A change-over unit for hoisting appliances with a lower block suspended in a plurality of rope parts from an upper block, and with an intermediate block inserted between said blocks, the intermediate block being adapted to be arbitrarily coupled to the upper block or to the lower block to change the transmission ratio and the permissible load, the upper block being provided with at least one releasable coupling member which is arranged to engage at least one coupling member provided on the intermediate block, the lower block having at least one uncoupling member which is designed as a releasing member for the coupling member of the upper block, said coupling member being adapted to be arbitrarily placed in a releasing position or a neutral position.

5 Claims, 6 Drawing Figures
The present invention relates to a change-over unit for hoisting appliances with a lower block suspended in a plurality of rope parts from an upper block, and with an intermediate block inserted between said blocks, and wherein the intermediate block can be arbitrarily coupled to the upper block or to the lower block to change the transmission ratio and the permissible load. Depending upon the coupling of the intermediate block to the lower block or to the upper block the hoisting appliance may, e.g., operate with two, respectively four parts of rope.

The invention has for its object to provide a unit by means of which the change-over operation can be executed simply and semi-automatically.

According to the invention this object is substantially attained by providing the upper block with at least one releasable coupling member which is arranged to engage at least one coupling member provided on the intermediate block, and by providing the lower block with at least one un-coupling member which is designed as a releasing member for the coupling member of the upper block, and which can be arbitrarily placed in a releasing position or a neutral position.

If by means of the lower block the intermediate block is hoisted into contact with the upper block, and the releasing member is in its neutral position, the intermediate block will be coupled to the upper block. In this manner a change-over can be made from operation, e.g., with two parts of rope to operation with four parts of rope, as the intermediate block remains coupled to the upper block when the lower block is lowered. If it is wanted again to change over from operation with four parts to operation with two parts of rope, the releasing member placed on the lower block is moved to releasing position, which can easily be done from the ground when the lower block has been lowered. When, thereupon, the lower block is hoisted, the releasing member will release the coupling connection between the upper block and the intermediate block, and the intermediate block can now be lowered together with the lower block, which is tantamount to a resumption of operation with two parts of rope. The two-parts operation continues for as long as the releasing member remains in its releasing position. Not until the releasing member is returned to its neutral position can the intermediate block be coupled to the upper block again, and a change-over to four-parts operation can take place. Four-parts operation continues for as long as the releasing member is allowed to remain in its neutral position.

According to the invention the coupling members may be designed as clutches and the releasing member as a filling member which may enter the gap of the clutch in the coupling member of the intermediate block. In a particularly simple but robust construction of this embodiment filling member may, according to the invention, consist of a sliding pawl which is swingably mounted on the lower block.

Furthermore, in an appropriate embodiment of the invention the coupling clutch of the upper block may be formed as a swingable, spring-loaded coupling member and the coupling clutch of the intermediate block as a stationary coupling member opposite the clutch of the upper block, whereby a simple and reliable construction is obtained.

In still another embodiment of the change-over unit according to the invention the lower block and/or the upper block may be provided with at least one resiliently yielding stop member facing the upper block, respectively the lower block, which said stop member is adapted to abut against the counter block, and the stop member may be so designed and positioned as to abut against the counter block, before the coupling members of the two blocks engage one another. This implies that the coupling connection is not effected until a certain elastic resistance of the stop member has been overcome. The thrust resulting from this serves to secure the coupling connection now established.

In a particularly suitable embodiment of the latter example of the invention the hoisting appliance according to the invention may be provided with an overload coupling, which is adapted to come into operation after the coupling together of the coupling members. Consequently, a special switch disconnecting the hoisting appliance after the coupling of the intermediate block to the upper block will be superfluous.

In the following the invention will be described in more detail, reference being had to the drawing which shows a particularly appropriate embodiment of the change-over unit according to the invention.

