 into slot 65 properly positions the card for printing in boxes 62–64, a spacer card can be inserted in slot 65 with card 56. When held together with card 56, the spacer card is long enough to reach the tripper when card 56 is inserted only part way into slot 65. Upon the entry of the card into unit 12, tripper 67 is engaged by the card and actuates switch 68 to the closed position. In turn solenoids 55 and 71 are energized and actuate frame meter 50 and time meter 54, respectively, to stamp the corresponding digits on the card. Whenever clock 52 transmits an impulse to time meter 54 to change the time indication, it is necessary to prevent the actuation of solenoids 55 and 71 since printing the time reading as the time meter changes could result in a blurred time indication or none at all. To preclude printing as the time meter reading is changed by the clock, there is provided relay 69 having switch 69*a* serially connected between source 43 and solenoids 55 and 71. Relay winding 69*b* is activated whenever the clock pulses time meter 54. When the relay is actuated, switch 69*a* is opened, thereby preventing actuation of solenoids 55 and 71 at such a time.

It is to be appreciated that embodiments described herein are merely intended to be illustrative of the present invention and that variations may be made thereon by one skilled in the art without departing from the spirit and the scope of the invention.

What is claimed is:

1. Apparatus for monitoring the operation of a bowling pin-setting machine comprising a first assembly adapted to be mounted adjacent the pin-setting machine, said first assembly including means for connecting the pin-setting machine to a source of energy, means for actuating said connecting means when said actuating means is electrically energized and disposed in a predetermined position, and switch means actuated in response to the cycle of operation of the pin-setting machine; and a second assembly adapted to be mounted remotely with respect to the pin-setting machine, said second assembly including means for electrically energizing said actuating means, means responsive to the actuation of said switch means for counting the cycles of operation of the pin-setting machine, clock means, and means for producing a record of the count of the cycles of operation from said counting means and the time of day from said clock means, whereby data related to the operation of the pin-setting machine is recorded in terms of the number of cycles of operation thereof and the time corresponding thereto when said pin-setting machine is connected to a source of energy by said actuating means being electrically energized and disposed in a predetermined position.

2. Apparatus for monitoring the operation of a bowling pin-setting machine comprising structure forming a first housing to be mounted adjacent to the pin-setting machine, said first housing including means mounted within said housing for connecting said pin-setting machine to a source of energy, means for actuating said connecting means when said actuating means is electrically energized and disposed in a predetermined position, and switch means mounted within said housing and actuated in response to the cycle of operation of the pin-setting machine; and means mounted remotely with respect to said pin-setting machine for electrically energizing said actuating means, means mounted remotely with respect to said pin-setting machine and responsive to the actuation of said switch means for counting the cycles of operation of the pin-setting machine, clock means mounted remotely with respect to said pin-setting machine and means mounted remotely with said pin-setting machine for producing a record of the count of the cycles of operation from said counting means and the time of day from said clock means, whereby data related to the operation of the pin-setting machine is recorded in terms of the number of cycles of operation thereof and time when said pin-setting machine is connected to a source of energy by said actuating means being electrically energized and disposed in a predetermined position.

3. Apparatus for monitoring the operation of a bowling pin-setting machine comprising structure forming a housing adapted to be mounted adjacent to the pin-setting machine, means mounted within said housing for connecting the pin-setting machine to a source of energy, means mounted within said housing for actuating said connecting means whenever said actuating means is electrically energized and disposed in a predetermined position, switch means mounted within said housing and actuated in re-

sponse to the cycle of operation of the pin-setting machine, clock means, structure forming an additional housing, means mounted within said additional housing for electrically energizing said actuating means, means mounted in said additional housing for counting the cycles of operation of the pin-setting machine in response to the actuation of said switch means, means mounted within said additional housing and connected to said counting means for producing a record of the count of the cycles of operation from said counting means, additional means mounted within said additional housing for producing a record of the time of day from said clock means, and means for actuating said recording means and said additional recording means, whereby data related to the operation of the pin-setting machine is recorded in terms of the number of cycles of operation thereof and time when the pin-setting machine is connected to sources of energy by said actuating means being electrically energized and disposed in a predetermined position.

