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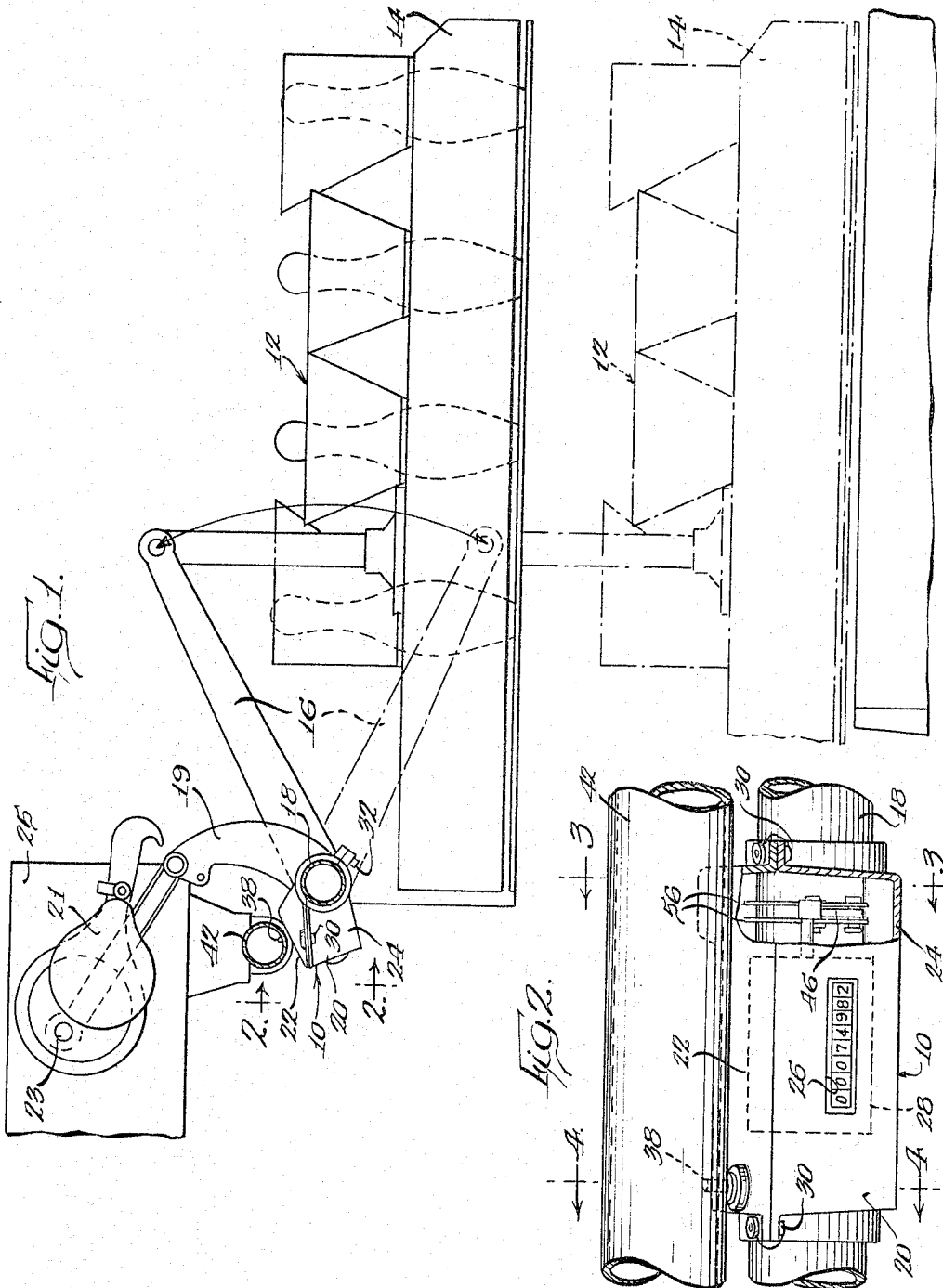
A. P. ROGERS ETAL

