Nov. 20, 1962 L. S. FEINN 3,064,971

ROPE SKIPPING DEVICE

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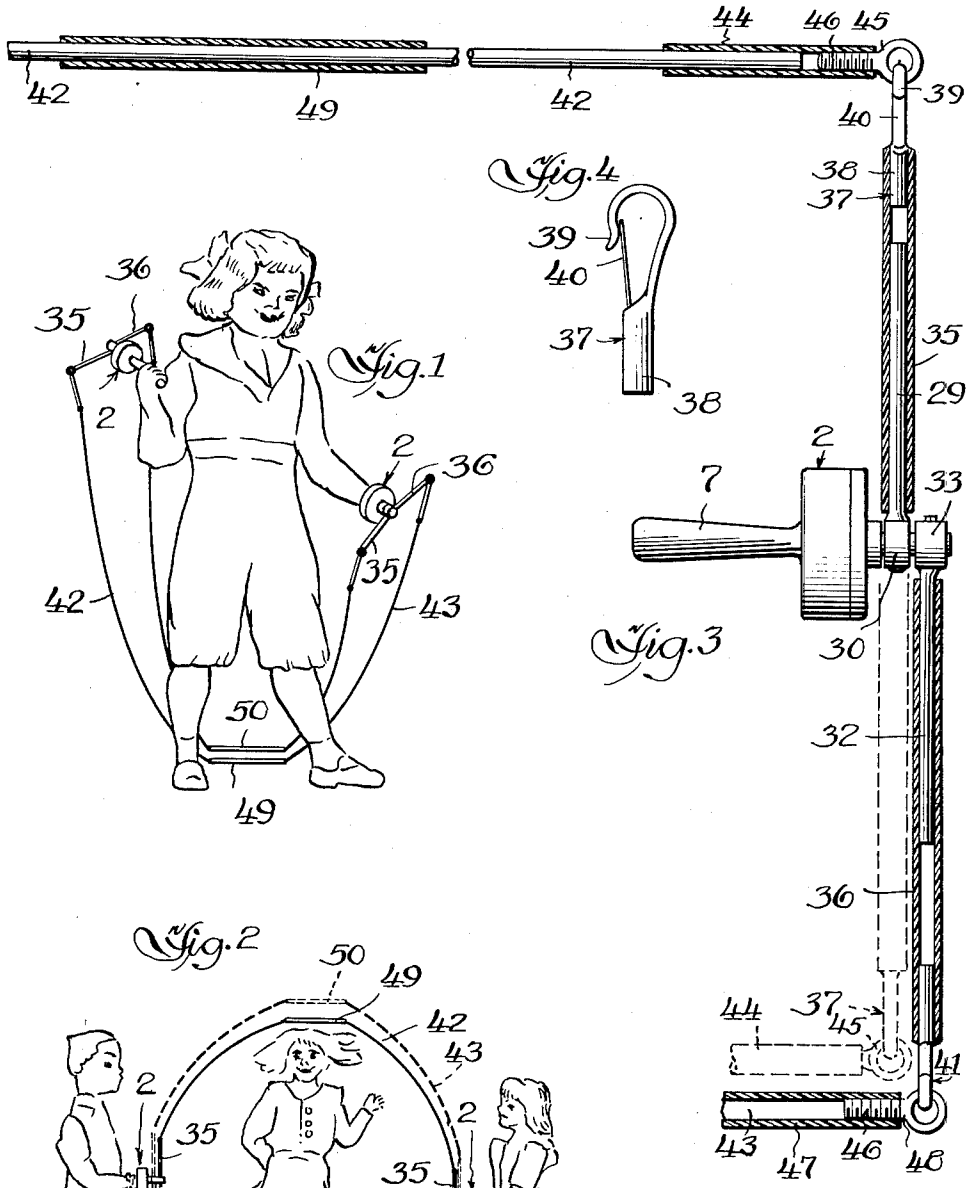


