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Rikman et al.

[11] **3,820,469**

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[54] **DEVICE FOR TRANSPORTATION OF LOADS BETWEEN OPERATIONS**

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[21] Appl. No.: **313,750**

Related U.S. Application Data

[63] Continuation of Ser. No. 163,712, June 19, 1971, abandoned.

[30] **Foreign Application Priority Data**

Nov. 4, 1970 U.S.S.R. 1483014

[52] **U.S. Cl.** ..... **104/96,** 104/172 C, 104/172 S

[51] **Int. Cl.** **B61b 3/00,** B61b 7/08

[58] **Field of Search** ..... 104/96, 172 C, 172 S; 198/20 R, 177 R, 177 T

[56] **References Cited**

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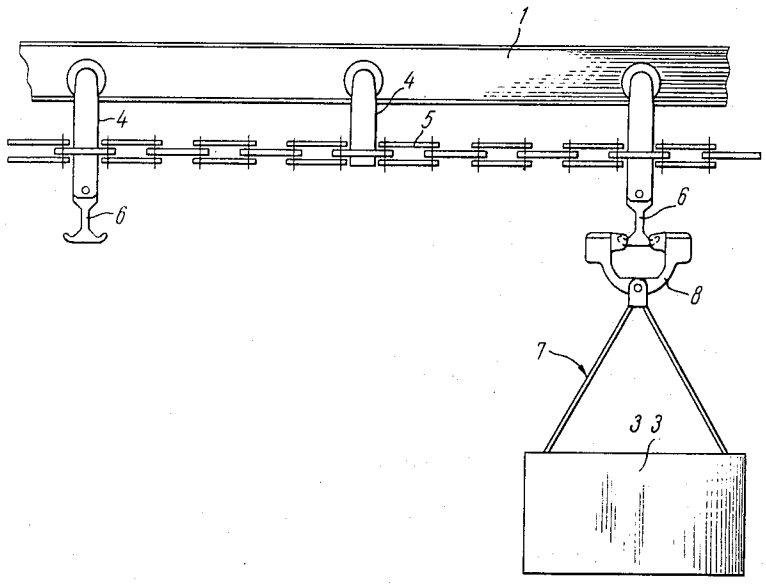
Primary Examiner—Drayton E. Hoffman

Attorney, Agent, or Firm—Holman & Stern

[57] **ABSTRACT**

The device of the present invention comprises overhead guide tracks along each of which carriages travel carrying a traction member and hooks for attaching a hanger with a load. Between these tracks there is arranged an overhead transfer conveyor, each trolley of which has a fork engaging with a carriage when the load is being transferred, and a lever for gripping the hanger. The lever is supported on master guides for lifting or lowering it when the hanger is being removed from or attached to a hook. These guides have a shaped groove fixing the trolley in the engagement zone. The front tooth of the fork is designed longer to be than the rear one, which makes it possible to select a length of the shaped groove that will ensure a reduction of the dynamic loads when a trolley with its load stops.

