

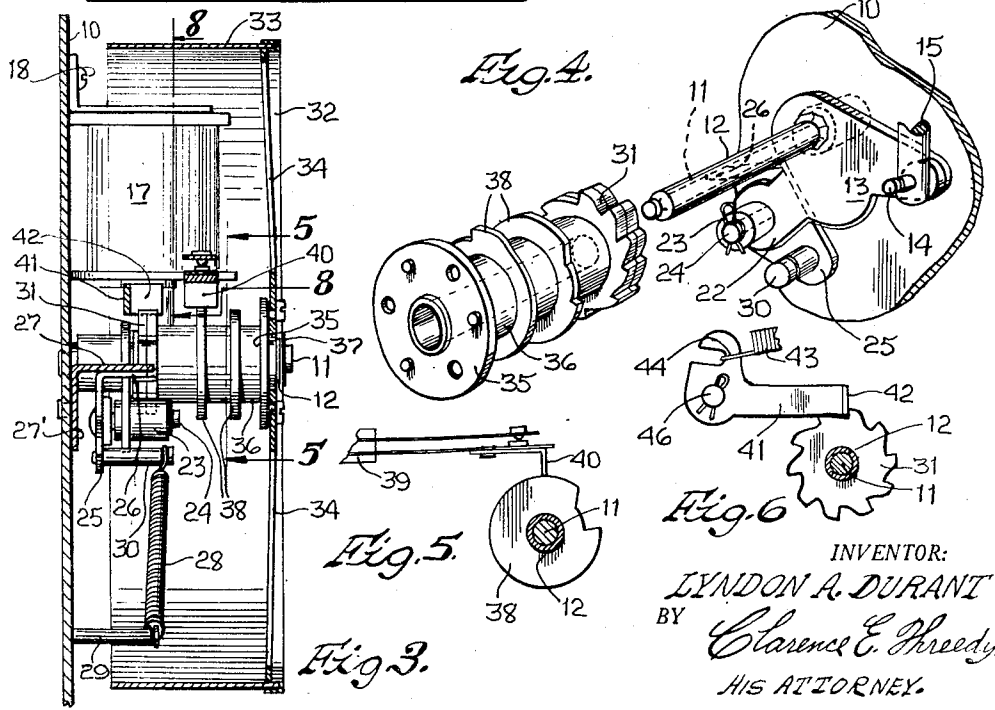
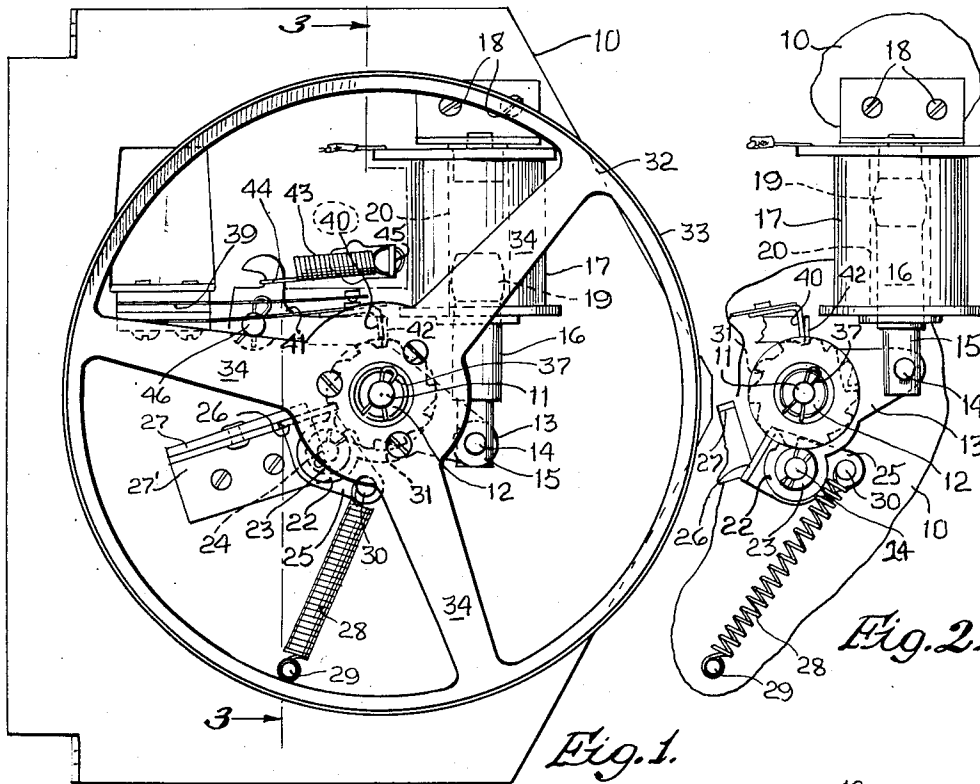
Jan. 29, 1957