Fig. 4

Fig. 1

Fig. 3

Fig. 2

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ROPE SKIPPING DEVICE

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Fig. 6

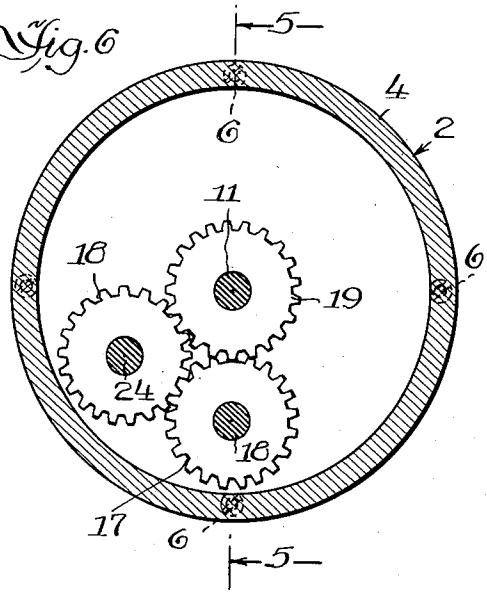


Fig. 5

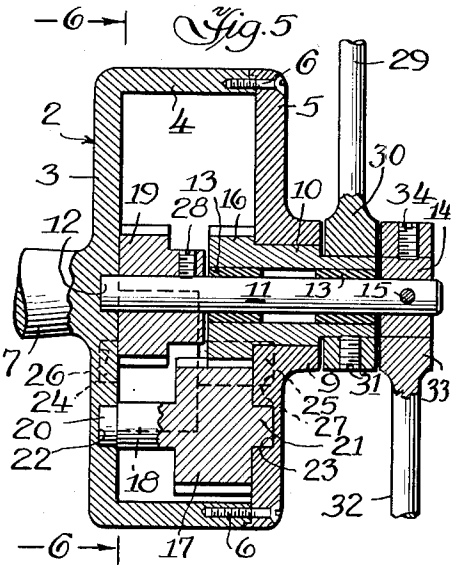


Fig. 8

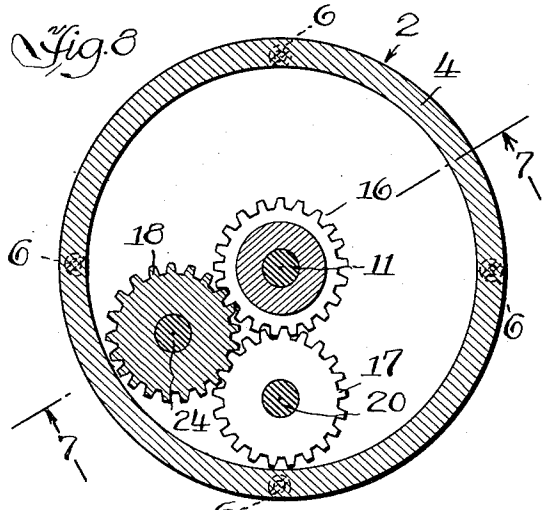


Fig. 7

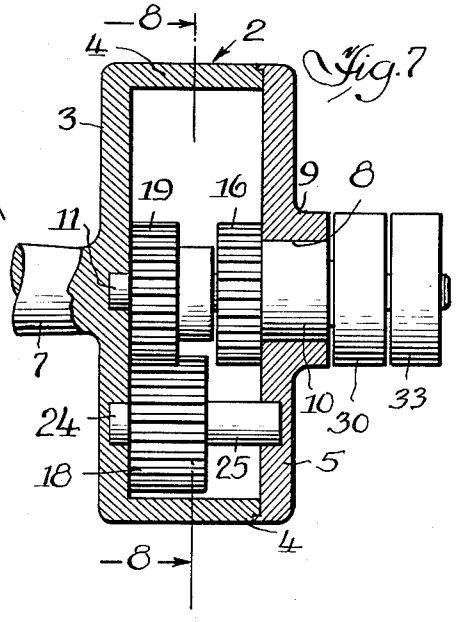
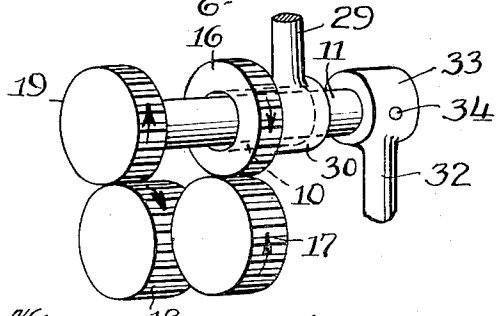


