June 16, 1953 O. E. DOTSON 2,642,266

HOIST

Filed Nov. 6, 1950 2 Sheets-Sheet 1

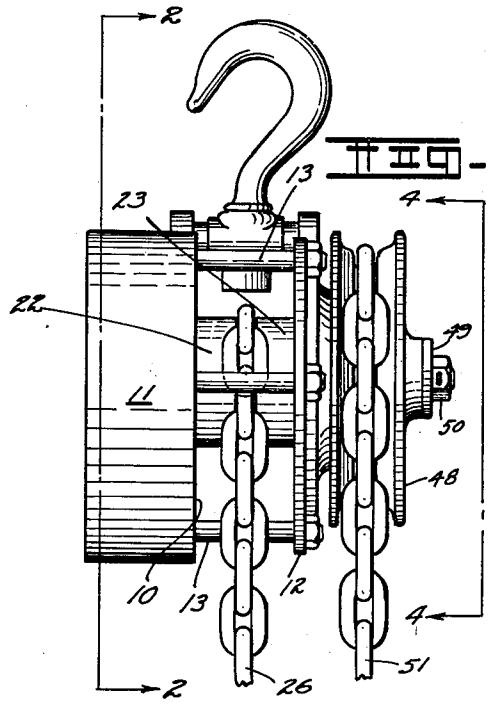


FIG. 1.

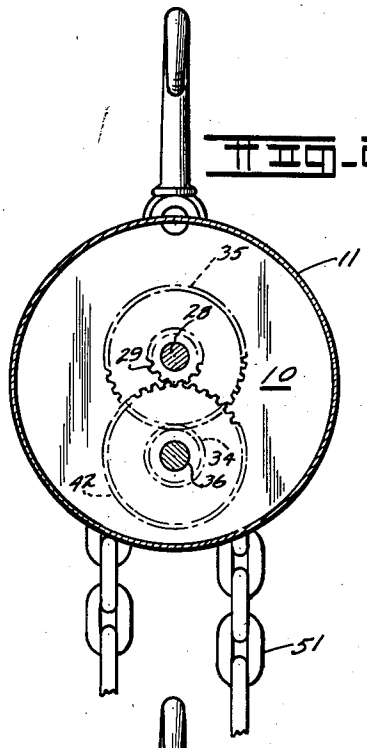


FIG. 2.

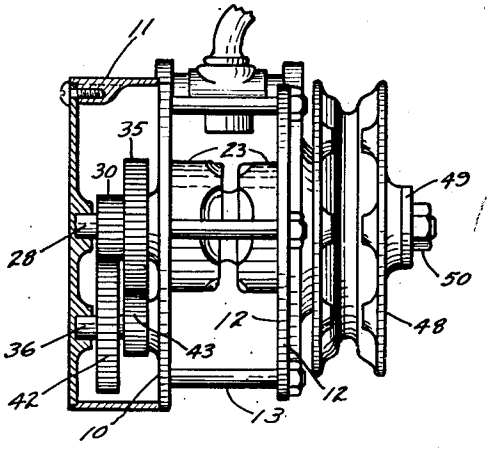


FIG. 3.

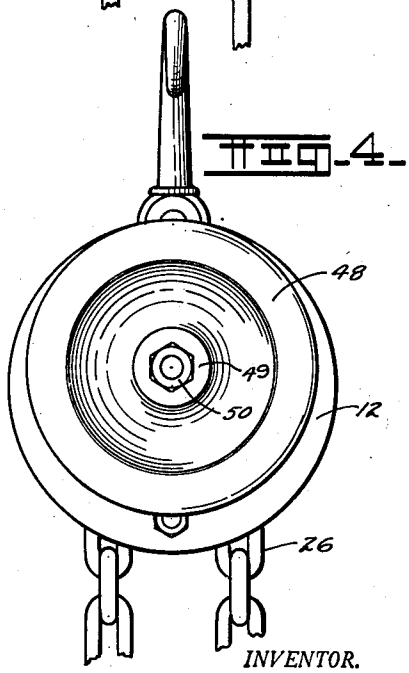


FIG. 4.

