March 10, 1953 O. L. GAMBILL 2,630,720

BELT GEARING

Filed July 26, 1948 3 Sheets-Sheet 1

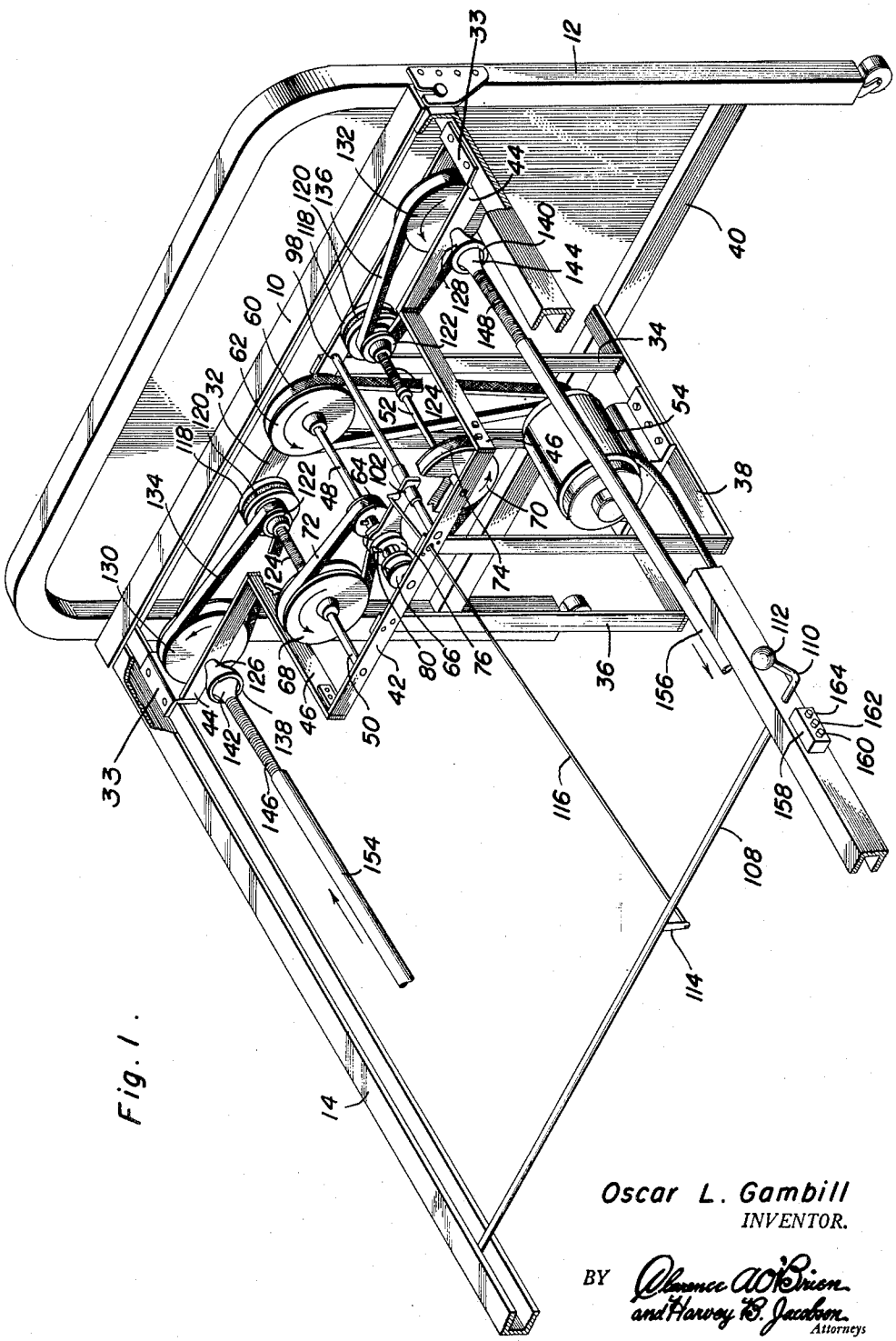

Fig. 1.

