July 9, 1946. C. S. SCHROEDER 2,403,462

CHAIN HOIST

Filed Feb. 25, 1944 2 Sheets-Sheet 1

Fig. 1.

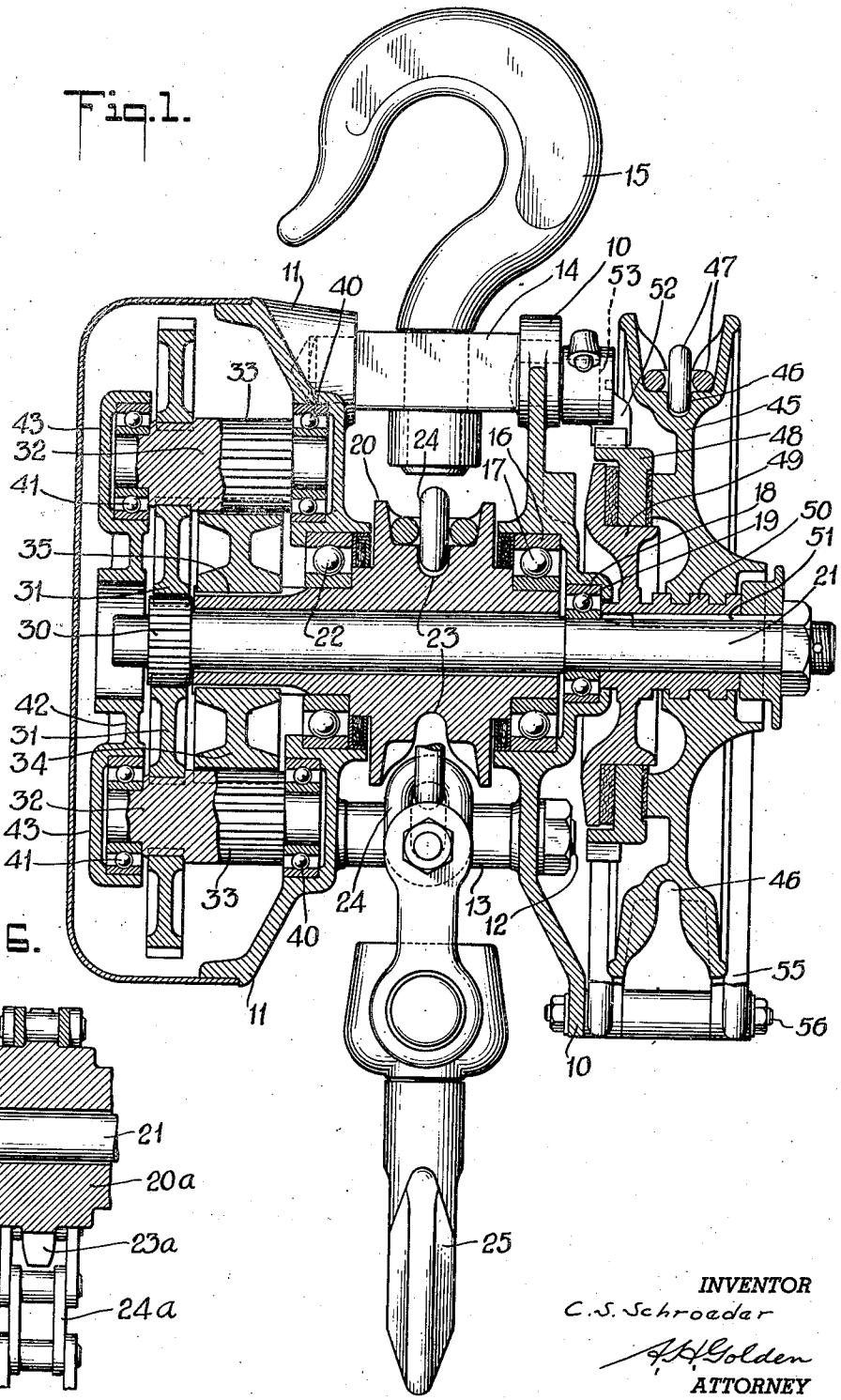


Fig. 6.

INVENTOR
C. S. Schroeder
A. H. Golden
ATTORNEY

July 9, 1946. C. S. SCHROEDER 2,403,462

CHAIN HOIST

Filed Feb. 25, 1944 2 Sheets-Sheet 2

Fig. 3.

