Oct. 3, 1961 L. KRIPAK 3,002,335

TOY CLOCK

Filed Sept. 8, 1958 2 Sheets-Sheet 1

Fig. 1.

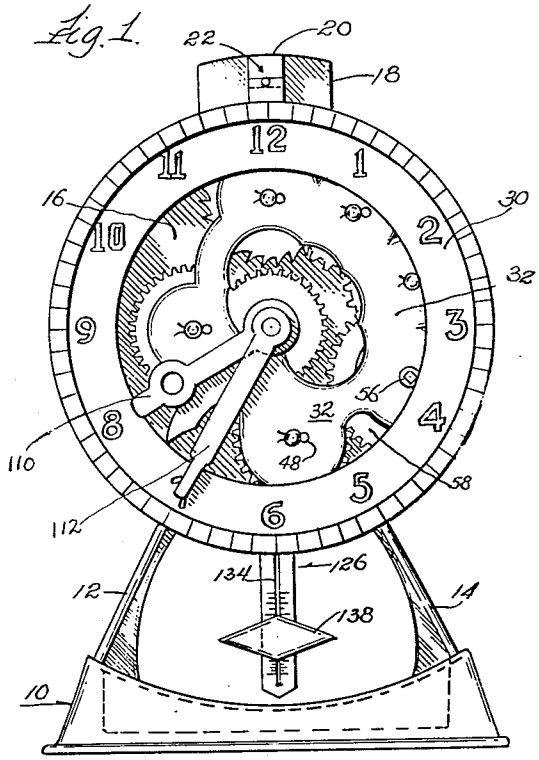


Fig. 2.

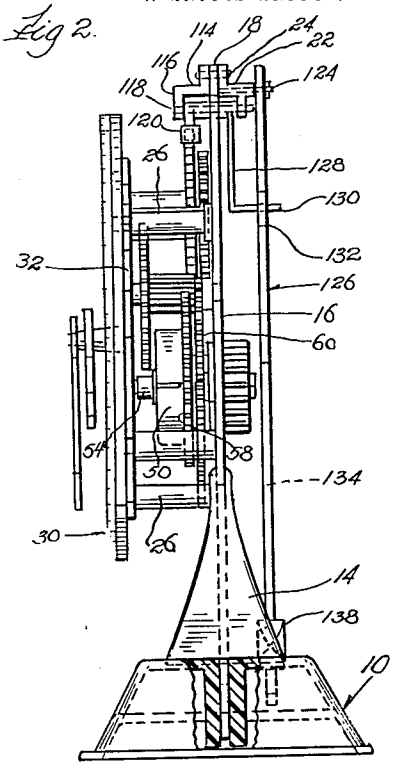


Fig. 4.

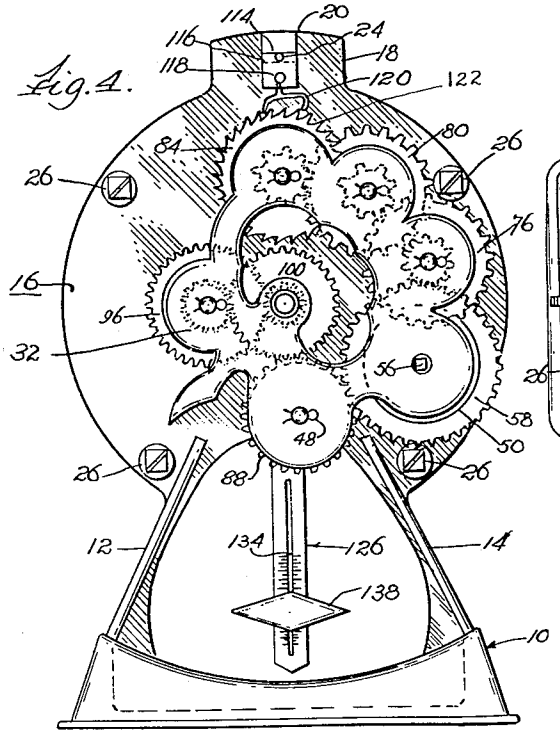
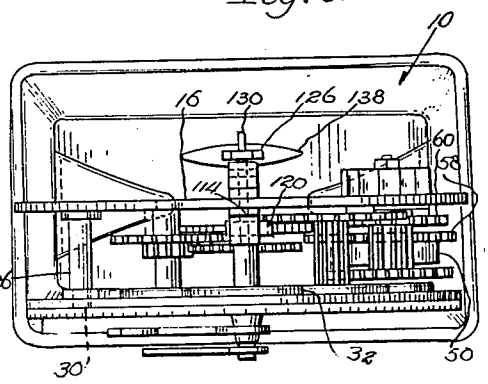


