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1,936,642

HOIST

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2 Sheets-Sheet 2

FIG. 3

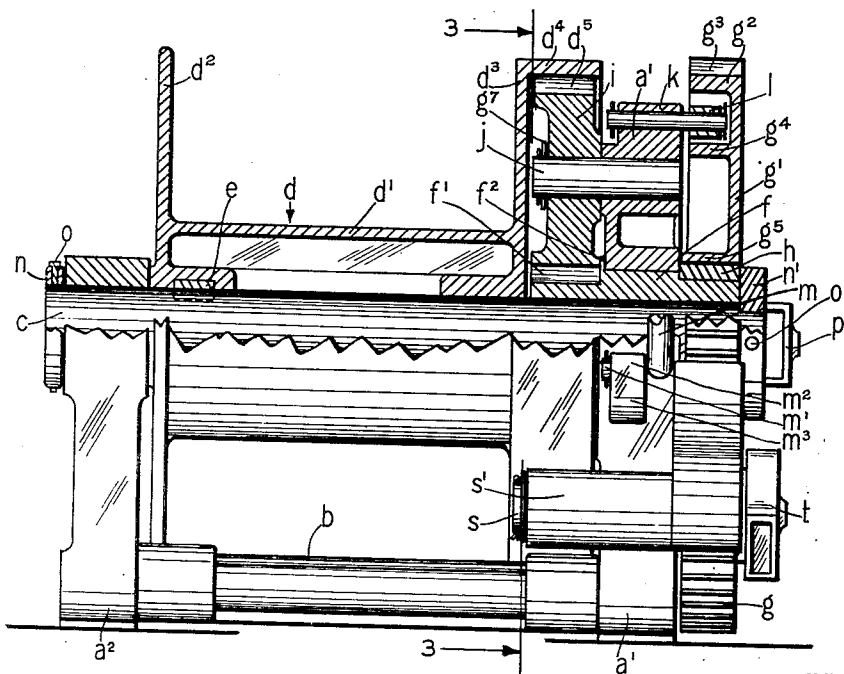
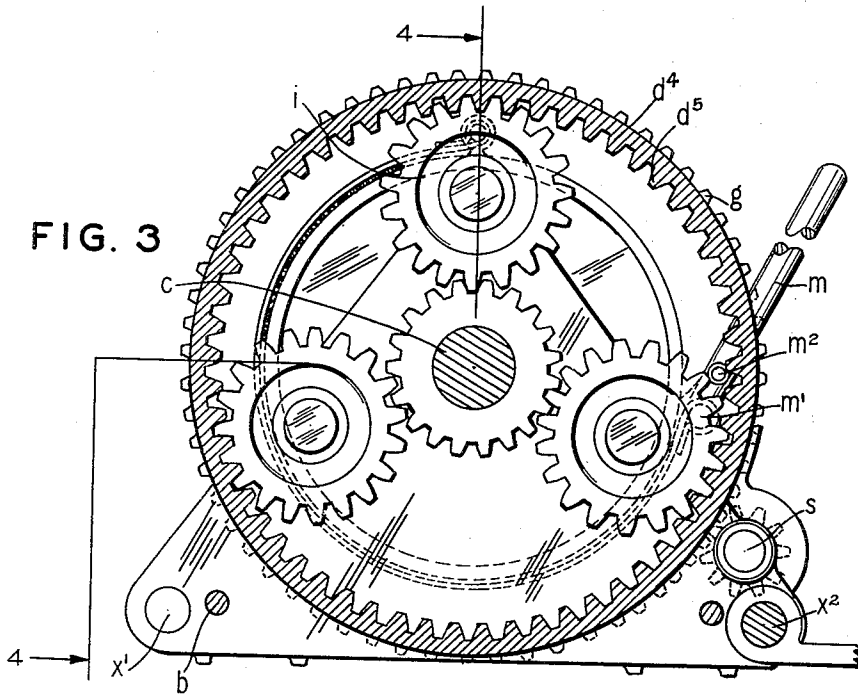


FIG. 4

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HOIST

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The object of this invention is to provide a manually-operated hoist which is capable of being actuated at different speeds with equal facility.