3,276,686

TAMPERPROOF COUNTER

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2 Sheets-Sheet 1



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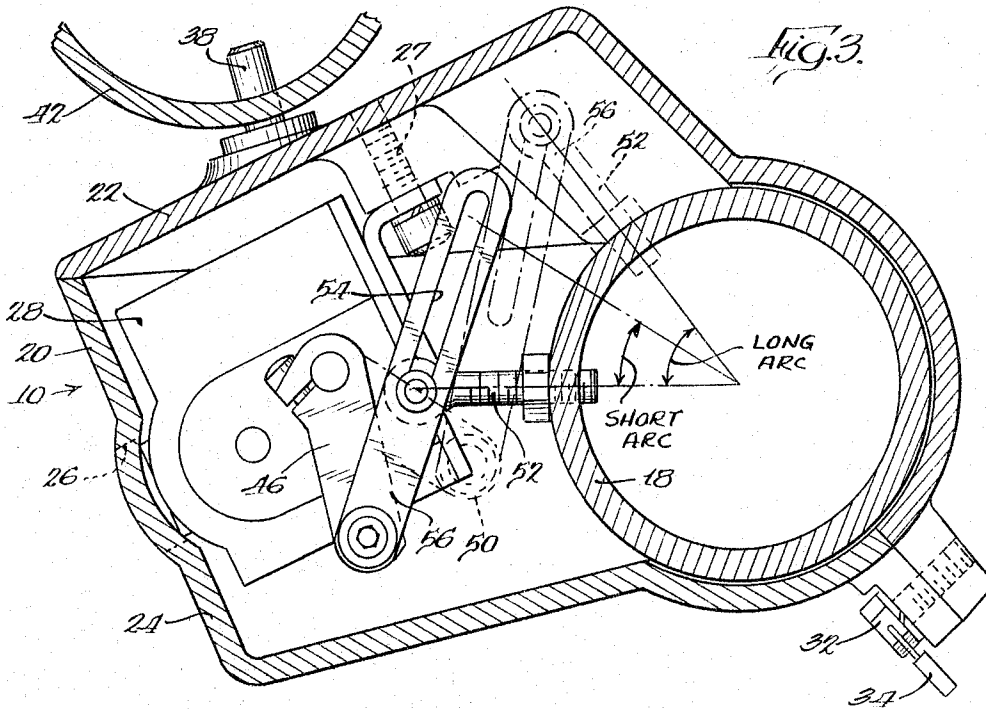
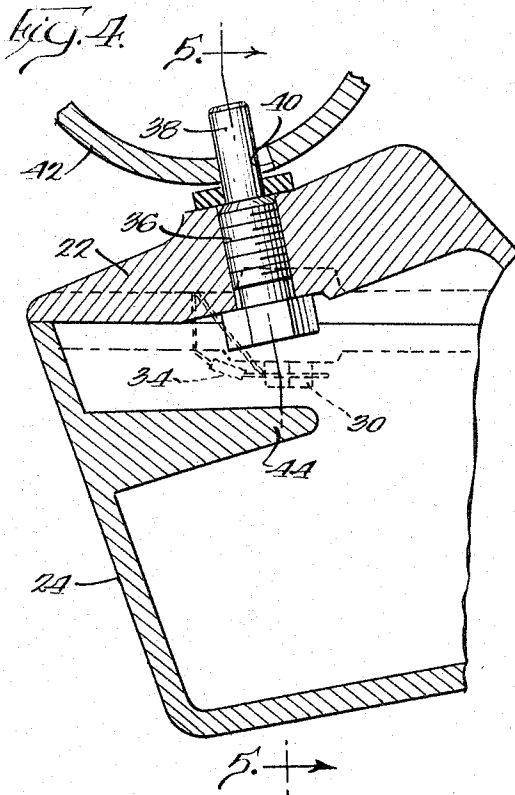
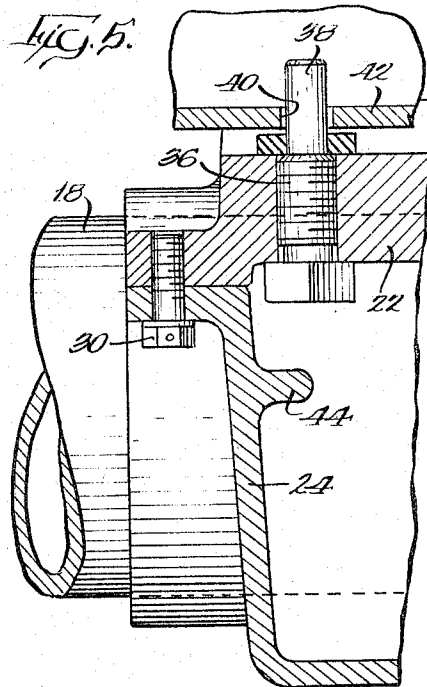
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1

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TAMPERPROOF COUNTER

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6 Claims. (Cl. 235—91)

This invention relates to a counting device and more particularly to a tamperproof counter for use in conjunction with a bowling pinsetter to count the number of times a set of pins is placed on the bowling alley.

An object of this invention is to provide a new and improved counting device.