Fig. 3.



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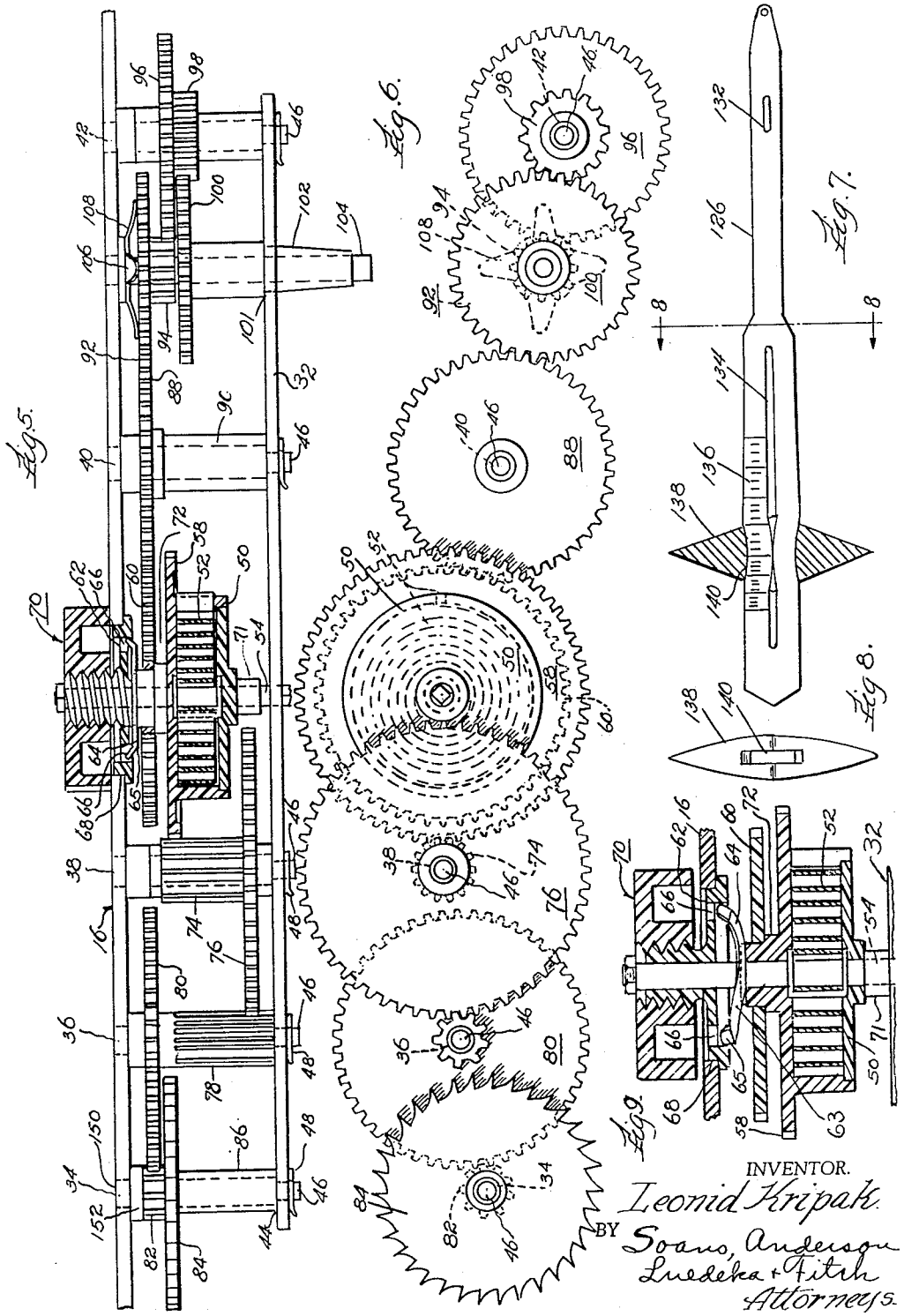


Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 9.

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TOY CLOCK

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4 Claims. (Cl. 58—2)

This invention relates to toys, and particularly is directed to a toy clock mechanism which can be easily taken apart and put together by children.

From time immemorial, children have always been fascinated by clocks and particularly the pendulum-like movement of the same with the result that many a clock has suffered by being taken apart and never put together properly.

As a result of this natural curiosity on the part of the children, it is an object of this invention to provide a means to satisfy such curiosity by providing a toy clock of the pendulum-type that is easily taken apart and put together without difficulty and always will result in an operative toy much to the delight of the child, giving him a sense of accomplishment and to edification of the parents.

Another object of this invention is to provide an easily assemblable and disassemblable clock of which the various parts are made of clear plastic so that the entire interrelationship of the various parts of the clock mechanism can be easily viewed while in operation.

It is still a further object of this invention to provide a spring-driven motor drive means to operate the clock which is safe for use by children since it automatically unwinds itself when it is disassembled from the clock structure.

Other objects of this invention are to provide an educational clock which is easily assemblable and disassemblable, simple in construction, inexpensive to make, and safe to operate under all conditions of play and use.

For a better understanding of the principles underlying my invention, reference should be had to the following detailed description given hereinbelow to be taken in conjunction with the accompanying drawings in which:

FIGURE 1 is an elevational view of the entire clock mechanism assembly;

FIGURE 2 is an edge view;

FIGURE 3 is a top plan view of the clock shown in FIGURE 1;

FIGURE 4 is a front view of FIGURE 1 with the face and hands thereof removed to show the relationship of the various components in assembled form;

FIGURE 5 is a modified diagrammatic top view showing the relationship of the various gear drive trains;

FIGURE 6 is a modified diagrammatic front view showing the relationship of the various gear drive trains;

FIGURE 7 is a back view of the pendulum;

FIGURE 8 is a section taken along line 8—8 of FIGURE 7; and

FIGURE 9 shows an enlarged fragmentary view of the spring-tension release means on spring-drive power means.

My improved clock toy comprises a base **10** with two side angularly disposed uprights **12** and **14** rising at an angle which, if extended, would intersect at about the center of the face of the clock. These uprights **12** and **14** support the circular back plate or main bridge **16** which in turn supports the entire assembly of the various components forming the toy clock structure. In the upper part of this said circular plate **16** is a rectangular extension-like support **18** in which there is a vertical slot **20** to act as a positioning means and a support for a subassembly **22** consisting of the pendulum and the ratchet escapement elements that are placed in contact with the escapement gear. Suitable means, such as a pin and

clip arrangement **24** or other type of locking devices are used to retain the assembly **22** in position and in contacting relation with the escapement wheel or gear **84** to control the speed of the conventional clock gear train described in further detail herein below.