5 A further object of my invention is to provide a hoist of this character in which substantially all of the operating gears are housed within one of the drum flanges and the brake mechanism is correspondingly housed within a laterally projecting flange, the extremities of said flanges lying adjacent and facing one of the frame elements.

15 A further object of my invention is to provide a hoist of this character with a fastening plate, which may be turned under the hoist to permit said hoist to be mounted adjacent one edge of a support, and to be hung pendent over said edge when it is not required for use.

20 Further details of my invention and the mode of operation thereof are hereinafter described with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of my improved hoist;

25 Fig. 2 is a side elevation thereof with portions shown broken away, and in section, to disclose structural details of the hoist and its mounting;

Fig. 3 is a sectional view taken substantially on the line 3—3 in Fig. 4; and

30 Fig. 4 is an end view of said hoist with the upper half shown broken away and in section to show structural details, said section being taken substantially on the line 4—4 in Fig. 3.

My improved hoist comprises a frame *a* comprising two spaced sides *a'*—*a2*, which are joined together and spaced apart by tie rods *b* extending transversely of said frame. Extending across said frame is a shaft *c* journaled in the frame sides and carrying a rotatable drum *d*. Said drum comprises a barrel portion *d'* and flanges *d2*—*d3*. The flange *d2* is of substantially uniform thickness and extends wholly in a plane normal to the axis of rotation of the barrel. The flange *d3*, however, terminates in a laterally-projecting flange *d4*, the under surface of which is formed into an internal gear *d5*. The drum is secured to the shaft by a key *e*, by welding or by other approved shop practice. Said shaft *c* extends thru and beyond the frame half *a'* a substantial distance and said shaft is journaled in said frame side thru the intermediate agency of a sleeve *f*. Said sleeve extends substantially equidistant from both sides of said frame side *a'* and the inner end of said sleeve is formed into an external gear *f'*, which is in alinement with the

internal gear *d5* carried by the drum *d*. Said sleeve preferably is provided with a collar *f2* upon the inner end of the gear *f'*, which collar bears against the frame *a'* and tends to prevent said sleeve from being forced outwardly. The outer end of said sleeve carries the primary gear *g*, which is secured to said sleeve by a key *h*, or by some equivalent device. Said primary gear comprises a principal web *g'*, and extending laterally therefrom is a peripheral flange *g2* upon which the toothed portion *g3* is formed.

A second lateral flange *g4* is arranged inwardly from said peripheral flange and serves as a brake flange. A third lateral flange portion *g5* extends inwardly from said principal web and serves as a journal for said gear. The flanges on the primary gear and the corresponding flange of the drum both extend toward the frame side *a'* and substantially house the mechanism adjacent thereto. The primary gear and said drum are of substantially the same diameter and both being carried by said shaft *c* are in substantial alinement. The faces of said members which are spaced from each other are free of projecting parts and thus to this extent eliminate the possibility of inadvertent injury from engagement with foreign objects, such as the clothing of the operator.

Operatively connecting the internal drum gear *d5* and the external collar gear *f'* are a series of planetary gears *i* carried by laterally extending shafts *j* projecting from the frame side *a'*. As is shown in Fig. 3, three of the gears are provided, and I find that three such gears produce an efficient transmission of power, but do not wish to limit myself to such number. Said gears are preferably rotatably mounted upon said shafts and are held against lateral movement by cotter keys or pins *g7*. Said frameside *a'* also carries the support *k* for the contacting brake band *l*, which encircles the brake flange *g4*. The other end of said brake band is carried upon an outstanding pin *m'* on the brake operating lever *m*. Said lever is pivotally mounted at *m2*, which in part is a boss *m3* upon the frame *a'*. The pin *m'* is spaced a distance from the pivot point and thus when the operating lever is moved angularly about its pivot the brake band is brought into encircling engagement or disengagement with the brake flange. The brake flange being carried by the primary gear thus is positioned to effectively brake the drum, for the reason that the braking force is exerted thru the gearing *f'*, *i* and *d5*.