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HOIST

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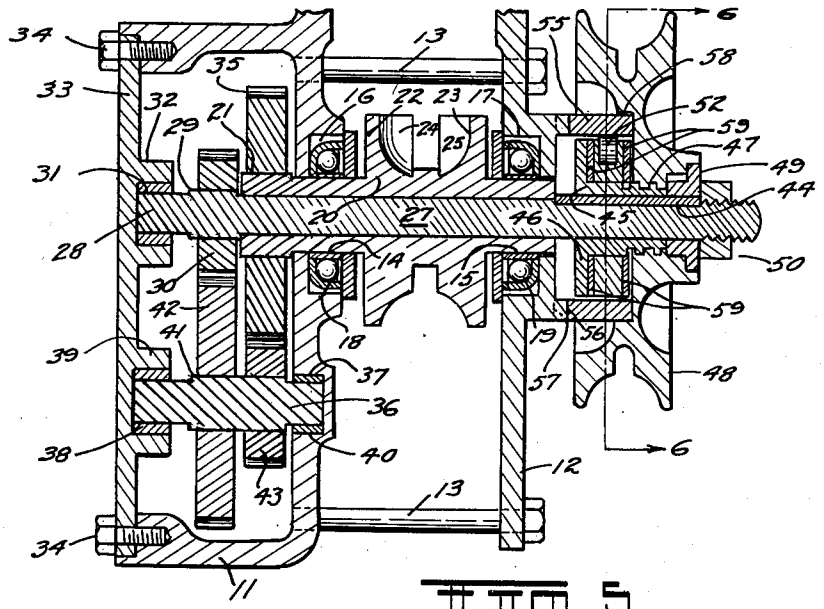


FIG. 5.

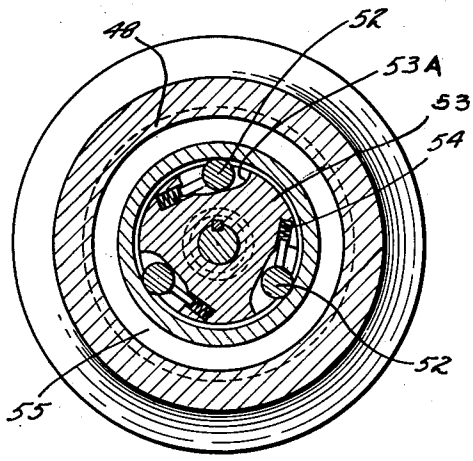


FIG. 6.

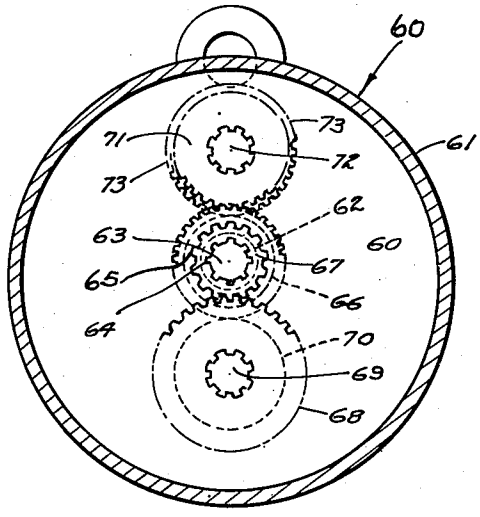


FIG. 7.

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HOIST

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Application November 6, 1950, Serial No. 194,369

1 Claim. (Cl. 254—169)

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This invention relates to a hoist and more particularly to a lightweight hoist having interchangeable gears by means of which its capacity may be altered.

The principal object of the invention is the provision of a lightweight hoist of simple construction incorporating interchangeable gears whereby the ratio between the drive and driven shafts thereof may be varied.

A further object of the invention is the provision of a hoist, the drive shaft of which is journaled in the driven shaft and the driven shaft of which is journaled in the body of the hoist.

A still further object of the invention is the provision of a hoist incorporating relatively inexpensive and easily formed pinion gears for interconnecting the drive and driven shafts of the hoist.

A still further object of the invention is the provision of a hoist wherein the plurality of gears utilized in establishing connection between the drive and driven shafts of the hoist are relatively small and are radially spaced with respect to the drive and driven shafts and splined to the same for ready removal and interchange.

The hoist disclosed herein comprises a simple and efficient lightweight device which is formed of a relatively few parts and is capable of handling relatively heavier loads than comparable hoists heretofore known in the art. The principal differences in the hoist disclosed herein as compared with those heretofore known in the art comprise the use of a plurality of relatively small, inexpensive, radially positioned gears which are splined to their respective shafts and thereby easily removed, replaced or interchanged to vary the effective capacity of the hoist and/or the speed of lift of the hoist.