L. A. DURANT  
STEP-UP MECHANISMS

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

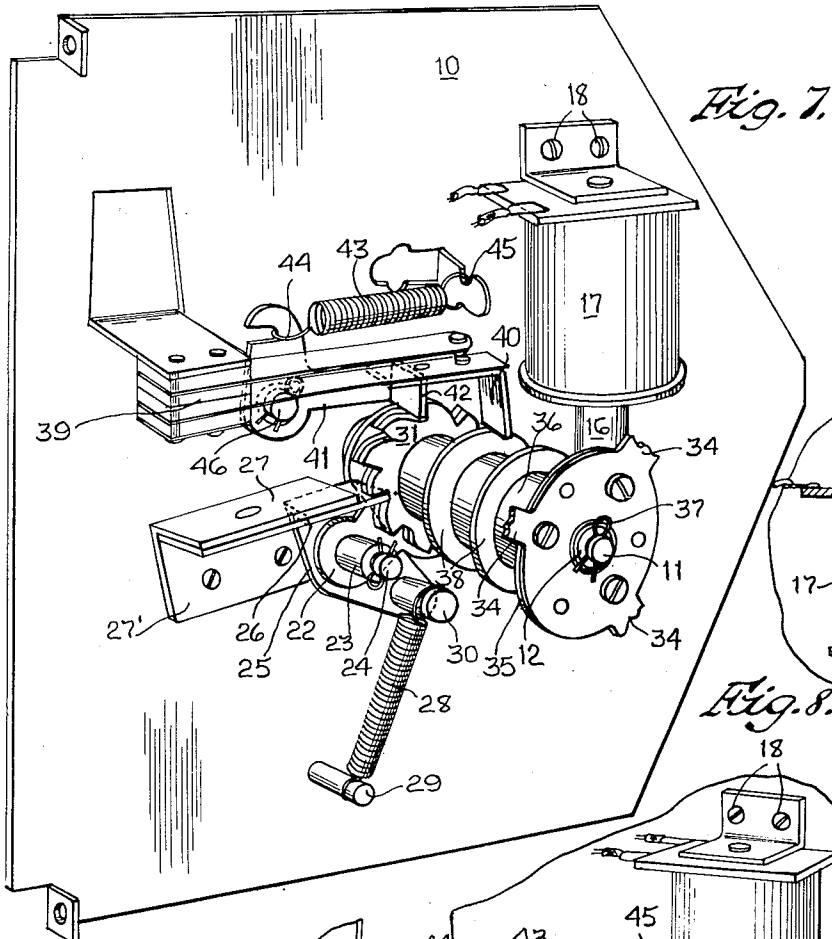


Fig. 7.

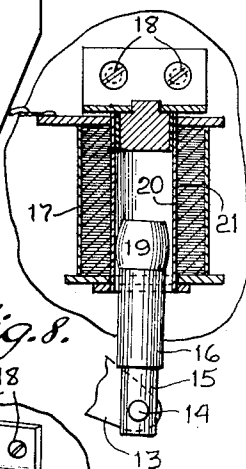


Fig. 8.

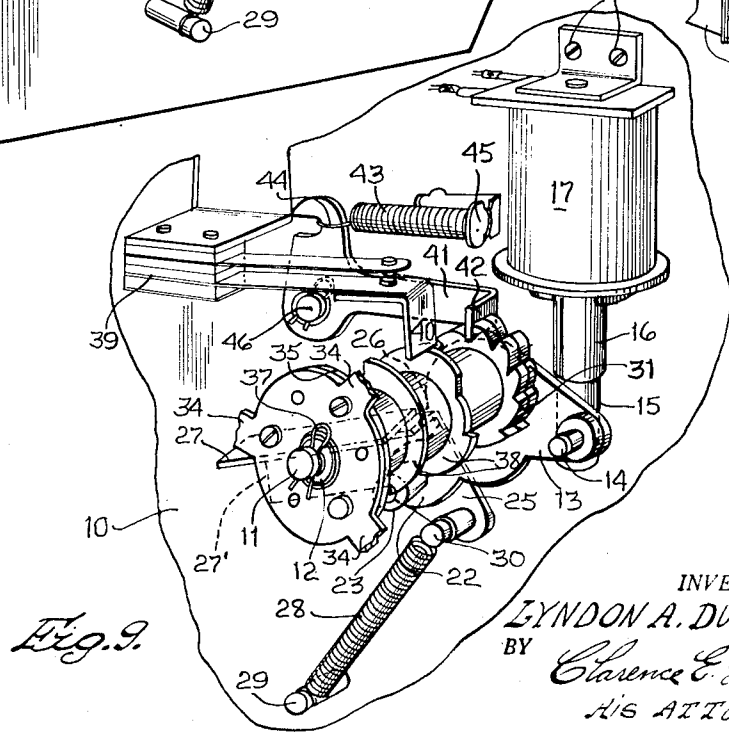


Fig. 9.