The shaft *c* is secured in position by collars *n*—*n'* arranged at the ends of said shafts and ex-

teriorly of the frame side $a2$ and the primary gear g , respectively. Said collars are made fast to said shaft by pins $o-o'$, respectively, or by some equivalent means. The collar n' is slightly larger in diameter than the sleeve f and thus said collar prevents said sleeve being moved inwardly. That is, said sleeve is held against outward movement by the integral collar $f2$ bearing against the face of the frame side a' and is prevented from moving in the opposite direction by the collar n' bearing against the face of the primary gear g . Said collar n' is provided with an integral box-like receiver p for releasably securing the operating handle q .

An operating gear r is also carried by the frame side a' upon a shaft s journaled at s' in the frame side a' . Said operating gear r is in constant mesh with the toothed portion $g3$ of the primary gear. Said operating gear is also provided with a box-like receiver t for releasably actuating by said operating handle q , and it is in said box-like receiver that the handle q is shown in Fig. 1. A similar box-like receiver u is provided upon the face of the primary gear g . Said box-like receivers extend substantially in the same plane, as can be noted in Figs. 1 and 4, and each may be provided with a thumb screw for holding said handle in place in each of said receivers. Said thumb screws may be provided for each receiver, as is shown in Figs. 1 and 2, or one thumb screw may be provided for all, as is indicated in Fig. 4, and the latter may be chained to the handle if it is desired, said variation being self-suggestive to a person skilled in the art, and thus is not illustrated. The handle q is offset at q' so that it may clear the box-like receivers other than the one in which the end is seated. A gripping portion $q2$ is adjustably mounted upon the handle so that varying degrees of leverage may be attained by shifting said gripping portion lengthwise of said handle.

A dog or pawl w is pivotally mounted upon said frame side a' and is adapted in one position, as is shown in Fig. 1, to engage the toothed portion $g3$ of the primary gear or may be held out of engagement therewith, as is shown in Fig. 2. Said dog is carried by a shaft w' , which is held retracted by a coiled spring $w2$. The opposed faces of the frame and the dog are inclined as at $w3$. Said faces oppose each other when the dog is in operating position but are out of engagement when said dog is swung to the position shown in Fig. 2. Thus when the inclined faces are in engagement the coiled spring $w2$ tends to move said dogs toward said toothed portion $g3$, and the angularity is such that the engagement with the gear g prevents the latter from rotating in one direction. In the other direction said pawl is permitted to ride over the points of said teeth.

A securing or mounting plate x is adapted to be fastened to said frame sides thru apertures x' at each end of said frame sides. That is, said securing plate is adapted to be pivotally secured to the hoist by a pivot pin $x2$, but said pivot pin may be passed thru the aligned apertures x' at either end of said hoist. Thus, for example, in Figs. 2 and 3 said securing plates are shown in two different positions but secured to the frame sides thru the aperture x' lying immediately under the operating gear shaft s . It is apparent that said securing plate could likewise be fastened to said frame sides by the apertures at the opposite ends thereof. Said securing plate is provided with a central hole or journal thru its face to accommodate a pivot pin y , as is shown in

Fig. 2. Thus said hoist may be arranged adjacent one edge of a support z , so that it may be arranged flatwise upon said support, as is shown in Fig. 2, or may be swung so as to hang pendent over the edge thereof and out of operating position. Said securing plate also may be arranged in the manner shown in Fig. 3, that is, extending laterally from said hoist, so as to arrange said securing plate to serve as a tail hold for said hoist. That is, said plate may extend laterally on said hoist and be adapted to be engaged by a cable so that a hoist can be secured to some more distant support.