The hoist incorporates a simple and efficient brake construction so that the load carried thereby may be easily controlled both by lifting and lowering stages and the entire device thereby forming an efficient tool for machine shops, repair garages or other similar locations where the use of a hoist is indicated.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being the intention to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

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The invention is illustrated in the accompanying drawing, wherein:

Figure 1 is a side elevation of the hoist.

Figure 2 is a vertical section taken on line 2—2 of Figure 1.

Figure 3 is a vertical section of the hoist shown in Figure 1 with parts broken away and parts in cross section.

Figure 4 is an end view taken on line 4—4 of Figure 1.

Figure 5 is an enlarged vertical section of the hoist.

Figure 6 is a vertical section taken on line 6—6 of Figure 5.

Figure 7 is an end view of a modified form of the hoist, the view comparing with Figure 2 and illustrating the use of an extra reducing gear set.

By referring to the drawings and Figures 1, 2, 3, 4 and 5 in particular it will be seen that the hoist comprises a body member 10 having an annular flange 11 extending outwardly from one side thereof and a secondary body member 12 spaced with respect to the body 10 on the other side thereof and secured thereto by means of a plurality of studs 13—13. Matching, horizontally aligned openings 14 and 15 are formed in the body members 10 and 11, respectively, and annular shoulders 16 and 17 are formed in the body members 10 and 12 about the openings 14 and 15 for the reception of bearing assemblies 18 and 19, respectively. A driven shaft 20 which is tubular in formation is positioned in the bearing assemblies 18 and 19 and extends through the body members 10 and 12, one end portion thereof having a spline 21 formed thereon.

The intermediate portion of the driven shaft 20 includes a pair of spaced flanges 22 and 23 having circumferentially spaced, oppositely disposed abutments 24 and 25 formed therebetween so that a chain 26 may be positioned on the driven shaft 20 and moved thereby. A drive shaft 27 is positioned longitudinally through the tubular driven shaft 20, the ends of the drive shaft 27 extending outwardly of the ends of the tubular driven shaft 20 and an end 28 of the drive shaft 27 having a spline 29 formed inwardly from the end thereof for the reception of a pinion gear 30. The outermost end 28 of the drive shaft 27 is adapted to be journaled in a bearing 31 positioned in an annular boss 32 which in turn is formed in a cap 33 secured to the periphery of the annular flange 11 by a plurality of cap screws 34—34.

A pinion gear 35 is positioned on the spline 21 heretofore referred to as being formed on

one end of the tubular driven shaft **20**. By referring to Figure 5 in particular it will be seen that the pinion gears **30** and **35** are positioned side-by-side in the area defined by the body member **10**, the annular flange **11** thereon and the cap **34** forming a closure with respect thereto. A stub shaft **36** is also positioned in the area defined by the body **10**, the annular flange **11** thereon and the cap **33** secured thereto and is journaled on bearings **37** and **38**, respectively, the bearing **38** being positioned in an annular boss **39** formed on the inner surface of the cap **33** while the bearing **37** is positioned in an opening **40** in the body member **10**.

The stub shaft **36** has a spline formation **41** thereon and a pinion gear **42** positioned thereon and in mesh with the pinion gear **30**, heretofore referred to, and the stub shaft **36** has a secondary pinion gear **43** positioned thereon and in mesh with the pinion gear **35** heretofore referred to. It will thus be seen that rotating motion imparted the drive shaft **27** will be conveyed by way of the pinion gears **30** and **42** to the stub shaft **36** and by way of the pinion gears **43** and **35** to the driven tubular shaft **20** and that the chain **26** located between the flanges **22** and **23** of the driven shaft **20** will be moved thereby.

It will occur to those skilled in the art that the pinion gears **30**, **42**, **43** and **35** will provide a suitable reduction between the drive shaft **27** and the driven shaft **20** so that relatively heavy loads may be lifted by the chain **26** and that at such time as it is desired to use the hoist for relatively lighter loads the pinion gears **30**, and **35** may be removed and replaced in reverse relation on the shafts **20** and **27** and the pinion gears **42** and **43** likewise reversed on the stub shaft **36** whereby the ratio between the drive shaft **27** and the driven shaft **20** is substantially changed. It will also occur to those skilled in the art that the use of the pinion gears **30**, **42**, **43** and **35** makes possible a relatively smaller hoist construction than has heretofore been believed possible and at a minimum of expense as the gears are capable of economical formation and rapid assembly on their respective shafts by means of the spline formation therebetween. The same formation facilitates their ready removal or replacement ability whereby the capacity and/or speed of the hoist may be varied.