Fig. 9



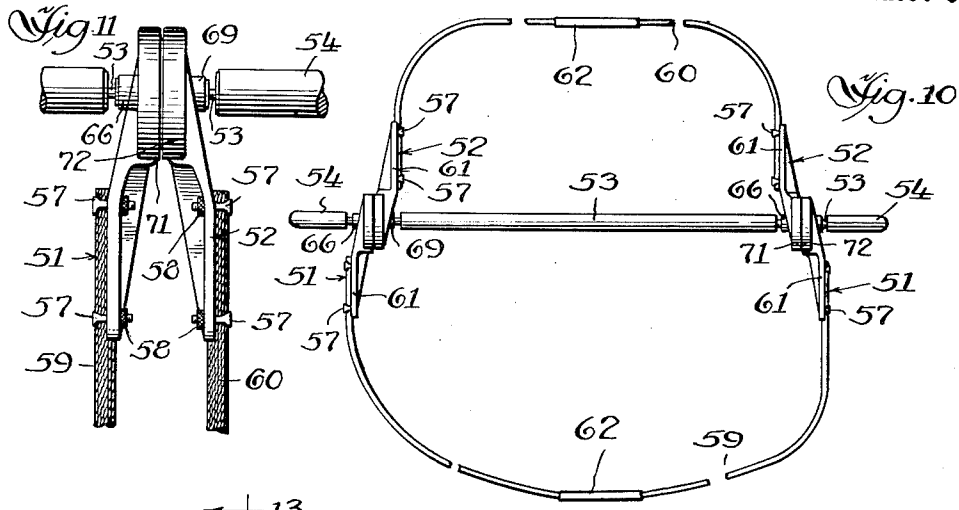
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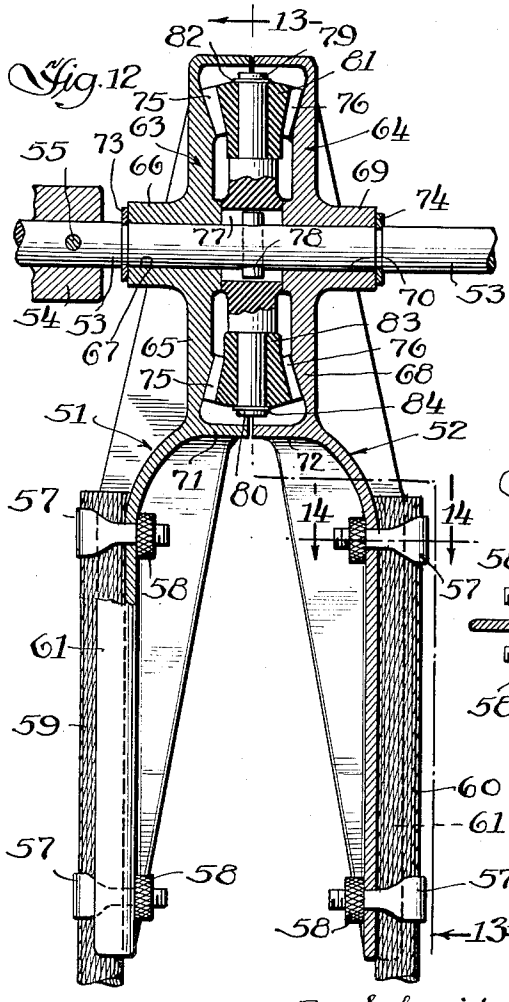
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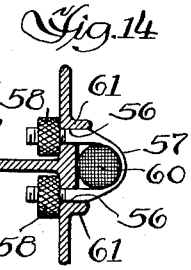
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ROPE SKIPPING DEVICE

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3,064,971

ROPE SKIPPING DEVICE

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19 Claims. (Cl. 272—75)

This invention relates to a rope skipping device, and is particularly concerned with means for simultaneously turning a pair of ropes in opposite directions.

Skipping rope is an extremely old pastime enjoyed by children, particularly girls, as a game, and indulged in by athletes, such as boxers, for example, as a means of exercising the leg muscles. Heretofore the game or exercise has been confined to a single rope turned either by the person skipping it, or turned by two people standing apart while a third person skips the rope. The addition of a second rope turning in opposite direction requires greater dexterity in skipping rope and thereby adds excitement and enjoyment to the game, and also increases the value of the practice as an exercising medium.

In accordance with the invention, the ends of a pair of ropes are secured to individual rotatable throwing arms. The axis may be provided by a single continuous shaft having a pair of throwing arms rotatably mounted adjacent each end, by two separate shafts adapted to be held in axial alignment as they are turned to rotate shafts mounted thereon, or by individual shafts each having a single throwing arm mounted thereon. Each pair of throwing arms is interconnected by gearing that causes the arms of each pair to rotate in opposite directions when the shaft or shafts are turned through a closed, substantially circular path.

One of the ropes is slightly longer than the other so that the loop of one rope doesn't interfere with the loop of the other as the ropes are turned. Preferably the longer rope is also heavier to provide driving power for turning the lighter rope in the opposite direction. The same effect may be obtained by making one throwing arm of each pair of arms heavier than the other arm, or by adding a heavier stiffening member to one of the ropes.

