Jan. 12, 1960 K. K. KÄMÄRÄINEN 2,920,736

DEVICE FOR LIFTING AND LOADING OF MASS-GOODS SUCH AS SAND, GRAVEL, GRAIN, SNOW ETC

Filed Nov. 25, 1957 4 Sheets-Sheet 1

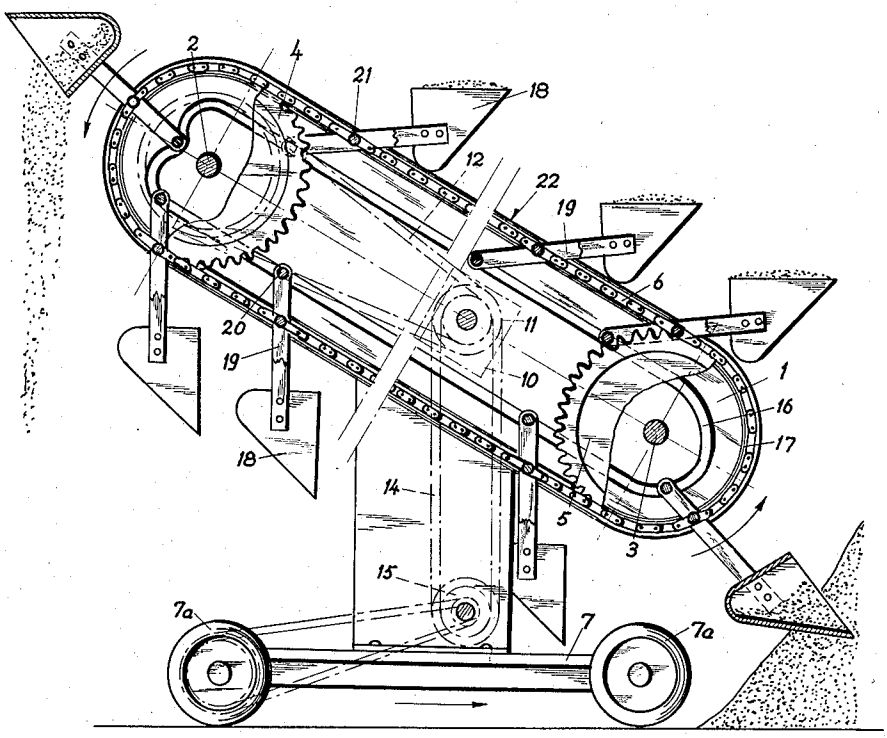


Fig. 1

Jan. 12, 1960 K. K. KÄMÄRÄINEN 2,920,736

DEVICE FOR LIFTING AND LOADING OF MASS-GOODS SUCH AS SAND, GRAVEL, GRAIN, SNOW ETC

Filed Nov. 25, 1957 4 Sheets-Sheet 2

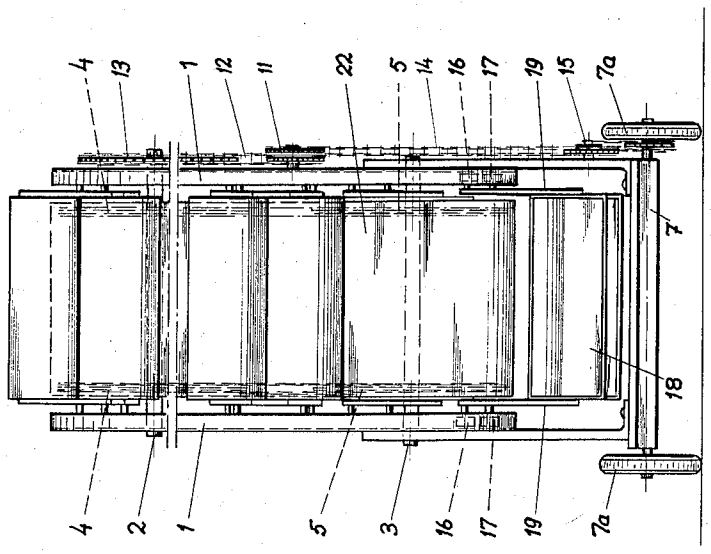


Fig. 2

Jan. 12, 1960 K. K. KÄMÄRÄINEN 2,920,736