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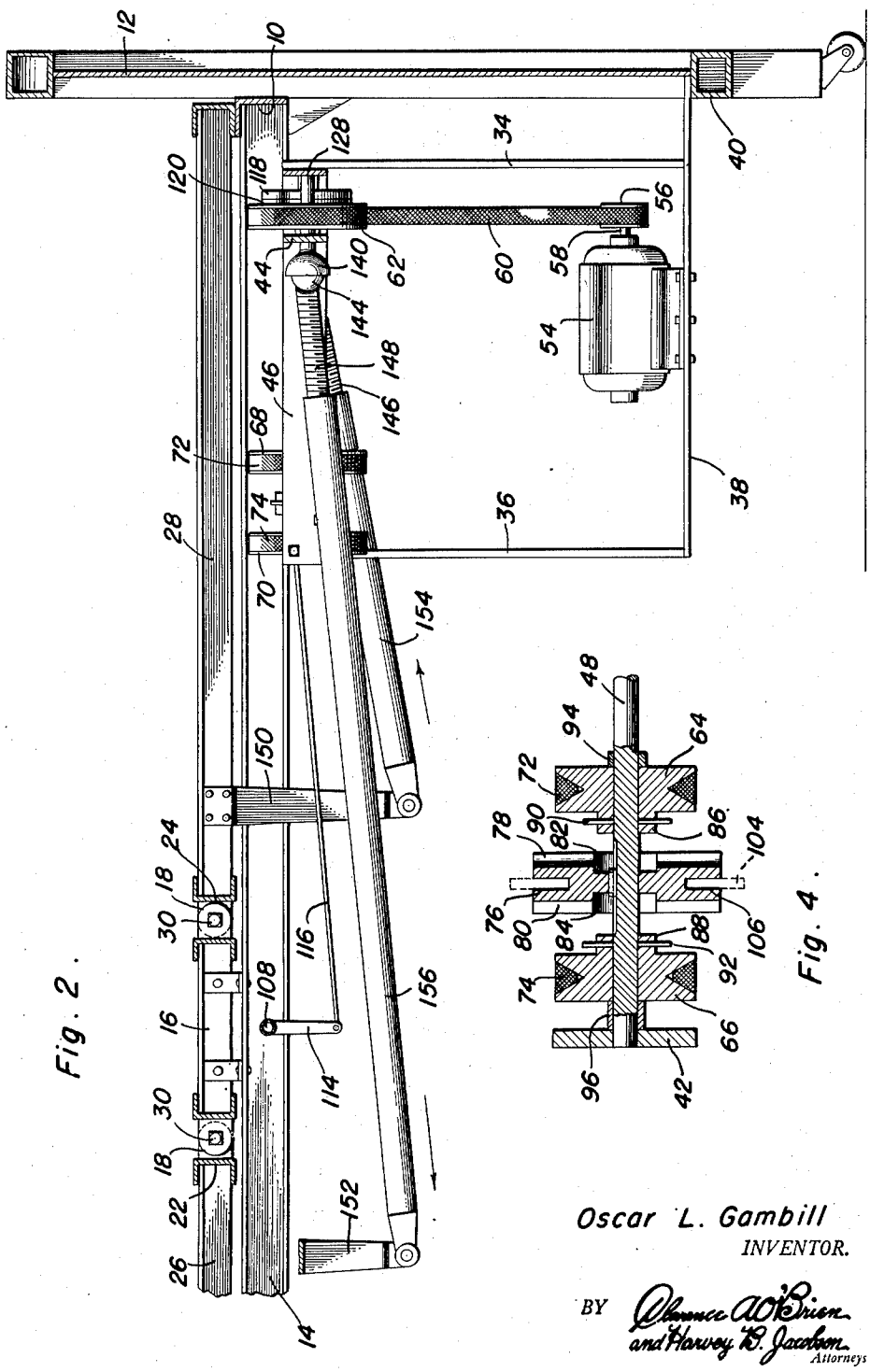

Fig. 2.