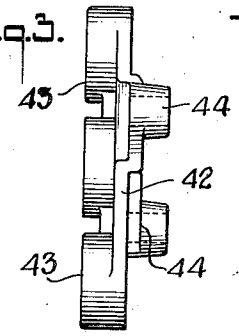


Fig. 4.

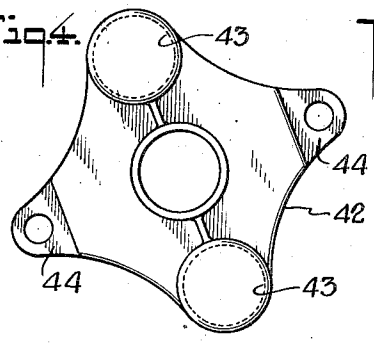


Fig. 5.

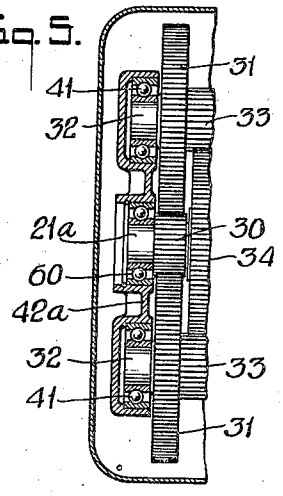
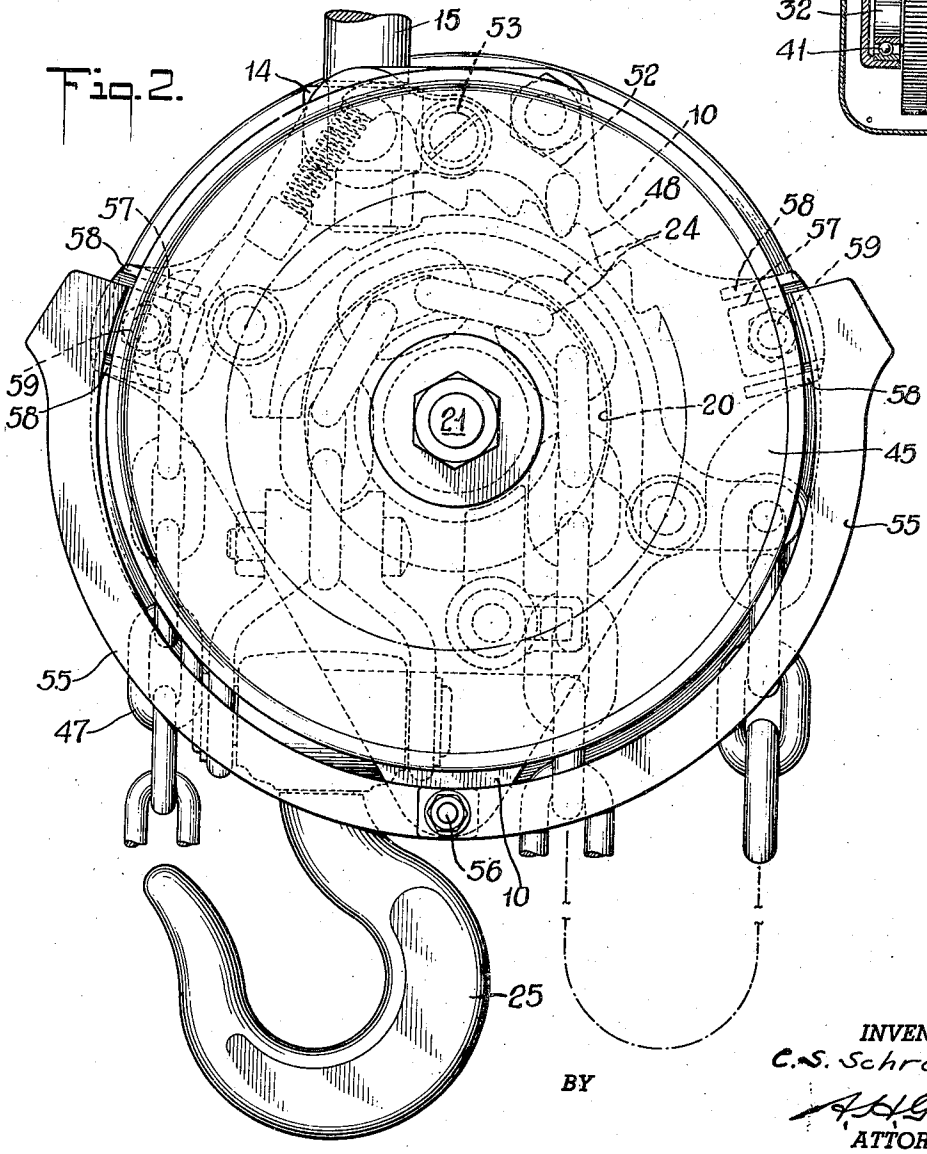