DEVICE FOR LIFTING AND LOADING OF MASS-GOODS SUCH AS SAND, GRAVEL, GRAIN, SNOW ETC

Filed Nov. 25, 1957 4 Sheets-Sheet 3

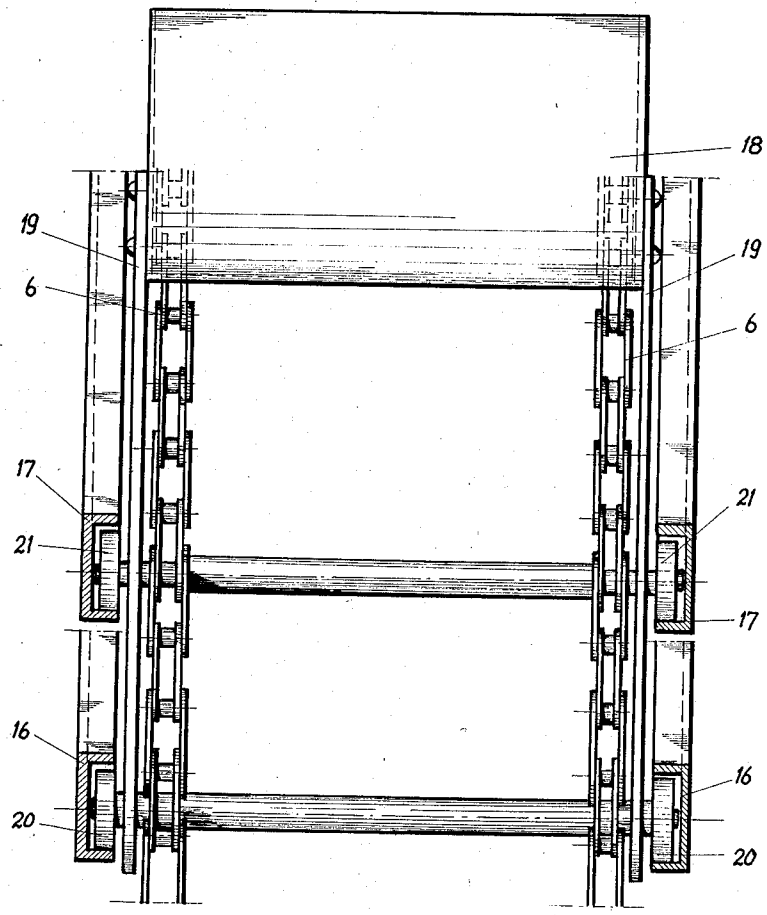


Fig. 3

Jan. 12, 1960 K. K. KÄMÄRÄINEN 2,920,736

DEVICE FOR LIFTING AND LOADING OF MASS-GOODS SUCH AS SAND, GRAVEL, GRAIN, SNOW ETC

Filed Nov. 25, 1957 4 Sheets-Sheet 4

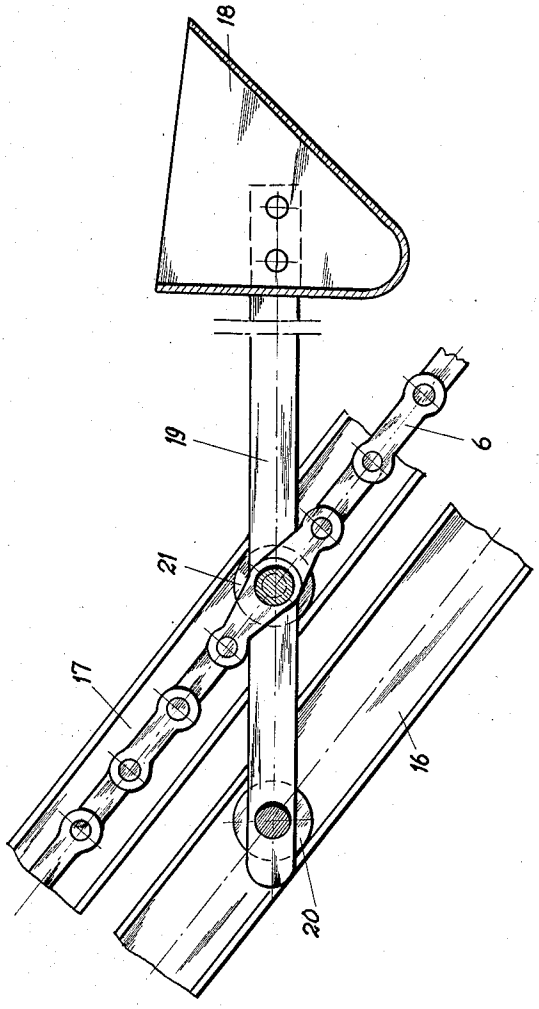


Fig. 4

United States Patent Office 2,920,736
Patented Jan. 12, 1960

2,920,736

DEVICE FOR LIFTING AND LOADING OF MASS-GOODS SUCH AS SAND, GRAVEL, GRAIN, SNOW ETC.