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2,779,200

STEP-UP MECHANISMS

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1 Claim. (Cl. 74—128)

This invention relates to certain new and useful step-up mechanisms especially designed for use in connection with the registration of scores accomplished by the playing of a coin-operated amusement game apparatus.

The invention has as a principal object the provision of an improved construction which is relatively simple, economical in manufacture, and highly efficient in use.

Another and equally important object of the invention is the provision of a step-up mechanism comprising a combination of parts compactly arranged together whereby to provide a step-up mechanism of a relatively small size.

Another and equally important object of the invention is the provision of a step-up unit, the construction of which assures longevity of the unit.

Another and equally important object of the invention is to provide a step-up mechanism in which the operating parts of the same are arranged within the circumference of an indicia-bearing drum actuated by such mechanism, thereby providing a step-up mechanism of a relatively small size and yet having a drum of ample diameter.

Another and equally important object of the invention is the provision of an arrangement for preventing overriding of the indicia-bearing drum by the action of the step-up dog.

Yet another object of the invention of equal importance is the provision of a step-up mechanism in which the indicia-bearing drum is advanced step-by-step by means of a ratchet comprising relatively few teeth, thereby permitting the drum to be advanced a substantial distance by a single operation of the step-up pawl. Such an arrangement permits relatively large indicia to be exposed through sight windows forwardly of the indicia-bearing portion of the drum.

Another object of the invention is the novel ratchet assembly embodied in this invention, which assembly comprises relatively few parts, affording expeditious assembly of the same, with the minimum degree of labor.

Another object of the invention is the provision of a step-up mechanism which is relatively small, thereby permitting a plurality of units to be mounted in parallel side-by-side relation with respect to each other while occupying a minimum amount of space.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings showing the preferred form of construction, and in which:

Fig. 1 is a front elevational view of the invention;

Fig. 2 is a fragmentary elevational view showing the elements of the step-up mechanism illustrated in Fig. 1 in different positions with respect to each other;

Fig. 3 is a sectional detail view taken substantially on line 3—3 of Fig. 1;

Fig. 4 is a perspective view of the drum-supporting

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elements, showing the same in exploded relation with respect to each other;

Fig. 5 is a fragmentary sectional detail view taken substantially on line 5—5 of Fig. 3;

Fig. 6 is a fragmentary detail view of the stop pawl embodied in the invention;

Fig. 7 is a perspective view of the invention, with the indicia-bearing drum partly omitted;

Fig. 8 is a fragmentary sectional detail view taken substantially on line 8—8 of Fig. 3;

Fig. 9 is a perspective view similar to Fig. 7 as viewed from the right-hand side thereof.

The several objects of my invention are best accomplished by the form of construction shown in the accompanying drawings in which my improved step-up mechanism comprises a mounting plate 10 of relatively flat formation. Extending laterally from and connected in any suitable manner to this mounting plate is a shaft 11. Mounted on this shaft 11 is an elongated sleeve 12. Integral with this sleeve 12 is a lateral extension 13. This extension 13 at its outer end portion carries a pin 14. This pin 14 pivotally connects to the extension 13, the outer end portion 15 of a solenoid 16 operable in an electromagnetic coil 17 mounted as at 18 to the mounting plate 10.

The solenoid 16 at its inner end portion provides a frusto-spherical body 19 which is of a diameter in a direction transversely of the solenoid 16 slightly larger than the bore 20 of the core 21 of the coil 17. By such an arrangement, only a relatively small portion of the solenoid 16 engages the core 21 thereby greatly reducing the frictional resistance between the solenoid 16 and the core 21. By shaping the body 19 as shown in the drawings, a non-slidable pivotal connection may be provided between the solenoid 16 and the extension 13, which loose coupling may take the form of a slot and pin connection as is now customary in the art.

The sleeve 12 provides a laterally extending finger 22. This finger 22 provides a lateral bushing 23 in which is positioned a shaft 24. This shaft 24 is formed as an integral part of a step-up dog 25. This step-up dog 25 includes a relatively flat lug 26 extending from the dog 25 laterally and which lug is adapted to engage a relatively flat stop plate 27 extending laterally from the mounting plate 10 and having a depending flange 27' by means of which the stop plate 27 is secured to the mounting plate. A spring 28 has one end portion connected to a pin 29 carried by the plate 10 and an opposite end portion connected to a pin 30 carried by the dog 25. This spring 28 normally retains the dog 25 in engagement with a ratchet wheel 31.

