Feb. 23, 1960 E. SUNDBLAD 2,926,039

LIFTING DEVICE

Filed March 19, 1957

FIG. 1

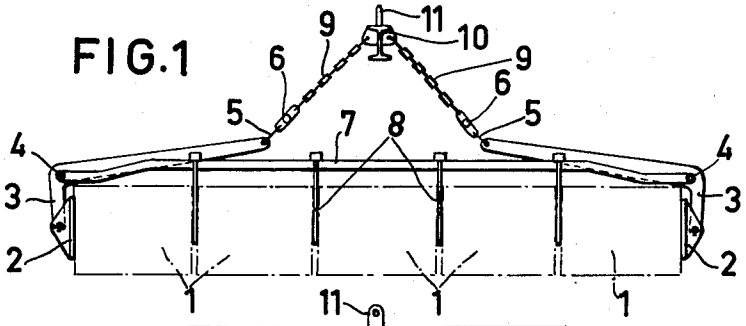


FIG. 2

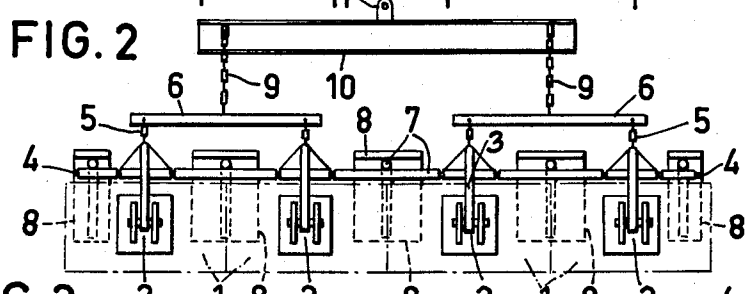
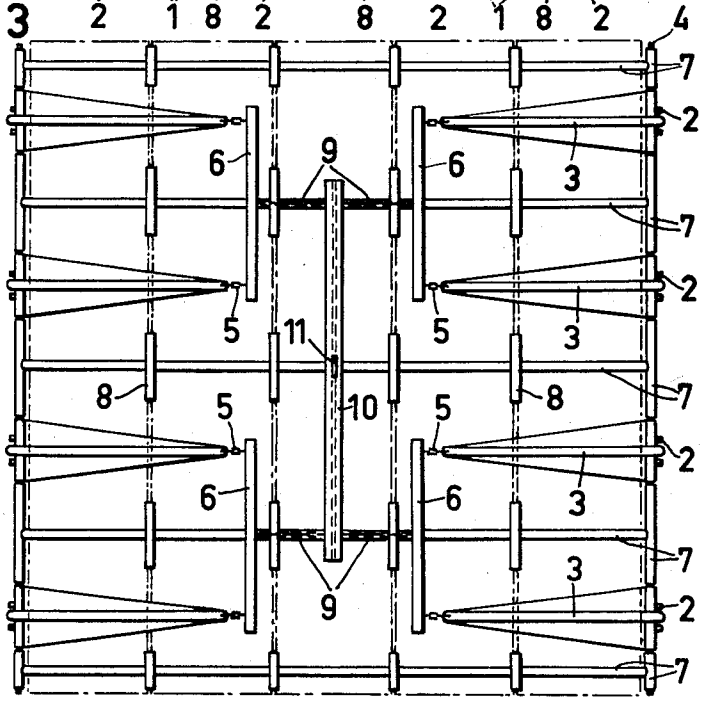


FIG. 3



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LIFTING DEVICE

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5 Claims. (Cl. 294—106)

The present invention relates to a device to be applied in the lifting hook of a crane, a travelling crane or some other lifting equipment, the purpose being to lift a load which during the lifting operation is retained between pivotally movable clamping means.

The invention is first of all applicable to such lifting devices which are used in storehouses, warehouses and in other premises, where it will be necessary to simultaneously lift a comparatively large number of parcels, which preferably should have at least substantially the same dimensions and/or have the same quality. As an example of places where such a lifting device may be used may be mentioned storehouses for bales of paper pulp and similar material. Hitherto, in lifting such goods, pallets or skids have generally been used, in which case, however, the bales must first be placed upon the pallet or the skid, before it is possible, by means of the lifting device, to lift simultaneously a greater number of parcels.

The object of the invention is to provide a device by which these disadvantages are eliminated. The invention, as mentioned above, is of the type operating with clamping action between pivotally movable clamping members, between which the load is placed. If one will lift simultaneously a greater number of parcels, for example bales of paper pulp, by such a device, one will find that the number of parcels, which in a satisfactory manner can be clamped simultaneously between the said clamping means is limited, and that this number cannot be substantially increased by increasing the clamping pressure, as the parcels then will be exposed to so great forces that the wrapping will burst or the parcels will in some other way be damaged or deformed. According to the invention, however, it is possible to lift simultaneously a great number of parcels, which are placed in one or more rows, the clamping force being caused to act upon the outermost parcels of each row only. According to the substantial characteristic of the invention this has been attained by arranging the clamping means in pairs at their respective end of a number of horizontal rods, besides which, in order to make it possible to clamp and lift satisfactorily a load consisting of a greater number of parcels, insertions are introduced between the side surfaces of the parcels which are pressed against each other, the said insertions being arranged to retain and carry adjacent parcels.