Although the ropes may be of any suitable material, it is preferred to use ropes of plastic material to provide maximum durability. It is preferred to stiffen the ropes, particularly the portions adjacent the throwing arms, to assist in the initial thrust with which the rotary movement of the arms is generally started, and also to prevent interference between the ropes as they pass each other. The rope skipping device may be started by merely moving the shaft in a closed substantially circular path, but preferably added impetus is provided at the start of the motion by a forward thrust against the throwing arms to which the heavier rope is attached. The rope may be stiffened by having a wire embedded therein. The ropes preferably are encased in plastic tubing at the center of their length to keep the center portions straight.

In the embodiment of the invention in which a separate shaft is provided for each rope end it is preferred to detachably connect the ropes to the throwing arms. In this embodiment the throwing arms are preferably in the form of vinyl resin or polyethylene tubing that extends perpendicularly to the shafts to provide a straight section adjacent each housing in which two concentric shafts are mounted. One end of each throwing arm is secured to a collar on the shaft, and a snap fastener is secured to the other end of the rod so that the ropes may be quickly and easily secured to or removed from the throwing arms.

The detachable connections for the ropes are preferred in the structure having a separate shaft for each rope end because the detachable connections permit interchanging long and short ropes. The same housings may be used when one person turns the ropes and skips them, or when two people turn the ropes while a third person skips. When the device is used by one person, the handles are held in inwardly extending position and the shorter rope is closest to the housing. The loop of the longer rope extends outside the loop of the shorter rope when the ropes are turned. When two people turn the ropes, one stands at each end, and the handles extend outwardly. The connections to the shafts are reversible, so that the loop of the shorter rope may be disposed within the loop of the longer rope regardless of the direction of the handles.

In this embodiment the shafts project coaxially from each housing to produce a more compact structure. The coaxial arrangement of shafts is attained by making one shaft tubular and having the other shaft extend therethrough. In order to make the rope connections interchangeable relative to the shafts so that they may be reversed, the shaft of smaller diameter has a collar pinned to it to provide an effective shaft diameter equal to the diameter of the tubular shaft through which it projects.

The structure by means of which the above-mentioned and other advantages of the invention are attained will be specifically described in the following specification, taken in conjunction with the accompanying drawings, showing two preferred illustrative embodiments of the invention, in which:

FIGURE 1 is an illustrative view showing one embodiment of the rope skipping device as it is held by one person;

FIG. 2 is an illustrative view showing how the rope skipping device of FIG. 1 is used by three persons;

FIG. 3 is a fragmentary cross sectional view showing the structure of the ropes and connecting members, the housing being shown in elevation;

FIG. 4 is a side elevational view of a snap fastener to which one end of a rope is adapted to be secured;

FIG. 5 is a fragmentary cross sectional view through the housing taken along the line 5—5 of FIG. 6;

FIG. 6 is a fragmentary elevational view, taken on the plane of the line 6—6 of FIG. 5 and showing the housing in section;

FIG. 7 is a fragmentary cross sectional view, taken along the line 7—7 of FIG. 8;

FIG. 8 is a fragmentary cross sectional view, taken along the line 8—8 of FIG. 7;

FIG. 9 is a diagrammatic view showing the gears interconnecting the shafts;

FIG. 10 is a front elevational view of another embodiment of the invention, showing the rope as it appears while it is being turned;

FIG. 11 is a fragmentary front elevational view of the throwing arms of FIG. 10;

FIG. 12 is an enlarged fragmentary vertical sectional view through the throwing arms and gearing at one end of the device of FIG. 10;

FIG. 13 is a vertical sectional view, taken along the line 13—13 of FIG. 12; and

FIG. 14 is a cross sectional view, taken along the line 14—14 of FIG. 12.

Referring to FIGS. 1 to 9 of the drawings, the device comprises a housing 2 having a back wall 3, a cylindrical wall 4 projecting forwardly therefrom, and a front closure 5 secured to the front edge of wall 4 by a plurality of circumferentially spaced screws 6 or other suitable fastening means. The housing is preferably molded of plastic material, but may be made of metal or any other suitable material. It is obvious that the housing may be of any desired shape. A centrally disposed handle 7 projects perpendicularly rearwardly from back wall 3. The handle

is shown as being integral, but may be formed as a separate member and secured to wall 3. Closure 5 is provided with a centrally disposed opening 8 surrounded by a boss 9.