A series of projecting posts **26** spaced equidistantly around the marginal portions of the back plate **16** extend transversely therefrom to provide support for the clock face **30**. The ends of the posts are notched so that they can fit into the corresponding holes or recesses on the back surface of the face plate **30** and whose diameter is slightly smaller than the ends of said posts **26** so that the face of the clock can be retained frictionally upon such supports **26**. Though in the preferred embodiment four sets of posts **26** are indicated, it is obvious that the same can be varied in number and distributed in any desired or preselected positions about the back plate **16** and still not interfere with or impair the utility of this toy.

As can be readily seen from the illustrations, the central portion of the face **30** is removed to expose to the view of the child the various gears and drive mechanisms comprising the assembly of the clockwork which is retained between the circular back plate **16** and the front plate **32**.

The front plate **32** is secured to the back plate **16** by means of the rods **34**, **36**, **38**, **40** and **42** extending laterally from one face of said plate. These rods or pins have variously sized diameters and act as shafts for the various gears in the gear train drive having corresponding diameters so that gears fit properly only on one shaft and on none other. Each of the said pins is provided with a shoulder **44** about its end. Centrally extending therefrom is a projection **46** which fits into and through a corresponding opening in the front plate or bridge **32** to project from the face thereof for a distance sufficient to engage a yoke-like or C clip **48** that is retained within a groove or slot circumferentially formed within the projection **46**. In this manner, the front plate **32** and the support or main bridge plate **16** are retained in proper spaced apart relationship to retain therebetween the clockwork.

It should be noted that one of the aspects of this invention is that each of the pins or shafts supporting any of the gears have differently sized diameters and only gears with the corresponding diameter will fit properly on such a shaft or pin. In the standard construction conventionally employed in the manufacture of clockwork mechanisms, the diameter of the various shafts and the color of the various gears are identical and thus become confusing to the average person or child who attempts to take the clockwork apart and reassemble it again.

The motive power for this clockwork is a spring-driven motor encased in a housing of the conventional type modified in accordance with the teachings of my invention to provide a safe power unit which when removed from the clockwork assembly, automatically unwinds itself. Within the housing **50**, the spring **52** has one end attached thereto to the inside wall of the said housing while the other end of the spring is attached to the shaft **54**. Shaft **54** extends through the said housing **50** and beyond the face plate and back plate **32** and **16**, respectively. The end of the shaft **54** extending beyond the face bridge plate **32** is squared to receive thereon a key or other suitable device for winding of the spring.

On the other end of said shaft **54**, immediately adjacent the housing **50**, is a gear **58** which is in intermeshing relationship with the escapement gear train controlled by the swing of the pendulum support and escapement assembly **22**. Adjacent to the gear **58**, but in spaced apart relationship thereto, is a gear **60** which is in intermeshing relationship with the gear train, driving the hour

and minute hands of the clock. Rearwardly to the said gear 60 in a spaced apart relationship and attached to the back plate about the shaft 54, is a clutch arrangement consisting of a ratchet circular plate 68 and a cup-like spring member 63 having thereon radially extending arms 64 with fingers 65 on ends thereof. The plate 68 has disposed about its circumference a series of spaced apart holes 66. The cup-like spring member 63 is axially mounted about the shaft 54 with one surface thereof abutting against the collar of the gear spacer 72 to which is locked the gear 60 and the other surface in a point contacting arched manner through the arms 64 and fingers 65 in partial engagement within the holes 66 in the circular plate 68. The fingers 65 escape from the holes 66 when the spring drive means is wound up, but remain in the holes 66 to prevent the spring from unwinding. To maintain the engagement of the fingers 65 within the holes 66 of the clutch means and prevent the unwinding of the spring within the housing 50, there is placed on the portion of the shaft 54 extending beyond the main bridge plate 16 a lock assembly 70 which draws on the shaft 54 through the sleeve 71 spaced intermediate the housing 50 and the back wall of the front plate 32. When the lock is released, the cup-like spring member 63 forces apart the entire clutch assembly, the gears 58 and 60 move toward the front plate bridge 32 and the tension of the spring housed within the housing 50 is immediately released since the fingers 65 are no longer in engagement within the holes 66. Likewise, if perchance, the clockwork assembly is removed, the gears 58 and 60 become disengaged and the spring housing 50 is free to unwind the spring. Thus, under all conditions of removal, the spring is released and the child when disassembling the clockwork mechanism cannot be injured.