4. Apparatus for monitoring the operation of a bowling pin-setting machine comprising structure forming a housing adapted to be mounted adjacent to the pin-setting machine, first means mounted within said housing for switching the pin-setting machine in circuit with a source of energy, second switching means mounted in said housing and connected to said first switching means when said second switching means is disposed in a predetermined position, third switching means mounted within said housing and actuated in response to the cycle of operation of the pin-setting machine, clock means, structure forming an additional housing, fourth switching means mounted within said additional housing and connected to said second switching means for activating said first switching means through said second switching means when said second switching means is in said predetermined position, means mounted within said additional housing for counting the cycles of operation of the pin-setting machine in response to the actuation of said third switching means, means mounted within said additional housing and connected to said counting means for producing a record of the count of the cycles of operation from said counting means, additional means mounted within said additional housing for producing a record of the time of day from said clock means, and means for actuating said recording means and said additional recording means, whereby data related to the operation of the pin-setting machine is recorded in terms of the number of cycles of operation thereof and the time corresponding thereto when the pin-setting machine is energized by said second switching means disposed in said predetermined position.

5. Apparatus for monitoring the operation of a bowling pin-setting machine comprising structure forming a housing adapted to be mounted adjacent to the pin-setting machine, first means mounted within said housing for switching the pin-setting machine in circuit with a source of energy, second switching means mounted in said housing and connected to said first switching means when said second switching means is disposed in a predetermined position, third switching means mounted within said housing and actuated in response to the cycle of operation of the pin-setting machine, clock means, structure forming an additional housing, fourth switching means mounted within said additional housing and connected to said second switching means for activating said first switching means through said second switching means when said second switching means is in said predetermined position, means mounted within said additional housing for counting the cycles of operation of the pin-setting machine in response to the actuation of said third switching means, means mounted within said additional housing and connected to said counting means for producing on a record receiving member a record of the count of the cycles of operation from said counting means, additional means mounted within said additional housing for producing on said record receiving member a record of the time of day from said clock means, and means mounted within said additional housing and responsive to the positioning adjacent thereto of said viewing member for actuating said recording means and said additional recording means, whereby data related to the operation of the pin-setting machine is recorded in terms of the number of cycles of operation thereof and the time corresponding thereto when the pin-setting machine is energized by said second switching means disposed in said predetermined position.

6. Apparatus for monitoring the operation of a bowling pin-setting machine comprising structure forming a housing adapted to be mounted adjacent to the pin-setting machine, first means mounted within said housing for switching the pin-setting machine in circuit with a source of energy, second switching means mounted in said housing and connected to said first switching means when said second switching means is disposed in a predetermined position, third switching means mounted within said housing and actuated in response to the cycle of operation of the pin-setting machine, clock means, structure forming an additional housing, fourth switching means mounted within said additional housing and connected to said second switching means for activating said first switching means through said second switching means when said second switching means is in said predetermined position, means mounted within said additional housing for counting the cycles of operation of the pin-setting machine in response to the actuation of said third switching means, means mounted within said additional housing and connected to said counting means for printing on a receiving surface a record of the count of the cycles of operation from said counting means, additional means mounted within said additional housing for printing on a receiving surface a record of the time of day from said clock means, and means mounted within said additional housing and responsive to the engagement therewith of said receiving surface for actuating said recording means and said additional recording means, whereby data related to the operation of the pin-setting machine is recorded in terms of the number of cycles of operation thereof and the time corresponding thereto when the pin-setting machine is energized by said second switching means disposed in said predetermined position.

7. Apparatus for monitoring the operation of a bowling pin-setting machine comprising structure forming a housing adapted to be mounted adjacent to the pin-setting machine, first means mounted within said housing for switching said pin-setting machine in circuit with a source of energy, second switching means mounted in said housing and connected to said first switching means when said second switching means is disposed in a predetermined position, third switching means mounted within said housing and actuated in response to the cycle of operation of the pin-setting machine, clock means, structure forming an additional housing, fourth switching means mounted within said additional housing and connected to said second switching means for activating said first switching means through said second switching means when said second switching means is in said predetermined position, means mounted within said additional housing for counting the cycles of operation of the pin-setting machine in response to the actuation of said third switching means, means mounted within said additional housing and connected to said counting means for printing on a card a record of the count of the cycles of operation from said counting means, additional means mounted within said additional housing for printing on a card a record of the time of day from said clock means, and fifth switching means mounted within said housing and responsive to the engagement therewith of said card for actuating said recording means and said additional recording means, whereby data related to the operation of the pin-setting machine is recorded in terms of the

number of cycles of operation thereof and the time corresponding thereto when the pin-setting machine is energized by said second switching means disposed in said predetermined position.