In order that motion may be imparted to the drive shaft **27**, a key **44** is positioned in the shaft and a sleeve **45** is positioned thereon and secured thereto by the key **44**. The sleeve **45** has an annular flange **46** on its innermost end and a large thread pattern **47** formed on its outer surface on which is located a pulley **48**. A bushing **49** positioned on the drive shaft **27** engages the pulley **48** and a nut **50** threadably engaged on the drive shaft **27** positions the bushing **49**. The pulley **48** is thereby capable of moving only approximately half a revolution on the sleeve **45** so that driving motion imparted to the pulley **48** as by means of a secondary chain **51** may be imparted to the drive shaft **27**.

Braking means is disclosed in Figures 5 and 6 of the drawings and comprises a plurality of rollers **52** circumferentially spaced about the sleeve **45** by a cam disc **53** having cam slots **53***a* formed therein. The rollers **52** are normally urged outwardly of the cam slots **53A** by a plurality of springs **54**. A secondary sleeve **55** is provided with a spline pattern **56** on its one

edge for registry with a spline pattern **57** formed on the secondary body **12** and the other edge of the secondary sleeve **55** is located in an annular recess **58** formed in the pulley **48**. Fiber washers **59—59** are positioned on either side of the rollers **52—52** so that they are maintained in desired alignment. It will thus be seen that when the pulley **48** is revolved in one direction, clockwise as shown in Figure 6 of the drawings, the rollers **52** will move along the cam slots **53** and lock the sleeve **45** to the secondary sleeve **55** thus effectively braking any movement of the pulley **48**, sleeve **45** and shaft **27** with respect to the body **12**. Those skilled in the art will recognize that this braking action will take place upon the relative slowing down of the pulley **48** with respect to the shaft **27** at such time as the hoist is lowering the chain **26** and that the same braking action may be obtained when the chain **26** is being elevated by reversing the motion of the pulley **48**. The pulley **48** and the annular shoulder **58** therein serve merely to position the secondary sleeve **55** which remains stationary at all times due to its splined engagement with the secondary body **12** of the hoist.

It will thus be seen that the construction disclosed is simple and efficient, capable of rapid formation and assembly and meets the several objects of the invention.

By referring now to Figure 7 of the drawings a modification in the pinion gear arrangement of the hoist such as hereinbefore disclosed may be seen and wherein a hoist body **60** is disclosed having an annular flange **61** and a drive shaft **62** and a driven shaft **63**. Splines **64** and **65** are formed on the drive and driven shafts **62** and **63**, respectively, and an idler gear **66** is rotatably mounted on the driven shaft **63**. A pinion gear **67** is positioned on the drive shaft **62** by the spline **64** and is engaged with a pinion gear **68** on a stub shaft **69**. A pinion gear **70** on the stub shaft **69** engages the idler gear **66** and it is also engaged by a pinion gear **71** on a stub shaft **72**. A pinion gear **73** on the stub shaft **72** engages a pinion gear **74** on the driven shaft **63** and secured thereto by the spline **65**. Thus a double reduction may be obtained and the capacity of the hoist increased without increasing the size or weight thereof materially.

It will thus be seen that the several objects of the invention are met by the hoist disclosed herein and particularly in the preferred embodiment as described in connection with Figures 1 through 6 of the drawings.

Having thus described my invention, what I claim is:

In a hoist a body member having oppositely disposed horizontally aligned openings and a tubular driven shaft located therein, a drive shaft positioned in said tubular driven shaft and extending outwardly of the ends thereof, a sleeve secured on one end of said drive shaft, a thread pattern formed on said sleeve, a pulley having a matching thread pattern engaged on said sleeve, an annular flange on said body member and a cap secured to said flange and having a bearing positioned therein, the other end of said drive shaft journaled in said bearing, a stub shaft positioned between said cap and said body member and spaced with respect to said drive shaft, splines formed on said drive shaft and said stub shaft and pinion gears positioned on said splines, one end of said tubular driven shaft

having a spline formed thereon and a secondary pinion gear positioned thereon and engaged with one of said pinion gears on said stub shaft whereby rotating motion imparted the drive shaft by said pulley is conveyed through said pinion gears to said secondary pinion gear and to said tubular driven shaft, a cam disc on said sleeve adjacent said pulley, a secondary sleeve positioned in said pulley and engaging said body member and defining a stationary annular chamber about said sleeve and cam disc, a plurality of cam slots formed in the periphery of said cam disc and a plurality of rollers located one in each of said cam slots, said pulley being capable of limited rotation on said sleeve to engage said cam disc and move the same in one direction.

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