It should be noted that there are several variations of this type of construction that can very well be employed and for convenience, the plate 68 can be completely eliminated and the holes 66 can become an integral part of the back plate 16. However, the principle involved is the same and is an important part of the safety feature of this clock toy.

In FIGURE 5, there is a schematic representation of the two geared trains which will now be described in order to have a better understanding of the principle involved in this invention as applied to a conventional clockwork gear train. Gear 58 forms a part of the housing 50 and is driven thereby when the spring tends to unwind itself. Gear 58 and gear 60 are in a spaced apart relationship by means of a spacer 72 which is affixed or cemented between the two gears and also acts as a journal about the shaft 54. The rearward face of the spacer 72 acts as an abutment when in contact with the clutch element 63 and it thus forces the said element 63 with its extending arms 64 and its fingers or projections 65 into engagement within the holes 66 of the plate 68.

The gear 58 is in intermeshing relationship with the pinion gear 74 mounted on a common shaft 38 with gear 76. Gear 76 is again in intermeshing gear relationship with the pinion 78 mounted on a common shaft 36 with the gear 80 which in turn, contacts the pinion 82 mounted on the escapement wheel shaft 34. The escapement gear 84 is held in abuting relationship with the pinion 82 by means of a sleeve 86 journaled about the shaft 34.

As previously indicated, the escapement gear 84 is controlled by means of the swinging of the pendulum in the sub-assembly 22 which will be described hereinafter.

The actual operation of the minute and hour hands is controlled by means of the gear 60 urged by the power of the spring within the housing 50 through the spacer 72 journaled about the shaft 54. Gear 60 is in intermeshing relationship with an intermediate gear 88 journaled about the shaft 40 and held in position by means of a sleeve 90.

The function of this particular intermediate gear 88 is to reverse the direction of the movement of the spring motor. Under some conditions, it can be completely eliminated provided that the spring motor be wound up in a counterclockwise direction so that when it unwinds in a counterclockwise direction, the intermediate gear 88 can be omitted and a direct connection with gear 92 and gear 60 can be made, thereby decreasing the cost of the construction and providing a less complicated structure to illustrate the fundamentals underlying clockwork mechanisms.

Gear 92 rides freely on the minute hand shaft 104, one end of which is freely journaled within the back plate supporting bridge 16, while the other end acting as a spindle to support the hour hand sleeve shaft 102, extends beyond the same. A pinion gear 94 which is fixed to the said minute hand shaft 104 is in frictionable abutment with the driving gear 92. A slight collar (not shown) on the shaft separates the pinion gear 94 from the hour hand gear 100 and its sleeve shaft 102 which is integrally connected with said gear 100 and extends beyond the face 30 of the clock but in a spaced apart rearward relation to the end of said minute hand shaft 104. The hour hand 110 and minute hand 112 are frictionably attached to the ends of their respective shafts 102 and 104.

Intermediate the end of shaft 102 and the gear 100 integrally attached to said shaft 102 is an annular collar 101 in abutting relationship with the rear of the wall of the front plate 32. A spider spring 106 is axially mounted about the shaft 104 on the back wall or support 16, with its legs 108 bearing against the side wall of the driver gear 92. Under the urging of this spider spring 106, the driver gear 92 is in frictionable abutting engagement with the pinion gear 94, which drives the minute hand shaft 104. The slight collar (not shown) on the shaft 104 separates the gear 100 from direct contact with the minute hand pinion gear 94, but it is in abutting slippable contact with the hub of the hour hand gear 100 whose sleeve-like shaft 102 has on its intermediate portion a collar 101 abutting the rear surface of the front plate 32. Thus, all the elements mounted on the shaft 104 between the back plate 16 and front plate 32 are in abutting relationship under the influence of the spider spring 106. The conventional 1:12 reduction gear 96 and associated pinion gear 98 mounted on shaft 42 are provided and are in contacting relationship with the minute pinion gear 94 and hour gear 100, respectively.