My improved manually-operated hoist is adapted to accommodate rope, preferably wire rope because of its greater strength, and one end of said rope is knotted and secured to the drum in a bayonet joint slot $d6$, shown in Fig. 1. It can then be coiled on said drum. Said drum is rotated at direct speed by arranging the handle q in the box-like receiver p , which is integral with the collar n' . As is shown in Fig. 4, said receiver and its integral collar are pinned to the shaft c and the shaft is keyed to the drum and thus all of said elements rotate together at the same speed, as if they were an integral structure. An approximate leverage of four to one is gained thru the planetary gearing i and its associated gearing $d5$ and f' , upon the drum and sleeve, respectively. Thus, when the handle is arranged in the box-like receiver u , it causes the primary gear to turn as would a disc and the toothed portion $g3$ is not brought into operative engagement, said toothed portion merely rotating the operating gear r as a free running member. A gear ratio of approximately twenty-five to one is secured when the handle is arranged as is shown in Fig. 1,—that is, with the handle in the box-like receiver t of the operating gear. With the handle arranged in this position, full advantage is secured from the various gear elements, the operating gear r meshing with and operating the primary gear g , and the latter acting thru the sleeve f to rotate the drum d thru the planetary gearing i .

The box-like receivers being arranged in substantially the same plane and immediately exteriorly of the primary gear g thus are equally available for engagement with the handle q and thus one operating station can be provided for said hoist and the changing in gear ratio may be easily and quickly made merely by removing the said handle from one receiver and placing it in another. When dogging mechanism is desired, the dog or pawl w can be swung from its position, as shown in Fig. 2, to the position shown in Fig. 1. In the latter position it is resiliently held against the teeth by the coiled spring $w2$. In the position shown in Fig. 2, however, said spring is ineffective, for the reason that two flat surfaces are in contact and no force is transmitted which would tend to rotate said parts.

I claim:

1. In a hoist, a frame comprising two sides secured in spaced relation, a shaft extending between said frame sides, a rotatable drum mounted upon said shaft and between said frame sides, said drum being fixed to said shaft, the latter journaled in the frame sides, said shaft projecting laterally beyond one of said side frames, a primary gear element arranged outwardly from said last-mentioned frame side, an operating gear meshing with said primary gear and carried by said frame side, said primary gear, operating

gear and shaft each provided with an operating element.

2. In a hoist, a frame comprising two sides secured in spaced relation, a shaft extending between said frame sides, a rotatable drum mounted upon said shaft and between said frame sides, said drum being fixed to said shaft, the latter journaled in the frame sides, said shaft projecting laterally beyond one of said side frames, a primary gear element arranged outwardly from said last-mentioned frame side, an operating gear meshing with said primary gear and carried by said frame side, said primary gear, operating gear and shaft each provided with an operating element, said operating elements lying substantially in the same plane.

3. In a hoist, a frame comprising two sides secured in spaced relation, a shaft extending between said frame sides, a rotatable drum mounted upon said shaft and between said frame sides, said drum being fixed to said shaft, the latter journaled in the frame sides, said shaft projecting laterally beyond one of said side frames, a primary gear element arranged outwardly from said last-mentioned frame side, an operating gear meshing with said primary gear and carried by said frame sides, said primary gear, operating gear and shaft each provided with an operating element, said operating elements lying substantially in the same plane, which plane extends immediately exteriorly of said primary gear element.

4. In a hoist, a frame comprising two sides secured in spaced relation, a shaft extending between said frame sides, a rotatable drum mounted upon said shaft and between said frame sides, said drum being fixed to said shaft, the latter journaled in the frame sides, said shaft projecting laterally beyond one of said side frames, a primary gear element arranged outwardly from said last-mentioned frame side, an operating gear meshing with said primary gear and carried by said frame sides, said primary gear, operating gear and shaft each provided with a retainer provided with separable securing means for an operating handle, said handle retainers lying substantially in the same plane.