Fig. 4.

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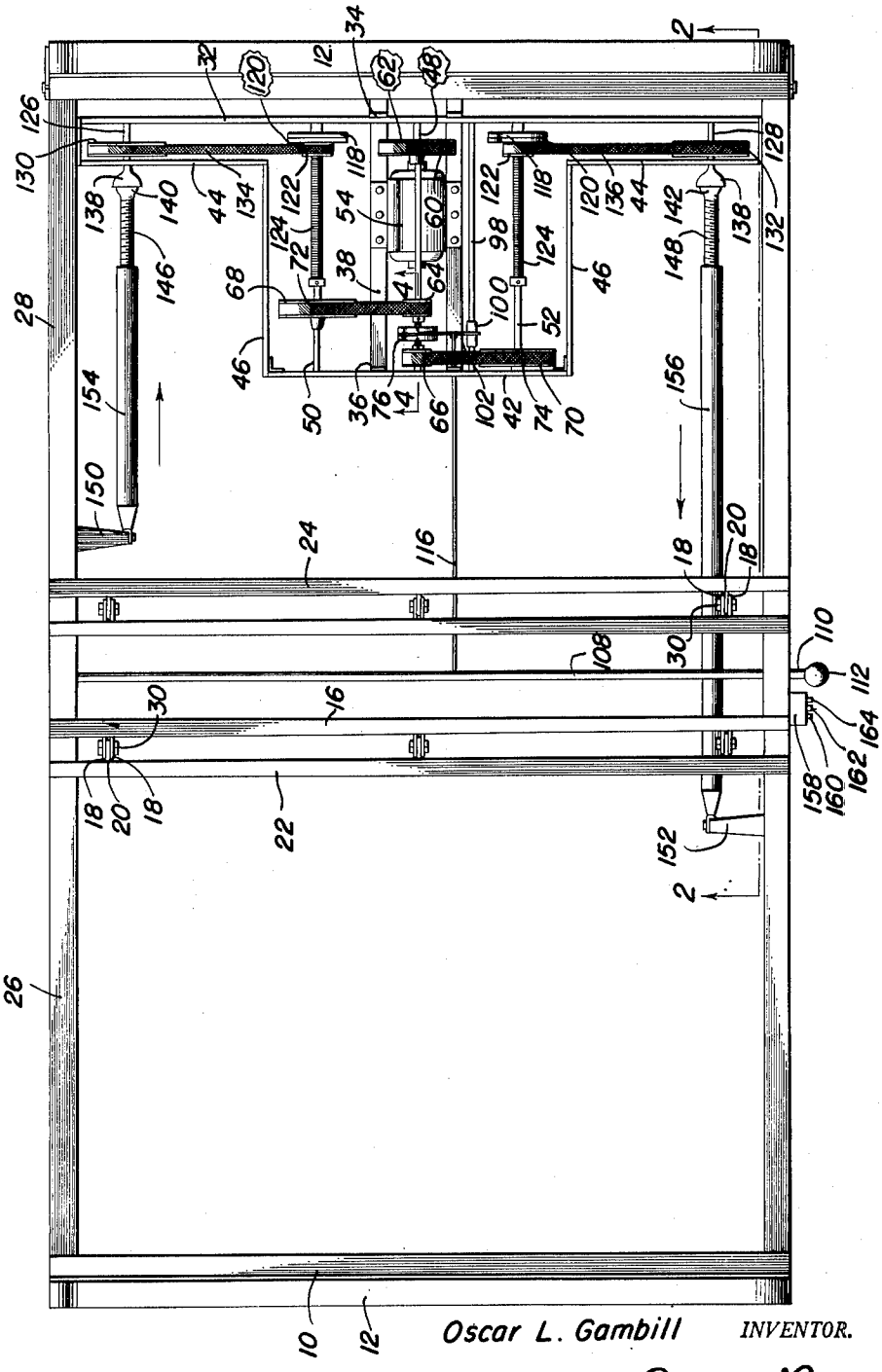

Fig. 3.