Kalle Kustaa Kämäräinen, Lahti, Finland

Application November 25, 1957, Serial No. 698,675

5 Claims. (Cl. 198—12)

The above invention refers to an arrangement for lifting, removing and loading of mass-goods, such as sand, gravel, grain, snow etc. comprising a driven paternoster mechanism, equipped with shovels, digging scoops, spades or the like equipment, arranged one after the other and driven by endless chains, wires or the like elements mounted movable around an oblong frame, preferably with rounded-off corners. This frame can most advantageously be arranged resting on transporting wheels. The frame is adjustable into different inclined positions relative the earth. The shovels are arranged to move upwards along the upper sides of the inclined frame and downwards along its lower sides turning around at both ends of the frame.

The device according to the invention is mainly characterized by the feature that the shovels of the elevator are mounted on a shaft at each side of the shovels, said shafts having two transversally projecting guide-pegs provided with rolls and being arranged to catch into two endless channel-formed guide-tracks on each side of the frame, so that the shovels during their motion around the frame will be guided by said tracks. The tracks are bent at the lower end of the frame in such a way that the shovels here will be pushed into the goods to be lifted, parallelly to the ground surface and only thereafter be lifted up together with the goods and transported to the upper end of the paternoster device substantially maintaining their position as to the ground, where the shovels are being tilted over and the goods thus emptied.

The accompanying drawing shows schematically one of the embodiments of a device according to the invention, viz.:

Fig. 1 shows a side elevation view of the device, with a side wall removed,

Fig. 2 shows the device seen from the front, and

Figs. 3 and 4 show a shovel element in a larger scale in front and side elevation.

The frame of the device comprises two parallel plates **1**, the ends of which are rounded. At both of the ends of the frame are axles **2** and **3** arranged with cog-wheels **4**, **5**, around which the driving chains **6** of the paternoster device are arranged to travel.

The frame **1** rests on a support **7** with wheels **7***a*. At the lower end of the frame is an adjustable stand with wheels. For driving the paternoster device there is arranged in the frame a motor **10**. The motor **10** transmits power to the driving chain **6** over the cog-wheel **11**, the chain **12**, and the cog-wheel **13** on the upper cog-wheel **4**. By means of another chain **14** running over the cog-wheel **15** connected to the transport wheel **7***a* the complete device may be moved by the motor **10**.

On the inner side of each of the side walls of the frame there are arranged two U-formed irons serving as guide-tracks **16** resp. **17** for the rolls **20**, **21** of the shafts **19** of the shovels **18** of the paternoster device. Each shaft has two sidewardly projecting guide-pegs, the one placed at the end of the shaft, the other at the middle of the shaft. These pegs carry the guide-rolls **20**, **21** which

are adapted to run inside and along the aforesaid guide-tracks **16**, **17**. The shovel shafts **19** are connected with the driving chains **6** of the device. Between the shovels is a belt **22** arranged to prevent the goods to be transported from falling down between the shovels and into the frame.

The guide-tracks **16**, **17** are to the greatest part of their length mutually parallel. At the end of the frame the outer track is running as a circular arc, while the inner track is bent according to a special form, for the purpose of adjusting the motion of the shovel shaft so that the shovels at the lower end will perform a digging motion into and parallelly relatively the ground against the goods intended for transport. Only hereafter they will be lifted upwards and transported to the upper end of the device. During the movement the shovels will substantially maintain their inclined position relatively the ground. The shovel shafts are steered by both of the steering tracks thus, that during the downward motion of the shovels towards the goods, the inner roll **20** of the shovel is in its moving direction following after the roll **21** running in the outer track. When the shovels are passing the lower end of the frame, the mutual position of the guide rolls will be reversed in such a way that, while the shovels are moving towards the upper end of the device, the inner roll **20** of the shovels will be running in front of the outer steering roll **21**, as shown in Figure 1.