Another object of the present invention is to provide a counting device in which the registered reading cannot be tampered with when the device is secured in operational position, without leaving evidence of such tampering.

Another object of this invention is to provide positive actuation of a rugged mechanical counter.

A further object of the present invention resides in providing a "frame" counter that is actuated by the rotation of a deck-lift shaft of a bowling pinsetter.

Still a further object is to provide a counting device that is positively actuated by the oscillation of a shaft through a predetermined angle and which will not register a count when the actuating shaft oscillates through a smaller angle than the predetermined angle.

Further objects and advantages will become apparent from the following detailed description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a side elevational view of the counting device in operational position in a bowling pinsetter;

FIGURE 2 is an enlarged view from line 2—2 of FIGURE 1 of the counting device with a portion of the housing broken away;

FIGURE 3 is a sectional view on an enlarged scale of the counting device taken along line 3—3 of FIGURE 2;

FIGURE 4 is a fragmentary sectional view of a portion of the counting device taken along line 4—4 of FIGURE 2; and

FIGURE 5 is a fragmentary sectional view of a portion of the counting device taken along line 5—5 of FIGURE 4.

While an illustrative embodiment of the invention is shown in the drawings and described in detail herein, the invention is susceptible of embodiment in many different forms, and it should be understood that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

Referring now to the drawings in more detail, FIGURE 1 shows the counting device 10 in operative position in a pinsetter shown generally at 12. The pinsetter has a deck 14 shown by full lines in an upper position and by broken lines in a lower position. The deck is raised and lowered by movement of a pair of identical deck-lift arms, one of which is shown at 16. The deck-lift arms are actuated by rotation of a deck-lift shaft 18, which in turn is motivated by crank-arm 19. The crank-arm 19 is operatively engaged by a drive mechanism 21 which is actuated by drive shaft 23 extending from gear box 25.

In the preferred embodiment shown in the drawings the counting device has a two-piece housing 20 of cast aluminum or other material having upper and lower portions 22 and 24 respectively. The housing 20 has

2

a window 26 through which the registered count may be observed.

The counting device has a counter 28 disposed in the lower portion 24 of the two-piece housing 20 and attached to the upper portion 22 of the housing 20 which is bolted together around the deck-lift shaft 18 with very little diametral clearance, but enough to allow the deck-lift shaft to rotate freely. A pair of housing bolts 30 securing the housing 20 together at one end and another pair of bolts 32 securing said housing together at its opposite end are wired and sealed with lead seals 34 which, if broken, would readily show evidence of tampering. The housing 20 is prevented from rotating by the special bolt 36 which has a stud end 38 which fits into a clearance hole 40 in a cross brace 42 of the pinsetter frame. The bolt 36 is made of hardened steel and cannot be cut by ordinary means like a hack saw. Bolt 36 cannot be backed out of the cross brace member 42 because the lower portion 24 of housing 20 has a protrusion 44 which extends beneath the head of said bolt and prevents its removal when the upper and lower portions 22 and 24 of the housing 20 are bolted together at their ends.

In assembling the preferred embodiment of the counting device shown in the drawings a pair of identical elongate link members 56 are operatively connected to one end of a counter lever 46. While in this embodiment of the invention two such members are used, it is recognized that in another form of this invention a single elongate link member can be utilized. Lever 46 is then attached to the counter 28. Special bolt 36 is screwed into the upper portion 22 of the housing 20. Then the counter 28 is attached to the upper portion 22 of housing 20 by suitable means such as bolt 27. The parts are then ready to be assembled in operative position in the pinsetter 12. The upper portion 22 of housing 20 is placed in position between the deck-lift shaft 18 and the cross brace 42 as shown in FIGURE 3 and held in this position by inserting the stud end 38 of the special bolt 36 into the clearance hole 40 in cross brace 42. One end of stud 52 is then screwed into deck-lift shaft 18 and its opposite end is positioned between the pair of elongate link members 56 and operatively connected in the slots 54 of said link members as shown in FIGURE 3. The lower portion 24 of the housing 20 is then placed in position below the upper portion 22 and the portions are secured together at their ends by a pair of bolts 32 on one side of the deck-lift shaft and by a second pair of bolts 30 on the opposite side of said shaft. Lastly, bolts 30 and 32 are wired and sealed with lead seals 34.

In operation the counter lever 46 of counter 28 is actuated by the rotation of the deck-lift shaft 18 which in turn actuates the mechanical linkage 50. This mechanical linkage has a stud 52 which is fastened to and extends radially from the deck-lift shaft 18 for rotation therewith. Stud 52 is slidably engaged in longitudinal slots 54 in elongate link members 56. The elongate link members 56 are operably connected to the counter lever 46 of the counter 28.