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UNITED STATES PATENT OFFICE

2,630,720

BELT GEARING

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2 Claims. (Cl. 74—722)

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This invention relates to new and useful improvements in sectional beds such as the type used in hospitals and the like, and the primary object of the present invention is to provide a bed including a pair of hinged sections and embodying novel and improved means for adjustably raising or lowering a selected one of the sections.

Another important object of the present invention is to provide an adjustable sectional bed including a power operated lifting mechanism that is conveniently actuated by a patient on the bed to adjustably raise or lower the head section or foot section of the bed to a comfortable position for a user thereof.

A further object of the present invention is to provide an attachment for hospital beds or beds having a pair of hinged sections and including a novel and improved clutch mechanism that is conveniently accessible to a person on the bed for adjustably raising or lowering a selected one of said pair of sections.

A still further aim of the present invention is to provide an adjustable sectional bed that is simple and practical in construction, strong and reliable in use, small and compact in structure, neat and attractive in appearance, efficient and durable in operation, relatively inexpensive to manufacture, and otherwise well adapted for the purposes for which the same is intended.

Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a fragmentary perspective view of a bed constructed in accordance with the present invention, and illustrating the lift mechanism thereof;

Figure 2 is an enlarged fragmentary, longitudinal vertical sectional view taken substantially on the plane of section line 2—2 of Figure 3;

Figure 3 is a top plan view of the bed constructed in accordance with the present invention; and,

Figure 4 is an enlarged fragmentary, longitudinal vertical sectional view taken substantially on the plane of section line 4—4 of Figure 3.

Referring now to the drawings in detail, wherein for the purpose of illustration, there is disclosed a preferred embodiment of the present invention, the numeral 10 represents a substantially rectangular bed frame that is retained in an elevated, substantially horizontal position by supporting U-shaped end frames 12.

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Fixed to the longitudinal side rails 14 of the bed frame 10 and spaced above the central portion of the frame 10, is a fixed central section 16 having a plurality of longitudinally spaced pairs of ears 18 that receive tongues 20 which project outwardly from the inner rails 22 and 24 of a substantially rectangular head section 26 and a substantially rectangular foot section 28. Fasteners 30 removably secure the ears 18 to the tongues 20 for raising and lowering pivotal movement of the sections 26 and 28 relative to the central section 16.

The present invention does not attempt to claim the above conventional structure but is merely an attachment for the same or for other such frames having one or more hinged or pivotal sections.

Heretofore, the sections 26 and 28 have been raised and lowered manually, thus making it difficult and in most instances impossible for a patient or person reclining on the bed to raise or lower the sections 26 and 28.

Therefore, the principal feature of the present invention is to provide a power operated mechanism embodying a reversible electric motor that will be conveniently accessible to a person resting upon the bed to effectively and efficiently raise or lower a selected of the sections 26 and 28 to the comfort of the bed patient.

To accomplish the above desired results, there is provided a transverse support member 32 the ends of which are fixed to mounting brackets 33 mounted on the longitudinal side rails 14 of the bed frame 10. The support member 32 supports a pair of depending brace members or hanger straps 34.

A pair of spaced L-shaped motor supporting members 36 are disposed beneath the bed frame 10 and have one of their legs, for example the horizontally disposed legs 38 thereof, fixed to a cross rail 40 between the legs of one end frame 12 and to the lower ends of the hanger straps 34.

The vertically disposed legs of the L-shaped motor supporting members 36 are fixed to a cross strap 42 which is spaced parallel to the member 32.

Fixed to the longitudinal side rails 14, are the outer ends or legs 44 of a pair of substantially horizontally disposed angle members 46, the inner legs of which are secured to the ends of the cross strap 42.