By such an arrangement it will be possible to apply the parcels rapidly to the lifting equipment and loosening them after completed conveyance from the lifting equipment without any extra reloading before or after the lifting operation, as the said insertions can be introduced from above or from the side between adjacent parcels, whereby these need not be moved.

The insertions may be of several different kinds. Their retaining action can be based on pure friction, in which case they are pressed against the side surfaces of adjacent parcels without really penetrating thereinto. They

may also be provided with jags or similar projections, which, when the clamping force is applied, penetrate more or less into the pracels or in the wrappings, in which case the retaining force normally will be greater than when only friction is utilized.

An embodiment of the invention will now be described, the accompanying drawings being referred to.

Fig. 1 illustrates a view of the invention, seen from one side.

Fig. 2 illustrates a view seen from an angle displaced 90° in respect of Fig. 1.

Fig. 3 shows a horizontal view of the device.

Parcels **1**, which may for example be boxes of uniform size, bales of paper pulp or the like, are applied in a lifting device having four pairs of outer clamping members **2** and intended to lift twenty parcels of the same size. Clamping members **2** are, by means of clamping arms **3**, which are bent angularly and are pivotally mounted on a shaft **4** located near the points of the angle, connected via chain links **5** to a balance arm **6**. The shafts **4** are attached to or are a part of a frame or stiffening tube structure **7**, which absorbs the forces of reaction of the clamping forces via the shafts **4**. Twenty insertions **8**, which may for example be rigid such as slotted plates or may be flexible as chains or ropes are suspended in the tube structure **7**. When the lifting equipment is lowered without load over a unit of parcels, the insertions **8** can move upward without penetrating into the space between the parcels. Only after the lifting equipment has been lowered entirely, so that the tube structure rests upon the parcels, the insertions are introduced between the parcels, which of course ought to take place before the equipment is lifted and a clamping action sets in. The four scale arms **6** are suspended in pairs by means of chain links **9** in their middle points at the ends of a scale beam **10**. At the centre of the scale beam a lifting loop **11** is provided, which can be gripped by the hook of the lifting equipment. Through combination of the scale arms **6** and **10** each of the clamping arms **3**, when lifting operation is carried out, will always exert a uniform clamping force via the respective clamping member **2**.

Means for connecting the scale beam **10** with the tube structure **7**, when the lifting equipment shall release its grip of the parcels and shall be conveyed without load to the next operation, are not illustrated in the drawing. Means for such a connection of the scale beam **10** with the tube structure **7** may consist of a hook, which can be connected and disconnected manually, or it may be made in some other manner. When the scale arm **10** and the tube structure **7** have been connected by a hook, the arms **6** and **3** are held down by their own weight, whereby the clamping means remain outstretched. When the hook has been released and lifting thereafter is carried out entirely via the arms **10**, **6**, and **3**, the clamping members **2** will be clamped together, whereby the parcels will be retained between the clamping means through the friction between the parcels and the clamping means **2** and the insertions **8**, and then the parcels cannot be released until the load of parcels has been put down.

Above a particular embodiment of the invention is described, but it is to be understood that the invention is not restricted to the embodiment shown and described, other embodiments being possible within the scope of the invention.

The scale beam system can be constructed in several different ways and can be enlarged according to the number of parcels to be lifted at a time. Instead of chain links shafts may be provided and rotatable bearings round them. Also other principles for converting the lifting force into clamping force may be applied, for example by means of ropes and pulleys or by means of

hydraulic transmission of force and the like. The clamping means may for example be in the form of smooth or grooved plates or the like. The clamping force need not necessarily be exerted by the lifting force, but may be effected by means of special devices independently of the lifting.

What I claim is:

1. A device of the type described comprising a rectangular framework, at least one pair of bell crank levers pivotally mounted at corresponding points on opposite sides of said framework so as to pivot in a plane at right angles to the plane of said framework, a clamping member on one end of each lever, a sling assembly attached to the other ends of said levers, a plurality of cross members fixed to said framework and extending from one of said opposite sides to the other thereof, and a plurality of inserts mounted on said cross members and movable therealong, said inserts being movable into position between packages to be lifted after said frame rests upon the packages, a clamping force exerted by said clamping members causing the packages to press against said inserts which rise with the frame producing a lifting force on the packages.

2. In the combination of claim 1, said inserts comprising flexible members, said inserts being laterally movable to permit insertion thereof before the clamping action is initiated.

3. The combination of claim 2 wherein said flexible inserts are chains.

4. The combination of claim 2 wherein said flexible inserts are ropes.

5. A device of the type described comprising a rectangular framework, at least one pair of bell crank levers pivotally mounted at corresponding points on opposite sides of said framework so as to pivot in a plane at right angles to the plane of said framework, a clamping member on one end of each lever, a sling assembly attached to the other ends of said levers, a plurality of cross members fixed to said framework and extending from one of said opposite sides to the other thereof, and a plurality of rigid inserts mounted on said cross members and movable therealong, said inserts being mounted for movement in a direction perpendicular to the plane of said frame whereby said inserts may be moved into position between packages to be lifted after said frame rests upon the packages, a clamping force exerted by said clamping members causing the packages to press against said inserts which rise with the frame producing a lifting force on the packages.

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