The above clutch arrangement permits the child to move about the hands on the face of the clock without injury to the gear trains because of the slippage between the various elements.

The pendulum support and escapement assembly 22 consists of a U-shaped block 114 between whose laterally extending arms 116 are positioned the ends of the shaft 118 about which in contacting relationship is mounted a pallet escapement ratchet 120 in meshing engagement with the escapement wheel teeth 122 of the escapement gear 84. Mounted within the flat portion of the U-shaped member 114 is an insert or hook 124 from which depends the pendulum 126. Depending from the shaft 118 is a pendulum rod 128 having at its end a laterally extending arm 130 which protrudes through a slot 132 made within the body of the pendulum 126. The movement of the pendulum controls the escapement operation by means of the dependent arm and hook arrangement 128 and 130.

The lower portion of the pendulum has a longitudinal slot 134 formed therein and extending approximately one-half of the length of the said pendulum 126. Along the marginal portions of the said longitudinal slot are a number of transverse parallel lines or markings 136 to facilitate the positioning of the pendulum weight 138. The pendulum weight 138 is provided with a vertical slot 140 therein having a width somewhat smaller than the overall width of the exterior of the pendulum lower portion in which the longitudinal slot 134 is located. Since

the pendulum is formed from a plastic material, there is a certain amount of resiliency and the pendulum weight **138** can be retained in the desired position by frictional engagement with the sides of the pendulum. Thus, the necessary vertical adjustment of the weight of the pendulum and its relationship to its effect on accuracy of time keeping can very readily be observed by and taught to the child by actual demonstration.

Though the illustrations show a preferred embodiment having projections or shaft-like pins **34, 36, 38, 40,** and **42** extending transversely and as being uniformly attached to the back plate **16** by means of an insert **150** reinforced by a spacer bearing block **152,** nevertheless, it is obvious that the properly dimensioned hole can be provided directly within the back plate or main bridge **16** to receive therein the properly dimensioned shaft. Various other modifications can also be substituted for those shown in the preferred embodiment. Likewise, though the preferred material of construction employed in the manufacture of this clock toy is a rigid transparent type of plastic material such as the methacrylates sold under various trade names as Plexiglas or Lucite, nevertheless, other plastic materials such as the polyethylene plastics and possessing the desired characteristics can be equally employed.

A novel feature of my invention is to provide a toy clock mechanism that can be very readily taken apart and reassembled by a child. In order to facilitate the proper placement and to study the relationship between the various geared trains, each of the shafts upon which the gears are mounted are of different diameters and so spaced about the main bridge plate that the proper intermeshing of gear teeth and of the gear relationship is established. In order to facilitate the proper positioning of the gears and pinion gears, I may even employ a tapered shaft which will only permit the insertion of a gear having a complementary taper in its bore. In addition to providing means for the proper installation of the various gear drives, I also provide in combination with this toy a spring motor drive that automatically disengages the spring to an unflexed condition when an attempt is made to remove it from the clockwork mechanism. As a further aid to the child in reassembly of this mechanism, the gears and their corresponding shafts attached to the back plate can be colored similarly so that the child will associate color relationships as well as mechanical relationships.

While various changes may be made in the detailed construction, it should be understood that all such changes and modifications shall be considered to be within the spirit and scope of the present invention as defined in the appended claims.