The device can be arranged so that it will empty the lifted goods into a truck, a railway wagon or into some suitable container. The shape of the shovels can also vary in different ways, depending on the kind of work that the device is made to perform. For example, instead of shovels there can be used forks or the like elements, whereby the device can be used for digging up potatoes and to place these into a sorting or a storing container.

The device according to the present invention is not limited to the form of construction shown in the drawing. It can be completed and varied in different ways without departing from the spirit and scope of the invention. It is for instance possible to substitute the motor **10** with a transmission axle receiving its driving power from a separate power resource, for instance a tractor.

What I claim is:

1. A material lifting device, comprising an endless travelling chain, scoop elements coupled to said chain, an outer continuous guideway, an inner continuous guideway cooperatively associated with said outer guideway, a first pair of rollers for and operatively associated with each said scoop element and cooperatively associated with said outer guideway and a second pair of rollers coupled to each said scoop element and cooperatively associated with said inner guideway for the continuous control of each of said scoop element as it is moved in a cycle by said endless travelling chain from a material loading position to a material discarding position without any loss of material therebeteween and again to the material loading position to recommence the cycle, said inner and outer guideways comprising guide-tracks on which said associated rollers travel, said inner guide-track being substantially uniformly spaced from said outer guide-track between said loading and discarding positions and being spaced a distance greater than the uniform spacing at said discarding position and a distance less than said uniform spacing at said loading position, which distances cooperate with each said scoop element in order to position it in said discarding position and in said loading position and to prevent loss of material when each said scoop element moves from said loading position to said discarding position.

2. The device in accordance with claim 1 including a pair of shaft handle members for each said scoop elements, each said shaft handles being fixedly coupled at one end to said scoop element, a first shaft member coupled to the end of each said shaft handle members and a second shaft member coupled to each said shaft handle members intermediate the ends thereof, said first pair of rollers being coupled to said first shaft member and said second pair of rollers being coupled to said second shaft member.

3. The device in accordance with claim 2 in which a first stud member projects from one end of said first shaft member and a second stud projects from the other end of said first shaft member, one roller of said first pair of rollers being coupled to the outer end of said first stud member and the other roller of said first pair of rollers being coupled to the outer end of said second stud member, and said endless travelling chain being coupled to the inner end of one of said stud members for driving said first shaft member and said first pair of rollers.

4. The device in accordance with claim 3 including another endless travelling chain coupled to said inner end of said second stud member for driving said first shaft in cooperation with said first-mentioned endless travelling chain.

5. A material lifting device, comprising an endless travelling chain, scoop elements coupled to said chain, an outer continuous guideway, an inner continuous guideway cooperatively associated with said outer guideway, a frame supporting said inner and outer guideways in position for movement of said scoop elements along the upper side of the frame and down along its lower side, the inner guideway being curved so as to be closer to said outer guideway at the lower extremity of said frame and being curved in a direction opposite to the curvature of said outer guideway at the upper extremity of said frame so that said scoop elements are pressed against and parallelly to the ground at said lower extremity of said frame and said scoop elements are overturned to release the material therein at said upper extremity of said frame, a first pair of rollers for and operatively associated with each said scoop elements and cooperatively associated with said outer guideway and a second pair of rollers for and operatively associated with each said scoop elements and cooperatively associated with said inner guideway for the continuous control of each of said scoop elements as they are moved in a cycle by said endless travelling chain from a material loading position at said lower extremity of said frame to a material discarding position at said upper extremity of said frame without any loss of material therebetween and again to the material loading position to recommence the cycle, a pair of shaft handle members for each said scoop elements, each said shaft handles being fixedly coupled at one end to each said scoop elements, a first shaft member coupled to the end of each of said shaft handle members and a second shaft member coupled to each said shaft handle members intermediate the ends thereof, said first pair of rollers being coupled to said first shaft member and said second pair of rollers being coupled to said second shaft member, a first stud member projects from one end of said first shaft and a second stud projects from the other end of said first shaft member, one roller of said first pair of rollers being coupled to the outer end of said first stud member and the other roller of said first pair of rollers being coupled to the outer end of said second stud member, and said endless travelling chain being coupled to the inner end of one of said stud members for driving said first shaft and said first pair of rollers.

References Cited in the file of this patent

UNITED STATES PATENTS

1,213,640	Hewitt	Jan. 23, 1917
1,304,683	Hewitt	May 27, 1919

FOREIGN PATENTS

143,540	Switzerland	Feb. 2, 1931