8. Apparatus for monitoring the operation of a bowling pin-setting machine comprising structure forming a housing adapted to be mounted adjacent to the pin-setting machine, first means mounted within said housing for switching said pin-setting machine in circuit with a source of energy, second switching means mounted in said housing and connected to said first switching means when said second switching means is disposed in a predetermined position, third switching means mounted within said housing and actuated in response to the cycle of operation of the pin-setting machine, clock means, structure forming an additional housing, fourth switching means mounted within said additional housing and connected to said second switching means for activating said first switching means through said second switching means when said second switching means is in said predetermined position, means mounted within said additional housing for counting the cycles of operation of the pin-setting machine in response to the actuation of said third switching means, means mounted within said additional housing and connected to said counting means for printing on a card a record of the count of the cycles of operation from said counting means, additional means mounted within said additional housing and connected to said clock means for printing on a card a record of the time of day and indicia of the date, and fifth switching means mounted within said housing and responsive to the engagement therewith of said card for actuating said recording means and said additional recording means, whereby data related to the operation of the pin-setting machine is recorded in terms of the number of cycles of operation thereof and the time corresponding thereto when the pin-setting machine is energized by said second switching means disposed in said predetermined position.

9. Apparatus for monitoring the operation of a plurality of bowling pin-setting machines comprising a plurality of housings, each housing of the plurality being adapted to be mounted adjacent to a different one of the plurality of pin-setting machines, means mounted within said housing for connecting the pin-setting machine adjacent thereto to a source of energy whenever said connecting means is disposed in a predetermined position, switch means mounted within said housing and actuated in response to the cycle of operation of the pin-setting machine, clock means, structure forming a control panel, a plurality of additional housings disposed adjacent to said control panel, each additional housing corresponding and being connected to a different one of said plurality of housings, means mounted within said additional housing for counting the cycles of operation of the pin-setting machine adjacent to the corresponding housing thereof in response to the actuation of said switch means thereof, means mounted within said additional housing and connected to said counting means thereof for producing a record of the count of the cycles of operation from said counting means, additional means

mounted within said additional housing for producing a record of the time of day from said clock means, and means mounted within said additional housing for actuating said recording means thereof and said additional recording means thereof, whereby data related to the operation of each of the plurality of pin-setting machines is recorded in terms of the number of cycles of operation thereof and the time corresponding thereto when the pin-setting machine is energized by said connecting means disposed in said predetermined position.

10. Apparatus for monitoring the operation of a bowling pin-setting machine comprising a plurality of housings, each housing of said plurality being adapted to be mounted adjacent to a different one of the plurality of pin-setting machines, first means mounted within said housing for switching said pin-setting machine in circuit with a source of energy, second switching means mounted in said housing and connected to said first switching means when said second switching means is disposed in a predetermined position, third switching means mounted within said housing and actuated in response to the cycle of operation of the pin-setting machine, clock means, structure forming a control panel, a plurality of additional housings disposed adjacent to said control panel, each additional housing of said plurality corresponding and being connected to a different one of said plurality of housings, fourth switching means mounted within said additional housing and connected to said second switching means of said corresponding housing for activating said first switching means thereof through said second switching means thereof when said second switching means is in said predetermined position, means mounted within said additional housing for counting the cycles of operation of a pin-setting machine in response to the actuation of said third switching means of said corresponding housing, means mounted within said additional housing and connected to said counting means thereof for producing a record of the count of the cycles of operation from said counting means, additional means mounted within said additional housing for producing a record of the time of day from said clock means, and means mounted within said additional housing for actuating said recording means thereof and said additional recording means thereof, whereby data related to the operation of each of the plurality of pin-setting machines is recorded in terms of the number of cycles of operation thereof and the time corresponding thereto when the pin-setting machine is energized by said second switching means disposed in said predetermined position.

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