I claim:

1. A toy clock adapted to be readily assembled and disassembled by a child comprising, in combination, a clockwork gear train, said gear train including a plurality of gears, and means for supporting said gear train so that said gear train may be readily disassembled including a supporting member having a plurality of shafts, each of said shafts being attached at one end to said supporting member, each of said shafts having a different diameter, each of said gears being adapted to be supported on one of said shafts for rotating movement thereon, each of said gears including a hollow bearing, the bearing of each gear being proportioned to fit the shaft which that gear is adapted to be supported on for rotating movement, whereby the gears and shafts adapted to one another may be assembled in only one manner, said shafts being so positioned with relation to one another that said gears are supported in their proper position to function in said clockwork gear train.

2. A toy clock adapted to be readily assembled and disassembled by a child comprising, in combination, a clockwork gear train, said gear train including a plurality of gears, and means for supporting said gear train so

that said gear train may be readily disassembled including a supporting member having a plurality of shafts, each of said shafts being attached at one end to said supporting member, each of said shafts having a different diameter, each of said gears being adapted to be supported on one of said shafts for rotating movement thereon, each of said gears including a hollow bearing, the bearing of each gear being proportioned to fit the shaft which that gear is adapted to be supported on for rotating movement, whereby the gears and shafts adapted to one another may be assembled in only one manner, said shafts being of different colors, each of said gears being the same color as the shaft which that gear is adapted to be supported on, whereby reassembly after disassembly of the toy is facilitated by matching gears with shafts of the same color, said shafts being so positioned with relation to one another that said gears are supported in their proper position to function in said clockwork gear train.

3. A toy clock adapted to be readily assembled and disassembled by a child comprising, in combination, a multicolored clockwork gear train, said gear train including a plurality of gears, and means supporting said gear train so that said gear train may be readily disassembled, a clock face supported adjacent said gear train by said support means and readily disengageable therefrom, a minute hand and an hour hand connected to said gear train so as to be readily disengageable therefrom and positioned adjacent said clock face so as to indicate the time of day, said support means including a supporting member having a plurality of shafts, each of said shafts being attached at one end to said supporting member, each of said shafts having a different diameter, each of said gears being adapted to be supported on one of said shafts for rotating movement thereon, each of said gears including a hollow bearing, the bearing of each gear being proportioned to fit the shaft which that gear is adapted to be supported on for rotating movement, whereby the gears and shafts adapted to one another may be assembled in only one manner, said shafts being of different colors, each of said gears being the same color as the shaft which that gear is adapted to be supported on, whereby reassembly after disassembly of the toy is facilitated by matching gears with shafts of the same color, said shafts being so positioned with relation to one another that said gears are supported in their proper position to function in said clockwork gear train, said clock face including means serving to expose portions of said multicolored gear train.

4. A toy clock adapted to be readily assembled and disassembled by a child comprising, in combination, a clockwork gear train including a plurality of gears, means supporting said gear train so that said gear train may be readily disassembled including a supporting member having a plurality of shafts, each of said shafts being attached at one end to said supporting member, each of said shafts having a different diameter, each of said gears being adapted to be supported on one of said shafts for rotating movement thereon, each of said gears including a hollow bearing, the bearing of each gear being proportioned to fit the shaft which that gear is adapted to be supported on for rotating movement, whereby the gears and shafts adapted to one another may be assembled in only one manner, said shafts being so positioned with relation to one another that said gears are supported in their proper position to function in said clockwork gear train, a drive shaft rotatably supported by said support means and axially movable incident to the disassembly of said toy, a drive spring, said spring being attached to said drive shaft, a housing which is rotatably mounted on said drive shaft and which encloses said spring, said spring also being attached to said housing, said housing being connected in driving engagement with said clockwork gear train, a one-way clutch between said support means and said drive shaft for allowing said shaft to

rotate only in the direction which will stress said spring to drive said clockwork gear train, said clutch including a pair of engageable members, one of said members having at least one resilient finger and the other of said members having at least one aperture positioned so as to receive said finger, said clutch being disengaged when said drive shaft is axially moved incident to disassembling said toy so that said drive shaft is free to rotate under the force of said spring thereby allowing said spring to untension.

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