A tubular shaft 10, which may be made of any suitable material, but is preferably made of plastic material, extends through opening 8 and projects forwardly beyond boss 9. A shaft 11, of the same material as shaft 10, has its back end rotatably mounted in a recess 12 in back wall 3 and extends through tubular shaft 10. The front end of shaft 11 extends forwardly of the front end of shaft 10. Spaced bushings 13 in the bore of shaft 10 maintain shaft 11 in coaxial relationship thereto and permit relative rotational movement between the two shafts. A collar 14 is pinned to shaft 11 forwardly of the end of shaft 10, as indicated at 15. Collar 14 is spaced slightly from the front end of shaft 10 so that it does not interfere with the relative rotation between shafts 10 and 11. The outer diameter of collar 14 is equal to the outer diameter of the portion of shaft 10 that projects forwardly of boss 9.

Four gears 16, 17, 18 and 19, interconnected to shafts 10 and 11, are enclosed within housing 2. Gear 16, positioned adjacent the rear surface of closure 5, is shown as being integral with shaft 10, but may be made as a separate unit and fixed thereto in any suitable manner, as, for example, by a pin or set screw (not shown). Gear 17 has integral studs 20 and 21 projecting from its opposite flat surfaces. Stud 20 is rotatably mounted in a recess 22 in back wall 3, and stud 21 is rotatably mounted in a recess 23 in closure 5. Gear 18 has integral studs 24 and 25 rotatably mounted in recesses 26 and 27 in back wall 3 and closure 5, respectively. Gear 19 is fixed to shaft 11 by a set screw 28 or other suitable securing means. Gear 17 is juxtaposed against the rear surface of closure 5, and gears 18 and 19 are both juxtaposed against the front surface of back wall 3.

Gear 17 meshes with gears 16 and 18, and gear 18 meshes with gears 17 and 19. Therefore, if gear 16 is rotated, it rotates gear 17 in the opposite direction, gear 17 rotates gear 18 in the same direction as the rotation of gear 16, and gear 18 rotates gear 19 in the opposite direction to the rotation of gear 16. Since gear 16 is rigid with shaft 10 and gear 19 is rigid with shaft 11, rotation of shaft 10 in either direction will cause rotation of shaft 11 in the opposite direction.

A throwing arm 29 provided with an integral ring 30 at one end is rigidly secured to shaft 10 by a set screw 31 which extends through ring 30 to engage shaft 10. A similar throwing arm 32 having an integral ring 33 at one end is secured to collar 14 by a set screw 34. The throwing arms may be metal, but preferably are of suitable plastic material. The openings of rings 30 and 33 are of the same size, and arms 29 and 32 may be interchanged. A plastic tube 35, preferably vinyl resin or polyethylene, is slid on arm 29, and a similar tube 36 is slid on arm 32, as shown in FIG. 3, to add rigidity to the throwing arms and to facilitate attachment of the rope to the throwing arms. Tubes 35 and 36 are each cemented to arms 29 and 32, respectively, with one end projecting beyond the outer end of the arm.

A snap hook 37 is secured in the outer end of each tube 35, either by cement, or by interengaging screw threads. Snap hooks 37 each comprise a stem portion 38, a hook 39 and a resilient spring 40. Spring 40 is fixed at one end to stem portion 38 and its opposite end is held against the inner surface of hook 39 in its own resilience. A snap hook 41 that is a duplicate of hook 37 is mounted in each plastic tube 36. As shown in FIG. 3, the outer end of hook 41 is spaced farther from shaft 11 than the outer end of hook 37 to provide clearance between the ends of rope 42, detachably secured to hooks 37, and the ends of rope 43, detachably secured to hooks 41.

Ropes 32 and 43 are substantially duplicates, except that rope 43 may be a little heavier than rope 42. Both ropes are preferably made of a suitable plastic, although ordinary rope may be used. The rope may be reinforced by wire if desired. The ends of rope 42 are cemented in a plastic tube 44, and an eyebolt 45 is secured in the outer end of each plastic tube 44. The eyebolts and tubes may be provided with interengaging threads 46, or the eyebolts may be cemented in the ends of the tubes. Eyebolts 45 are detachably engaged with hooks 37. Rope 43 is secured in the same manner to plastic tubes 47 having eyebolts 48 secured in their outer ends. Plastic tubes 49 and 50 may be cemented to the central portion of ropes 42 and 43, respectively, to provide a straight portion. The extra weight of rope 43 may be provided by using heavier plastic tubes on it than on rope 42, although the rope itself may be made thicker, if desired.