Fig. 2.



INVENTOR
C. S. Schroeder
BY
A. H. Golden
ATTORNEY

Patented July 9, 1946

2,403,462

UNITED STATES PATENT OFFICE

2,403,462

CHAIN HOIST

Charles S. Schroeder, Philadelphia, Pa., assignor to The Yale & Towne Manufacturing Company, Stamford, Conn., a corporation of Connecticut

Application February 25, 1944, Serial No. 523,798

1 Claim. (Cl. 254—169)

1

This invention relates to a hoist, and more particularly to a chain hoist of the type utilizing a load sheave rotated through the intermediary of gearing that is actuated by a chain driven hand wheel. Hoists of the particular class are well known in the art and were in fact pioneered by The Yale & Towne Manufacturing Company to whom this application is assigned.

A feature of my invention resides in the conception of an extremely simple structural arrangement whereby I am able to build a much smaller chain hoist than those found in the prior art, while employing ball bearings that normally compel an increase in size rather than a decrease in the size of the hoist structure.

A further feature of this part of my invention resides in the construction of the hoist of two main plates, which in combination with a bearing plate, comprise the sole structural members of the hoist. Thus, the remaining parts are operating parts or mere fastening members. This is an extremely important feature of my invention.

A still further feature of my invention resides in the particular manner in which the drive shaft of my hoist is supported relatively to the load sheave. A further feature of my invention relates to securing means for a chain guide used with the hand wheel of the hoist.

Referring now to the drawings,

Fig. 1 is a vertical section through the hoist of my invention.

Fig. 2 is a view looking at the hoist from the right of Fig. 1.

Figs. 3 and 4 are respectively an end and an elevation of the bearing plate secured to one of the main plates forming part of my invention.

Fig. 5 is a section showing a modification of my invention.

Fig. 6 is a section of the center portion of a modified load sheave of the sprocket type.

Referring now more particularly to the drawings, and especially Figs. 1 to 4 inclusive, my hoist utilizes a first main plate 10 and a second main plate 11. These main plates are held together, and in spaced relation, by a series of bolts 12 and spacer sleeves 13, together with a hook supporting bar 14. A supporting hook 15 is mounted on the bar 14 in a conventional manner.

The main plate 10 is formed so as to support at 16 the ball bearing 17, and at 18 the ball bearing 19. As is quite apparent, the ball bearings 17 and 19 are concentric, and are therefore adapted to support for rotation the coaxially rotating load sheave 20 and drive shaft 21. The load sheave 20 is of course supported at its right

2

end by the bearing 17 on the main plate 10. At its other end the load sheave 20 is supported by a ball bearing 22 mounted on the main plate 11. The load sheave is formed with a series of pockets 23 for the links 24 of a load chain that supports a load hook 25. Rotation of the load sheave 20 moves the chain links 24 so as to lift and lower a load carried on the load hook 25.

The drive shaft 21 is supported at its right end by the ball bearing 19, and has formed on its other end a pinion 30 that is in driving relation to the teeth of a pair of gears 31. The gears 31 are termed by me intermediate gears, and are formed as parts of intermediate shafts 32 on which are formed intermediate pinions 33. The intermediate pinions 33 are in driving relation to a gear 34 that is splined at 35 to the load sheave 20. It is obvious that rotation of the drive shaft 21 will effect rotation of the gear 34 and load sheave 20 through the medium of the intermediate gears 31 and the intermediate pinions 33. It will also be seen that the gears 31 will, through the intermediary of the pinion 30, support the left end of the drive shaft 21 for rotation, the opposite end of the shaft being of course carried on the ball bearing 19. It will also be noted that drive shaft 21, while rotating concentrically with sheave 20 and in a bore thereof, is spaced therefrom.