Journaled for rotation between the cross member 32 and the cross strap 42, is a plurality of spaced paralled shafts, including a driving shaft

or member 48 and a pair of driven shafts or members 50 and 52.

Removably secured to the horiozntal legs 38 of the L-shaped members 36, is a reversible electric motor 54 having a pulley 56 fixed on its reversible drive shaft 58 that is connected by an endless, preferably V-type belt 60 to a further pulley 62 that is removably secured to the driving shaft 48 so that the driving shaft 48 will be rotated by the motor 54.

Journaled for rotation on the driving shaft 48 is a pair of preferably V-type pulleys 64 and 66 which are connected to pulleys 68 and 70, rotatable with the driven shafts 50 and 52, by endless V-type pulley belts 72 and 74.

An annular clutch member or plate 76 is slidable on and rotatable with the driving shaft 48 and the opposite side faces of the clutch plate 76 are provided with diametrical recesses or slots 78 and 80 that communicate with central annular recesses 82 and 84 formed in the side faces of said clutch plate, see Figure 4.

The inner faces of the pulleys 64 and 66 are provided with central, annular projections 86 and 88 that are receivable in the recesses 82 and 84 respectively, and these projections 86 and 88 support diametrically disposed lugs or pins 90 and 92 that are positionable in the recesses 78 and 80 respectively for driving or rotating a selected one of the pulleys 64 or 66 with the shaft 48.

Suitable abutments or stops 94 and 96 are mounted on the driving shaft 48 to limit the sliding movement of the pulleys 64 and 66 and thus permit the clutch plate to engage a selected of the said pulleys 64 or 66.

Slidably positioned on a guide bar 98 that extends between the cross member 32 and cross strap 42, is a sleeve 100 which supports an actuating member 102 having a bifurcated free end portion 104 that engages an annular recess 106 provided in the clutch plate 76.

Rotatably carried by the longitudinal side rails 14, is a transverse operating rod or lever 108 having an angulated end portion 110 that supports a hand grip 112 which is disposed adjacent the central section of the bed frame 10. The rod 108 is provided with a lateral projection 114 that is pivoted to one end of a longitudinal actuating lever or bar 116 which is slidably disposed in suitable apertures provided in the cross strap 42 and the upper end of one of the members 36. The free end of the bar 116 is suitably pivoted to the actuating member 102, so that as the grip 112 is rotated in one direction, the rod 116 will be pulled toward the rod 108 to engage the pin 92 of the pulley 66 with the recess 80 in the clutch plate 76, and as the hand grip 112 is rotated in an opposite direction, the rod 116 will be pushed away from the bar 108 and the pin 90 of the pulley 64 will be received in the recess 78 of the clutch plate.

Suitably fixed on each of the driven shafts 50 and 52 is a stationary friction clutch plate 118 having a friction facing 120 that engages a sliding friction clutch plate 122. A tension spring 124 embraces each driven shaft 50 and 52 and normally urges the sliding clutch plates 122 into frictional engagement with the facings 120.

Journaled for rotation between the outer legs 44 of the angle members 46 and the cross member 32, is a pair of auxiliary shafts 126 and 128 that support pulleys 130 and 132 which are connected by V-type pulley belts 134 and 136 to annular, V-grooves provided in the sliding clutch plates 122 on the respective shafts 50 and 52.

The inner ends of the auxiliary shafts 126 and 128 terminate in sockets 138 and 140 that receive spherical ends 142 and 144 of a pair of oppositely threaded worms 146 and 148. It being understood, that the spherical ends 142 and 144 are mounted in the sockets 138 and 140 for universal movement but secured to the sockets for rotation therewith.

Depending from one side of the foot section 28 and the opposite side of the head section 26, is a pair of rigid arms 150 and 152 respectively, that are pivoted to rearwardly extending lifting bars or actuating tubes 154 and 156 having internally threaded sockets that receivably engage the worms 146 and 148.