As shown in FIG. 2, rope 43 is slightly longer than rope 42. This gives rope 43 some additional weight. The extra weight is desirable because when the ropes are turned, each rope and the throwing arm to which it is attached exerts a centrifugal force tending to maintain the rotation of the ropes and throwing arms. If these forces were equal, the user would have difficulty getting the ropes turning properly. By making the longer rope heavier, arms 32 are rotated in one direction as soon as the handles are swung in their normal closed path, and the gearing causes the lighter assembly, comprising arms 29 and the rope attached thereto, to rotate in the opposite direction.

When two players are turning rope for a third, as shown in FIG. 2, it is necessary for the longer rope to be positioned on the arms 36 closest to the two players holding the ropes, so that the outer loop will be larger, and the two loops will not interfere with each other as the rope is turned. When the person skipping rope turns it, as shown in FIG. 1, the handles are reversed, and the longer rope 43 is farther from the rope skipper than the shorter rope. As shown in FIG. 5, the arms 29 and 32 may be secured to either shaft 10 or 11 so that they may be interchangeably mounted to adapt the device to operation by either the rope skipper or by two other persons.

In the embodiment of the invention illustrated in FIGS. 10 to 14 of the drawings, two pairs of throwing arms 51 and 52 are rotatably mounted on a shaft 53. Preferably a single continuous shaft is used to insure uniform rotary motion for both ends of each rope. Each pair of throwing arms may be rotatably mounted on a separate shaft, but such structure is not preferred because of the difficulty of turning two separate shafts with a substantially uniform rotary motion. When the rotary motion at both ends of the device is identical, both ropes will turn uniformly in opposite directions. A handle 54 is fixed by a pin 55 to each end of shaft 53 beyond each pair of throwing arms. In this embodiment it is preferred to have both handles on the outside of the throwing arms regardless of whether the ropes are turned by the rope skipper or by two other people.

Each pair of throwing arms is the same, and therefore only one pair will be described. Arm 52 is a duplicate of arm 51 except that it is reversed. Each arm is preferably molded of suitable plastic material, but can be cast of metal if desired. The lower portion of each arm extends downwardly and is provided with a plurality of pairs of transversely aligned apertures 56 (FIG. 14) adapted to receive the ends of a U-shaped clamp 57 secured in place by nuts 58. The clamps on arm 51 hold one end of a rope 59 that is slightly longer than the rope 60, one end of which is held by the clamps on arm 52. Integral ribs 61 extend longitudinally of each arm adjacent apertures 56 to reinforce the arm and also to help align ropes 59 and 60. Each rope is preferably provided with a plastic tube 62 enclosing its center portion to insure having a straight section for skipping.

Each throwing arm has a housing section 63 or 64 integral therewith. Housing sections 63 and 64 are complementary. Section 63 comprises a back wall 65

provided with a hub 66 having a bore 67 for receiving axle 53 which extends therethrough. Section 64 similarly comprises a back wall 68 and a hub 69 having a bore 70 for receiving axle 53. Section 63 has a peripheral rim 71 adapted to cooperate with a similar peripheral rim 72 on section 64 to form a gear housing. Sections 63 and 64 are held adjacent each other on shaft 53 by retaining rings 73 and 74, respectively. The inner faces of sections 63 and 64 are provided with ring gears 75 and 76, respectively. The ring gears are the same size and are preferably molded integrally with sections 63 and 64, but may be made separately and secured thereto in any suitable manner.

A hub 77, mounted on shaft 53 between sections 63 and 64, is secured against rotation relative to shaft 53 by a pin 78. Shafts 79 and 80 extend from dimetrically opposite edges of hub 77. A pinion 81 meshing with ring gears 75 and 76 is rotatably mounted on shaft 79 and is retained thereon by a retaining ring 82. A similar pinion 83, also meshing with ring gears 75 and 76, is rotatably mounted on shaft 80 and is secured in place by a retaining ring 84.

In using the device, the operator holds one handle 54 in each hand with shaft 53 forwardly of his body. The shaft is swung forwardly with a rotary motion and throwing arms 51 are simultaneously pushed forward by pushing the operator's thumbs against them to start rotation of arms 51 about shaft 53. The rotary motion of shaft 53 is continued in a closed path that is approximately circular. This continuous rotary motion of shaft 53 is sufficient to cause arms 51 to act through ring gear 75, pinions 81 and 83, and ring gear 76 to rotate throwing arm 52 at the same speed as arms 51, but in the opposite direction. Since the assembly of rope 59 and arms 51 is heavier than the assembly of rope 60 and arms 52, rotation of rope 60 will continue as long as arms 51 are turned in their circular path. The additional length of rope 59 enables both ropes to continue to rotate without interference from each other. The tubular casing 62 at the center of each rope also aids in keeping the ropes from interfering with each other.