The intermediate shafts 32 are supported at their right ends by ball bearings 40 that are mounted on the main plate 11. At their left ends the shafts 32 are supported by ball bearings 41 that are carried on a bearing plate 42, best illustrated in Figs. 3 and 4. There, the plate 42 is shown equipped with caps 43 in which the ball bearings 41 are mounted. It is also shown formed with ears 44 whereby it may be bolted to the main plate 11.

For rotating the drive shaft 21 there is utilized the chain driven hand wheel 45 formed with pockets 46 for cooperation with the hand chain links 47. The hand wheel 45 actuates the drive shaft 21 through the intermediary of a ratchet disk 48 and a friction disk 49 that is formed as a part of an externally threaded sleeve 50 keyed at 51 to the drive shaft 21. A pawl 52 is mounted on a stub shaft 53 carried by the main plate 10 and cooperates with the teeth of the ratchet disk 48. The manner in which the hand wheel and the several parts associated therewith control the drive shaft 21 will not be herein set forth because the particular structure is well known in the hoist art.

For holding the chain links 47 in proper coaction with the hand wheel 45, I utilize what is

termed in the art a chain guide **55**. This chain guide is formed of two parts held together by a bolt **56** as is best shown in Figs. 1 and 2. The bolt **56** passes through a downwardly extending part of the main plate **10** and thereby forms a rigid assembly of the parts of the chain guide **55**. Each of the said parts of the chain guide **55** is formed with a bracket **57** that is adapted to be inserted between pairs of lugs **58** formed integrally with the main bearing plate **10**. Because of this construction it is very simple indeed to assemble the parts of the chain guide **55** in their proper relation to the main plate **10**. A bolt **59** is thereafter passed through bores in each of the brackets **57** of the chain guide **55**, and in the main plate **10**, for securing the parts of the chain guide **55** in position.

From the description so far given, it is readily seen that I have contributed an extremely small and compact hoist structure utilizing but three structural parts. Those structural parts are the main plates **10** and **11** and the bearing plate **42**. The manner in which the three structural parts support the operating parts, and the further manner in which the operating parts are related, form a contribution of much merit to this art.

In Fig. 5 I illustrate a modified form **42***a* of the bearing plate **42**. Thus, in Fig. 5, the bearing plate **42***a* is shown supporting a ball bearing **60** for the left end **21***a* of the drive shaft. It will be remembered that in the preferred form, the left end of the drive shaft **21** is carried by the pinion **30** through its engagement with intermediate gears **31**.

In Fig. 6 I show a modified form of load sheave designated by reference numeral **20***a*. Thus, the load sheave **20***a* is formed with teeth **23***a* instead of the pockets **23** of the load sheave of the first modification. The teeth cooperate with a sprocket roller chain **24***a* in a manner

which will be well understood by those skilled in the art. It will be noted that as in the case of the modification of Fig. 1, in the modification of Fig. 6 the drive shaft **21** is mounted for rotation within a bore in the load sheave but in spaced relation thereto, thereby contributing an extremely smooth and easy operating hoist mechanism.

I believe that the structure and operation of my invention will now be apparent to those skilled in the art.

I now claim:

In a hoist of the class described, a pair of main plates, means securing said plates to one another in spaced relation, a load sheave, a ball bearing on one of said plates for supporting one end of said load sheave for rotation, a pair of concentric cup-shaped surfaces formed in stepped relation on the other of said plates, a ball bearing nested into the larger of said stepped cup-shaped surfaces for supporting the other end of said load sheave, a second ball bearing nested in the smaller of said stepped cup-shaped surfaces and thereby retained against endwise movement in one direction, a drive shaft within a central bore of said load sheave and spaced therefrom, one end of said drive shaft supported by said second ball bearing and having a shoulder for retaining said ball bearing against movement endwise in the opposite direction, a pinion on the other end of said drive shaft, a pair of intermediate shafts supported on said one plate, intermediate gears formed on said intermediate shafts and in driving engagement with said pinion, said intermediate shafts and gears through said pinion alone supporting for rotation the other end of said drive shaft, and means whereby said intermediate gears rotate said load sheave.

CHARLES S. SCHROEDER.