The longitudinal slots 54 in the elongate link members 56 are provided so that when the deck-lift shaft 18 oscillates through a predetermined arc to lower the deck 14 to detect standing pins, the counter lever 46 is not actuated because of the motion lost in the longitudinal slots 54 of elongate link members 56. When the deck-lift shaft 18 oscillates through a larger arc to place a set of pins on the alley the elongate link members 56 are moved by the stud 52 to the position shown by broken lines in FIGURE 3 and the counter lever 46 is thus actuated and a count is registered. In the particular embodiment shown the decklift shaft 18 rotates through an arc of about 30 de-

3

greets to detect standing pins and through an arc of approximately 52 degrees to place a set of pins on the alley. In the above described manner the counting device counts only the times a set of pins is placed on the alley which closely corresponds to the number of "frames" that are bowled.

I claim:

1. A counting device comprising: a multipiece housing; a counter mounted in said housing; a counter lever; fastening means for securing said housing together around a shaft with enough clearance to allow said shaft to rotate freely; seals affixed to said fastening means for preventing the removal of said fastening means without first breaking said seals; securing means to hold said housing in a stationary position; means preventing the removal of said securing means when said housing is secured together; and actuating means for said counter lever including mechanical linkage actuated by the rotation of said shaft including an elongate link member and a stud, one end of which is secured to said shaft to rotate therewith, the other end of which is engaged by said elongate link member, said elongate link member engaging said counter lever of said counter.

2. A counting device comprising: a multipiece housing; a counter mounted in said housing; fastening means for securing said housing together around a shaft with enough clearance to allow said shaft to rotate freely; seals affixed to said fastening means for preventing the removal of said fastening means without first breaking said seals; securing means to hold said housing in a stationary position including a bolt screwed into one part of said housing with its protruding end engaged in a hole in a brace member; means on the other part of the housing spaced less than the length of the protruding end from the bolt head for preventing the removal of said bolt when said housing is secured together; and means for actuating said counter.

3. A counting device comprising: a multipiece housing; a counter mounted in said housing; fastening means for securing said housing together around a shaft with enough clearance to allow said shaft to rotate freely; seals affixed to said fastening means for preventing the removal of said fastening means without first breaking said seals; securing means to hold said housing in a stationary position including a bolt screwed into said housing with its protruding end engaged in a hole in a brace member; means for preventing the removal of said bolt when said housing is secured together; means for actuating said counter, and the means for preventing the removal of said bolt comprises a protrusion of the inner wall of said housing against which the head of said bolt will abut should said bolt be attempted to be removed from said brace member while said housing is secured together.

4. In a frame counting device for a bowling pinsetter having a cross brace member spaced from a deck-lift shaft; a multipiece housing; a counter mounted in said housing; a counter lever; fastening means for securing said housing together around said deck-lift shaft with enough clearance to allow said shaft to rotate freely; securing means for holding said housing in a stationary position including a bolt having one end secured in said housing and an opposite end for engagement with said cross brace member; and means for actuating said counter lever including mechanical linkage having a slotted link

4

member, a stud with one end screwed into said shaft to rotate therewith and an opposite end of which is slidably engaged by said slotted link member, said link member being connected to said counter lever.

5. In a frame counting device for a bowling pinsetter having a cross brace member spaced from a rotatable deck-lift shaft: a multipiece housing; a counter mounted in said housing; fastening means for securing said housing together around said deck-lift shaft with enough clearance to allow said shaft to rotate freely; means movable with said deck-lift shaft for actuating said counter; securing means for holding said housing in a stationary position including a bolt made of hardened steel and having one end secured in said housing and an opposite end adapted for engagement with said cross brace member.

6. A tamperproof, frame counting device for a bowling pinsetter having a deck-lift shaft and a cross brace member comprising: a multipiece housing; a counter assembly mounted in said housing; a counter lever; fastening means for securing said housing together around said deck-lift shaft with enough clearance to allow said shaft to rotate freely; seals affixed to said fastening means for preventing removal of said fastening means without first breaking said seals; securing means to hold said housing in a stationary position including a bolt screwed into said housing having a stud end protruding out of said housing and engaged in a clearance hole in said cross brace member; means for preventing the removal of said bolt including a protrusion of the inner wall of said housing adapted to interfere with the removal of said bolt while said housing is secured together; and means for actuating said counter assembly including an elongate link member having a longitudinal slot therein, a stud, having one end which is screwed into said shaft to rotate therewith and an opposite end which is slidably engaged in a slot in said elongate link member, said link member being connected to said counter lever of said counter assembly.

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