FIG. 1 showing the unit arranged for operation with two parts of rope,
FIG. 2 the unit prepared for changing over to operation with four parts of rope,
FIG. 3 the unit immediately before changing over to operation with four parts of rope,
FIG. 4 the unit arranged for operation with four parts of rope,
FIG. 5 the unit prepared for changing over to operation with two parts of rope, and
FIG. 6 shows a further embodiment of the unit.

The drawing shows a travelling trolley 1, which by means of travelling rollers 2 is movably suspended from a travel-rail 3. The trolley is provided with two rope pulleys 4 and constitutes the upper block in a hoisting appliance.

A lower block 5 provided with rope pulleys 6 and a crane hook 7 is suspended from said lower block.

The hoisting appliance furthermore comprises an intermediate block 8 with a rope pulley 9.

The rope 10 of the hoisting appliance has been passed over the rope pulleys 4 and 9 and under the rope pulleys 6.

Furthermore, the travelling trolley or upper block 1 has two coupling clutches 11, the coupling gaps of which facing one another. Both clutches are swingable about separate axes 12 and are urged in direction towards each other, each by its own compression spring 13, their movement of swinging in said direction being restricted by stop members 14.

The intermediate block 8 is provided with similarly designed and positioned counter clutches 15, which are in fixed connection with the block and whose gaps face away from one another.

The lower block 5 is provided with swingably mounted sliding paws 16 which are designed and positioned in such a way that they may be swung into and at least partially fill out the gaps in the clutches 15 of the intermediate block 8, when the intermediate block 8 is coupled to the lower block 5.
Moreover, the lower block 5 is provided with resiliently yielding stop members 17 in the form of caoutchouc buffers, which extend freely some way up from the side of the lower block 5 facing the upper block 1 and are located on opposite sides of the intermediate block 8. As shown in FIG. 6, the resiliently yielding stop member 17' may also be attached to the upper block 1 and face the lower block 5.

The change-over unit described heretofore operates as follows:

Assume that the unit is in the position shown in FIG. 1. In this position the intermediate block 8 is coupled to the lower block 5 by resting on a supporting surface 18 of the lower block, whereby the intermediate block 8 is held in this abutting position by means of the rope arrangement described in the foregoing. The sliding pawls 16 have been swung into their releasing position in the gaps of the clutches 15. The lower block 5 is suspended in two rope parts 10a and 10b together with the intermediate block 8.

In this condition the unit is arranged for operation with two parts of rope, the sliding pawls 16, having been turned inwardly, preventing the clutches 11 of the upper block 1 from engaging the clutches 15 of the intermediate block 8, in case of lower block 5 is hoisted all the way up together with the intermediate block 8.

If it is desired to change over to operation with four parts of rope, the sliding pawls 16 are swung out into neutral position as shown in FIG. 2, which can be easily done from the ground, when the lower block 5 has been hauled down. This means that the clutches 15 of the intermediate block 8 have now been “opened” for engaging the clutches 11 of the upper block 1.

The first thing which happens if, now, by means of the lower block 5 the intermediate block 8 is hoisted towards the upper block 1, is that the caoutchouc buffers 17 or 17’ come into abutment with the upper block 1. Continued raising of the lower block 5 will effect a compression of the buffers 17 or 17’, whereby partly the position of the lower block 5 and consequently also the position of the intermediate block 8 in relation to the upper block 1 are secured, and partly a thrust is accumulated in the buffers. After a certain compression of the buffers 17 or 17’ the clutches 11 and 15 will engage each other, as initially the clutches 15 against the spring load of the clutches 11 will force the latter slightly backwards, and thereby the clutches 11 urged by the compression springs 13 will engage the clutches 15.

Furthermore, the hoisting appliance is provided with an overload coupling 18, shown in FIG. 1, which now starts functioning, i.e., after the clutches 11 and 15 have engaged one another. This means that the thrust accumulated in the buffers 17 or 17’, now also contributes to secure the engagement of the clutches.