Although I have described two preferred embodiments of the invention in considerable detail, it will be understood that the description thereof is intended to be illustrative, rather than restrictive, as many details of structure may be modified or changed, without departing from the spirit or scope of the invention. Accordingly, I do not desire to be restricted to the exact construction described.

I claim:

1. In a device for skipping rope, two pairs of rotatably mounted throwing arms, one arm of each pair of arms being mechanically interengaged with the other arm of said pair for rotation in opposite directions about a common axis, a rope having its ends secured to corresponding arms of each pair of arms, and a second rope having its ends secured to the other arms of said pairs of arms, whereby said ropes may be simultaneously turned in opposite directions.

2. In a device for skipping rope, two pairs of rotatably mounted throwing arms, gearing interposed between one arm of each pair of arms and the other arm of said pair to cause one arm of each pair to rotate in one direction when the other arm of said pair is rotated in the opposite direction, each pair of arms having a common axis of rotation, a rope having its ends secured to corresponding arms of each pair of arms, and a second rope having its ends secured to the other arms of said pairs of arms, whereby said ropes may be simultaneously turned in opposite directions.

3. A device for skipping rope comprising a shaft, two pairs of ring gears rotatably mounted on said shaft, each ring gear facing the other ring gear of its pair and being spaced therefrom, a pinion rotatably mounted between the ring gears of each pair, a throwing arm rigidly connected to each of said ring gears and extending therefrom at an angle to the axis of said shaft, said pinions being operable when arms connected to one ring gear of each pair are rotated in one direction to rotate said other arms in the opposite direction, a rope having its ends secured to arms extending from corresponding ring gears of each pair, and a second rope having its ends secured to arms extending from said other ring gears, whereby said ropes may be simultaneously turned in opposite directions.

4. In a device for skipping rope, a pair of separate ropes, two pairs of arms, the arms of each of said pairs of arms being rotatable about a common axis, the ends of one of said ropes being each secured to one arm of one of each of said pairs of arms, the corresponding ends of said other rope being each secured to the other arm of each of said pairs of arms, and means associated with each of said arms for simultaneously turning one arm of each pair of arms in one direction, and the other arm of each pair of arms in the opposite direction.

5. In a device for skipping rope, a pair of separate ropes, two pairs of rotatably mounted arms, each pair of arms holding corresponding ends of said ropes, and gearing interengaging one arm of each of said pairs of arms with the other arm of said pair for simultaneously rotating the arms of each of said pairs of arms in opposite directions about a common axis when one arm of each of said pairs of arms is rotated.

6. A device for skipping rope, comprising two pairs of rotatably mounted throwing arms, the arms of each pair of arms being mechanically interengaged for rotation in opposite directions, a rope having its ends secured to corresponding arms of each pair of arms, and a second rope having its ends secured to the other arms of said pairs of arms, one of said ropes and the arms connected thereto having a total length greater than the total length of said other rope and the arms connected thereto, said first mentioned rope and the arms connected thereto also having a greater weight than the weight of said second mentioned rope and the arms connected thereto, whereby rotation of said first mentioned arms turns the rope connected thereto in one direction and rotates said second mentioned arms and the rope connected thereto in the opposite direction.

7. In a rope skipping device, a first shaft, a pair of shafts perpendicular to said first shaft, a pinion mounted on each of said second shafts, said pinions each being rotatable about an axis coincident with the axis of its shaft, two pairs of ring gears rotatably mounted on said first shaft, each of said pairs of ring gears being on opposite sides of one of said pinions, each of said ring gears being in engagement with the adjacent pinion, whereby the ring gears of each pair rotate in opposite directions when one ring gear of said pair of ring gears is rotated, a throwing arm extending from each of said ring gears, and a pair of ropes, each rope having its ends attached to corresponding arms extending from two of said ring gears, whereby said ropes may be simultaneously turned in opposite directions.

8. In a device for skipping rope, a pair of shafts, a pair of arms rotatably mounted on each of said shafts, a pair of ropes, one of said ropes having its ends secured to corresponding arms of each of said pairs of arms, said other rope having its ends secured to the other arm of each of said pairs of arms, and gearing interconnecting one arm of each pair of arms with the other arm of said pair, whereby the arms of each pair of arms are rotatable in opposite directions about a common axis to turn said ropes in opposite directions.