A switch 158 is mounted on one side rail of the main frame 10 adjacent the hand grip 112 and includes three push buttons 160, 162 and 164 which control the motor 54.

The switch 158 is of the conventional type used for reversible electric motors 54 and the buttons 160, 162 and 164 are used for rotating the drive shaft 58 in one direction, placing the drive shaft 58 in a neutral position, against rotation, and for rotating the drive shaft 58 in an opposite direction.

In practical use of the present invention, the foot section 28 is raised or lowered by pressing either the button 160 or 164 with the clutch plate 76 engaged with the pulley 64, and the head section is raised or lowered by pressing either the button 160 or 164 with the clutch plate 76 engaged with the pulley 66.

As shown by directional arrows in Figure 1, when the button 160 is depressed the driving shaft 48 will rotate in a counter-clockwise direction and likewise the shaft 126, when the clutch plate is engaged with the pulley 64, to feed the worm 146 into the lifting bar 154 and raise the foot section 28. When the button 164 is depressed, the drive shaft 58 will rotate the driving member in a clockwise direction and the shaft 126 will also be rotated in a clockwise direction to move the worm 146 outwardly from the lift bar 154 and the foot section 28 will be lowered.

As the drive shaft 58 rotates in a counter-clockwise direction, the driven shaft 52 and auxiliary shaft 128 will also rotate in a counter-clockwise direction, with the clutch plate 76 engaged with the pulley 66, and the worm 148 will be moved outwardly from the lift bar 156 to push the head section 26 upwardly. When the button 164 is depressed, the drive shaft 58, driven shaft 52 and auxiliary shaft 128 will rotate in a clockwise direction to feed the worm 148 into the lift bar 156 and lowered the head section.

In view of the foregoing description taken in conjunction with the accompanying drawings it is believed that a clear understanding of the device will be quite apparent to those skilled in this art. A more detailed description is accordingly deemed unnecessary.

It is to be understood, however, that even though there is herein shown and described a preferred embodiment of the invention the same is susceptible to certain changes fully comprehended by the spirit of the invention as herein described and the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. A raising and lowering mechanism comprising a pair of horizontally disposed spaced back to back angle members, a cross-strap joining one end of one member to one end of the other member, said angle members including a pair of coaxial arms, a transverse support member spaced

from and extending alongside of said arms, mounting brackets connecting the arms to the ends of the support member, L-shaped supporting members fixed to and depending from said cross-strap and including horizontal portions underlying said angle members, hanger straps terminally secured to said horizontal portions and said support member, a raising and lowering means carried by each of said arms and the ends of said support member, an operating mechanism carried by said cross-strap and said support member and operatively connected to said means, and a motor mounted on the horizontal portions of said L-shaped supporting members and operatively connected to said mechanism.

2. A raising and lowering mechanism comprising an elongated open frame having a pair of coaxial longitudinal projections at its ends, brackets forming the outer extremities of said projections and adapted to be secured to a supporting structure, a pair of spaced parallel shafts rotatably supported by said frame and extending transversely of the frame, a main driven shaft also rotatably supported by the frame and extending transversely of the frame and located between the pair of shafts, hanger members depending from the frame, a motor supported by said hanger members and connected to the main driven shaft for rotating the latter, a driven member carried by each of said projections, one of said driven members being operatively connected to one of said pair of shafts and the other of said driven members being operatively connected to the other of said pair of shafts, a pair of pulleys journaled on said main driven shaft, one of said pulleys being operatively connected to one of said pair of shafts and the other of said pulleys being operatively connected to the other of said pair of shafts, a clutch collar keyed on said main driven shaft between said pulleys for selectively engaging the pulleys, a rod fixed to the frame alongside of and parallel to the main driven shaft, a sleeve slidably received on said rod, a rigid actuating member fixed to the sleeve and having a bifurcated end engaging the clutch collar, and an operating bar slidably carried by the frame and having an end pivotally secured to the actuating member.

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