Hereafter the unit operates with four parts of rope, as the intermediate block 8 is now coupled to the upper block 1, and thus the lower block is suspended in four rope parts, 10a, 10b, 10c, and 10d, see FIG. 4.

Operation with four parts of rope continues for as long as the sliding pawls 16 remain in the neutral position shown in FIGS. 2-4. Not until they are again swung into their releasing position, as shown in FIG. 5, which also can be done without difficulty from the ground if the lower block 5 has been hauled down, is a change-over to operation with two parts of rope prepared again, as the pawls 16 may then, when the lower block 5 is hoisted all the way up, penetrate between the clutches 11 and 15 and force the clutches 11 to disengage the clutches 15. As long as the pawls 15 are allowed to remain in their releasing position, the unit is again arranged for operation with two parts of rope, as described in connection with FIG. 1.

The unit herein described can also be applied in a modified form to change-over operations with other numbers of rope parts without departing from the principle of the invention as explained in the foregoing.

What we claim is:

1. A change-over unit for hoisting appliances comprising:
   an upper block having at least one releasable coupling member and a plurality of rope parts;
   a lower block for connection to a load to be hoisted, the lower block being suspended from and hoisted toward the upper block by the rope parts and including means for releasing the coupling member of the upper block, said means including at least one releasing member having a neutral position and a releasing position;
   an intermediate block inserted between the upper and lower blocks and supported by the lower block, the intermediate block having at least one coupling member arranged to engage the releasable coupling member on the upper block when the lower and intermediate blocks are hoisted toward the upper block, the intermediate block (1) being coupled to the upper block, when said releasing member is in the neutral position, to suspend the intermediate block from the upper block and (2) being supported by the lower block when said releasing member is in the releasing position, the intermediate block further including means for increasing the number of rope parts when the intermediate block is suspended from the upper block to change the transmission ratio and the permissible load of the hoisting appliance when the coupling members are engaged and the intermediate block is suspended from the upper block; and
   at least one resiliently yielding stop member supported by the lower block in facing relation to the upper block, the stop member abutting against the upper block before the coupling members of the intermediate and upper blocks engage one another to compress said stop member, said compressed stop member securing the lower block with respect to the upper block and, upon engagement of the coupling members, exerting a thrust tending to secure such engagement.

2. A change-over unit according to claim 1, characterized in that the hoisting appliance is provided with an overload coupling, which is adapted to come into operation after the coupling together of the coupling members.

3. A change-over unit according to claim 2, wherein the overload coupling comes into operation upon continued hoisting of the intermediate and lower blocks after the coupling together of the coupling members.

4. A change-over unit according to claim 1, wherein the stop member has areas for abutment with the upper block that are positioned in straddling relation with the intermediate block.

5. A change-over unit for hoisting appliances comprising:
an upper block having at least one releasable coupling member and a plurality of rope parts; a lower block for connection to a load to be hoisted, the lower block being suspended from and hoisted toward the upper block by the rope parts and including means for releasing the coupling member of the upper block, said means including at least one releasing member having a neutral position and a releasing position; an intermediate block inserted between the upper and lower blocks and supported by the lower block, the intermediate block having at least one coupling member arranged to engage the releasable coupling member on the upper block when the lower and intermediate blocks are hoisted toward the upper block, the intermediate block (1) being coupled to the upper block, when said releasing member is in the neutral position, to suspend the intermediate block and (2) being supported by the lower block when said releasing member is in the releasing position, the intermediate block further including means for increasing the number of rope parts when the intermediate block is suspended from the upper block to change the transmission ratio and the permissible load of the hoisting appliance when the coupling members are engaged and the intermediate block is suspended from the upper block; and at least one resiliently yielding stop member supported by the upper block in facing relation to the lower block, the stop member abutting against the lower block before the coupling members of the intermediate and upper blocks engage one another to compress said stop member, said compressed stop member securing the lower block with respect to the upper block and, upon engagement of the coupling members, exerting a thrust tending to secure such engagement.

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