An indicia-bearing drum is indicated at 32 and comprises a ribbon-like periphery 33 on which the indicia, such as numbers, are printed or otherwise impressed. Spokes 34 connect the periphery 33 with a disc 35 formed as an integral part of an elongated hub 36. This hub 36 is mounted upon the sleeve 12 and is prevented from displacement therefrom by a spring cotter pin 37.

The hub 36 comprises adjacent cams 38 which are adapted to engage the actuating fingers of a switch mounted on the mounting plate 10, one of such switches being indicated at 39 and the actuating finger thereof at 40. The ratchet wheel 31 is formed as an integral part of the hub structure 36.

A holding dog is indicated at 41. This holding dog includes a finger 42 adapted to engage the teeth 31. This finger 42 is held in engagement with such teeth by means of a spring 43, one end of which is connected as at 44 to the holding dog 41 and the opposite end as at 45 to the mounting plate 10. This dog 41 is pivotally mounted on a stud shaft 46 extending laterally from the plate 10.

The function of this holding dog 41 is to hold the drum 32 against retroactive rotation when the latter is actuated or rotated by the stepping-up dog 25.

When the coil 17 is energized by the closing of a suitable electric circuit, which circuit may be a part of the scoring circuit of a coin-operated amusement game apparatus, the solenoid 16 is retracted within the coil 17 to position the step-up dog 25 in a position to engage a tooth of the ratchet wheel 31 whereby the dog 25, under the action of the spring 28, upon energization of the coil 17, will advance the ratchet wheel 31 one step and consequently advance the drum 32 likewise one step, which is a distance sufficient to expose one of the indicia on the periphery of the drum 32 through a sight opening (not shown) of the apparatus with which the step-up mechanism is associated.

After the step-up dog 25 has performed its function in the above manner, the holding dog 41 will prevent retroactive movement of the drum 32.

One of the important features of my invention is the provision of an arrangement for limiting the movement of the step-up dog 25 in a direction of stepping up the drum 32, so that the drum will not override the position it is supposed to occupy upon each step-up operation. I accomplish this in a very simple manner by providing the relatively flat stop plate 27 engageable with the lug 26 of the step-up dog 25. By this arrangement overriding of the drum 32 is prevented. This stop plate 27 also serves the function of cooperating with the spring 28 to maintain the dog 25 in engagement with the teeth of the ratchet wheel 31.

From the foregoing description, it will be apparent that my improved step-up mechanism comprises a combination of elements arranged in a convenient and compact structure which permits me to manufacture the step-up mechanism at the most economical cost. Such structure being of a relatively small size permits mounting a plurality of such mechanisms in an amusement game apparatus in parallel side-by-side relation while occupying a relatively small space. It will be apparent that the drum-actuating mechanism as well as the drum-holding mechanism is mounted entirely upon one side of the mounting plate. This facilitates assembling of the unit with the minimum amount of labor. Furthermore, the parts arranged in the manner described produce a step-up mechanism which is highly efficient in use and of exceptional longevity.

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

A step-up mechanism comprising a mounting plate, an elongated shaft fixedly connected to the mounting plate and extending laterally therefrom, a magnetic coil including a solenoid mounted on said mounting plate with the solenoid extending substantially at right angles to said shaft and closely adjacent thereto, an elongated sleeve mounted on said shaft and providing oppositely disposed integral extensions extending in parallel confronting relation with respect to said mounting plate, an indicia bearing drum having a hub rotatably mounted on said sleeve to one side of the extensions, said hub being of a diameter less than the distance between the oppositely disposed extensions of said sleeve so as to be positioned between the ends thereof, a pin connection between the end of one of the extensions and the outer end of the solenoid, a step-up dog carried adjacent the end of the other of said extensions between said extension and said plate and having an integral formed stud shaft thereon extending in parallel relation to said shaft and said hub, a sleeve integral with the outer end of the other of said extensions and providing a bearing for said step-up dog shaft, a stop member mounted on said plate and including a relatively flat portion extending laterally from the mounting plate and parallel to said hub and in the path of movement of said dog, said dog having a relatively flat portion engageable with the other flat portion, a holding dog pivotally mounted on said plate closely adjacent said shaft, a ratchet on said hub engageable with the relatively flat portion of said step-up dog and said holding dog, said drum having a ribbonlike peripheral of a width greater than the length of said hub so as to cooperate with said mounting plate to form a housing for said coil, said dogs and said stop member.

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