9. In a device for skipping rope, a pair of shafts rotatably mounted on a common axis, means for rotating said shafts in opposite directions simultaneously, an arm rigidly secured to an end of each of said shafts, a pair of ropes, each of said ropes having one end secured to one of said arms, and means for holding the other end of

each of said ropes, whereby said ropes may be simultaneously turned in opposite directions.

10. In a device for skipping rope, a housing, a pair of rotatable shafts projecting from said housing, said shafts having a common axis, means for simultaneously rotating said shafts in opposite directions about said common axis, an arm rigidly secured at right angles to each of said shafts, said arms being spaced to permit simultaneous rotation thereof, and means on each of said arms for securing one end of a rope thereto.

11. In a device for skipping rope, a housing, a rotatable shaft projecting from said housing, an arm rigidly secured to said shaft to rotate therewith, a second shaft parallel to said first shaft and rotatable about the axis of said first shaft, said second shaft projecting beyond the end of said first shaft, an arm rigidly secured to said second shaft beyond the end of said first shaft, means for simultaneously rotating said shafts in opposite directions, and means on each of said arms for securing one end of a rope thereto.

12. In a device for skipping rope, a pair of ropes of different lengths, a first pair of rotatable shafts having a common axis, a second pair of rotatable shafts having a common axis, each of said ropes having its ends operatively connected to corresponding shafts of said pairs of shafts, and means for sumultaneously rotating the shafts of each pair of shafts in opposite directions to simultaneously turn said ropes in opposite directions.

13. A device for skipping rope comprising a first pair of rotatable shafts having a common axis, a second pair of rotatable shafts having a common axis, a pair of ropes, each of said shafts having one end of one of said ropes operatively connected thereto, a gear fixed to each of said shafts, and each pair of shafts having associated therewith a pair of intermediate gears each meshed to one of said first gears and to each other, whereby rotation of one of said shafts of each of said pairs of shafts causes the other shafts to rotate in the opposite direction to simultaneously turn both of said ropes in opposite directions.

14. A rope skipping device comprising a housing, a pair of rotatable shafts projecting through one wall of said housing along a common axis, gearing enclosed in said housing, said gearing being interengaged with said shafts in such manner that rotation of one of said shafts in either direction will rotate said other shaft in the opposite direction, and means for operatively connecting one end of a skipping rope to each of said shafts outside of said housing.

15. A rope skipping device comprising a pair of separate housings, a pair of concentric rotatable shafts projecting through one wall of each of said housings, and gearing enclosed in each of said housings, the gearing in each housing being interconnected to the shafts projecting therefrom in such manner that rotation of one of said shafts in either direction will rotate the adjacent shaft in the opposite direction, a pair of skipping ropes, each of said ropes having its opposite ends operatively connected to shafts projecting from different housings, said ropes being of different lengths, whereby they may be turned in opposite directions by the oppositely directed rotation of the shafts projecting from each of the housings.

16. A rope skipping device comprising a housing, a tubular shaft projecting through one wall of said housing, a second shaft projecting through said tubular shaft, means for operatively connecting one end of a skipping rope to each of said shafts outside of said housing, and gearing enclosed in said housing, said gearing being interengaged with said shafts in such manner that rotation of one of said shafts in either direction will rotate said other shaft in the opposite direction.

17. In a device for skipping rope, a pair of housings, a pair of concentric shafts projecting from one wall of each of said housings, a plurality of interconnected gears in each housing for rotating the shafts of each pair of shafts in opposite directions, a pair of arms interchangeably securable to said shafts, a pair of ropes of different lengths, corresponding arms of each pair of arms being engageable with opposite ends of either rope, whereby said ropes may be simultaneously turned in opposite directions with either the longer or shorter rope positioned closer to said housings.

18. In a device for skipping rope, two pairs of arms, one arm of each pair being mechanically interengaged with the other arm of said pair, the arms of each pair being rotatably mounted for rotation in opposite directions, the axis of rotation of one arm of each pair being closely adjacent the axis of rotation of the other arm of said pair, and a pair of ropes, each rope having its ends secured to corresponding arms of each pair of arms, whereby said ropes are turned in opposite directions simultaneously as said arms are rotated.

19. In a device for skipping rope, a shaft, an arm rotatably mounted on each end of said shaft, a second arm rotatably mounted adjacent each of said first mentioned arms for rotation in a direction opposite the direction of rotation of said first mentioned arms, each of said second mentioned arms being mechanically interengaged with the adjacent first mentioned arm, a rope having its ends secured to said first mentioned arms, and a second rope having its ends secured to said second mentioned arms, whereby said ropes are turned in opposite directions simultaneously as said arms are rotated.

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