5. In a hoist, a frame comprising two sides secured in spaced relation, a shaft extending between said frame sides, a rotatable drum mounted upon said shaft and between said frame sides, a sleeve journaled in one frame side and upon said shaft extending laterally from both sides of said frame side, said drum having a laterally projecting flange extending toward said last-mentioned frame side and overlying said sleeve, an internal gear formed upon the inner face of said drum flange and an alined external gear formed upon said sleeve and a gear journaled in said frame side and meshing with said internal gear and said sleeve gear.

6. In a hoist, a frame comprising two sides secured in spaced relation, a shaft extending between said frame sides, a rotatable drum mounted upon said shaft and between said frame sides, a sleeve journaled in one frame side and upon said shaft extending laterally from both sides of said frame side, said drum having a laterally projecting peripheral flange extending toward said last-mentioned frame side and overlying said sleeve, an internal gear formed upon the inner face of said drum flange and an alined external gear formed upon said sleeve and a gear journaled in said frame side and meshing with said internal gear and said sleeve gear.

7. In a hoist, a frame comprising two sides secured in spaced relation, a shaft extending between said frame sides, a rotatable drum mounted upon said shaft and between said frame sides, a sleeve journaled in one frame side and upon said shaft extending laterally from both sides of said frame side, said drum having a laterally projecting flange extending toward said last-mentioned frame side and overlying said sleeve, an internal gear formed upon the inner face of said drum flange and an alined external gear formed upon said sleeve and a series of planetary gears journaled in said frame side and meshing with said internal gear and said sleeve gear.

8. In a hoist, a frame comprising two sides secured in spaced relation, a shaft extending between said frame sides, a rotatable drum mounted upon said shaft and between said frame sides, a sleeve journaled in one frame side and upon said shaft extending laterally from both sides of said frame side, said drum having a laterally projecting flange extending toward said last-mentioned frame side and overlying said sleeve, an internal gear formed upon the inner face of said drum flange and an alined external gear formed upon said sleeve and a gear journaled in said frame side and meshing with said internal gear and said sleeve gear, a primary gear element arranged outwardly from said last-mentioned frame side and a brake flange carried by said gear element and facing said frame side, a brake element including operating mechanism carried by said frame side and operatively engaging said brake flange.

9. In a hoist, a frame comprising two sides secured in spaced relation, a shaft extending between said frame sides, a rotatable drum mounted upon said shaft and between said frame sides, a sleeve journaled in one frame side and upon said shaft extending laterally from both sides of said frame side, said drum having a laterally projecting flange extending toward said last-mentioned frame side and overlying said sleeve, an internal gear formed upon the inner face of said drum flange and an alined external gear formed upon said sleeve and a gear journaled in said frame side and meshing with said internal gear and said sleeve gear, a primary gear element arranged outwardly from said last-mentioned frame side, said gear being of approximately the same diameter as said drum and being arranged in substantial alinement therewith.

10. In a hoist, a frame comprising two sides secured in spaced relation, a shaft extending between said frame sides, a rotatable drum mounted upon said shaft and between said frame sides, said drum being fixed to said shaft, the latter journaled in the frame sides, said shaft projecting laterally beyond one of said frames, a sleeve journaled in said frame side and upon said shaft extending laterally from both sides of said frame side, said drum having a laterally projecting flange extending toward said last-mentioned frame side and overlying said sleeve, an internal gear formed upon the inner face of said drum flange and an alined external gear formed upon said sleeve, a series of planetary gears journaled in said frame side and meshing with said internal gear and said sleeve gear, a primary gear element arranged outwardly from said last-mentioned frame side, said gear being of approximately the same diameter as said drum and being arranged in substantial alinement therewith, a brake flange carried by said gear element and facing said frame side, a brake element including operating

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 a sleeve journaled in one frame side and upon
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 primary gear and operating gear each provided
 with an operating element.

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