1 Claim, 7 Drawing Figures



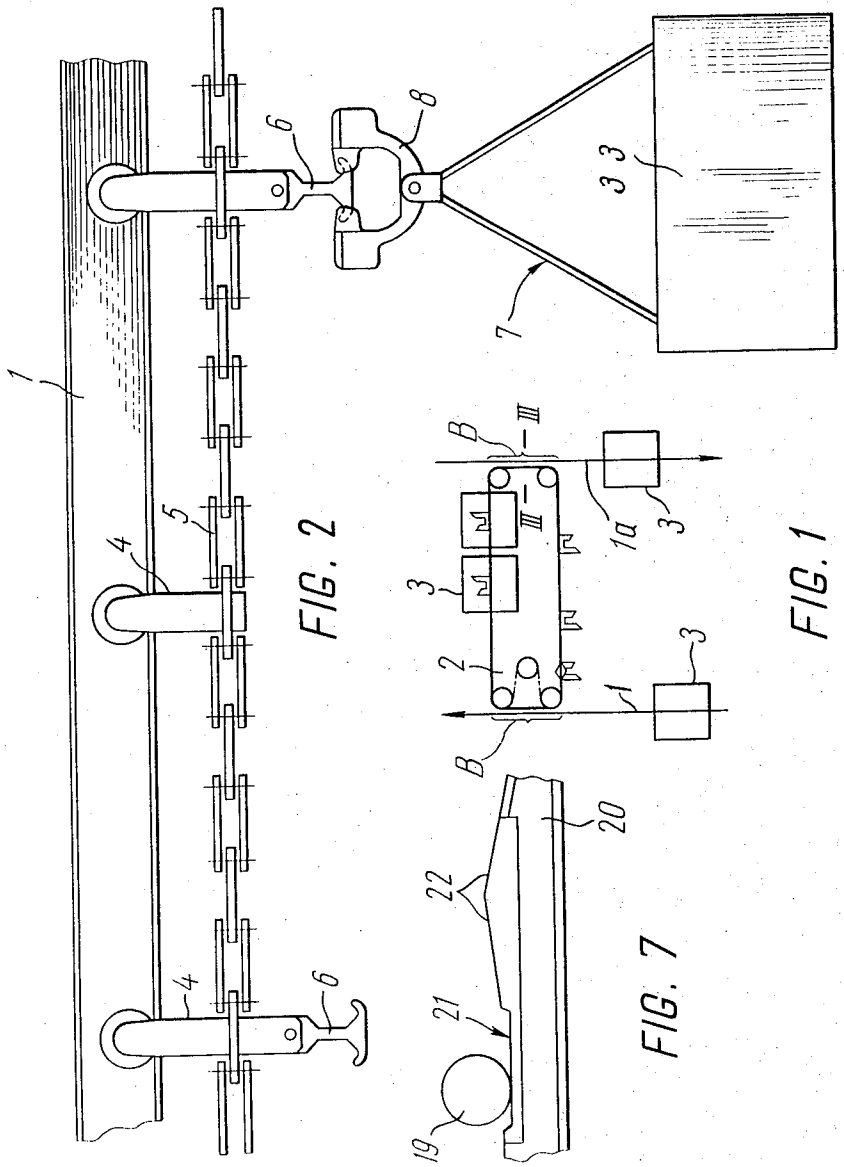


FIG. 2

FIG. 1

FIG. 7

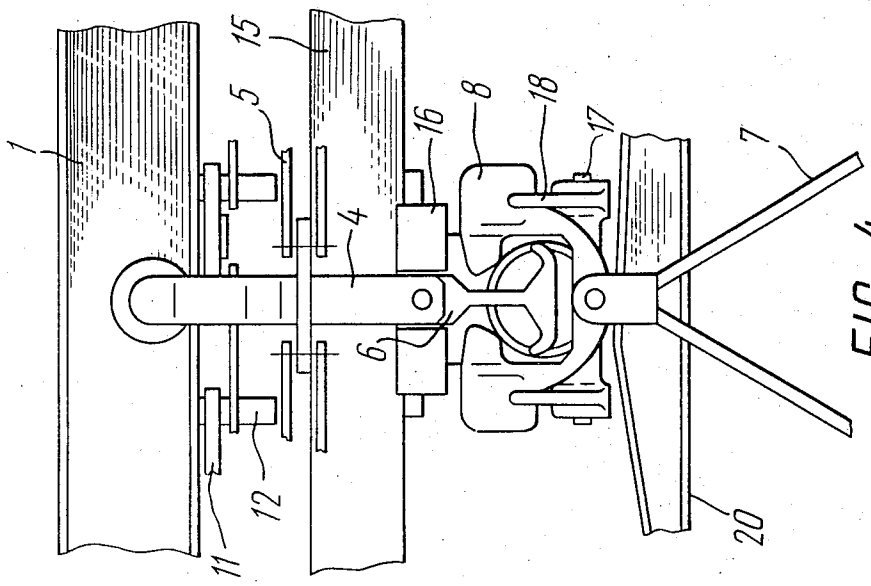


FIG. 4

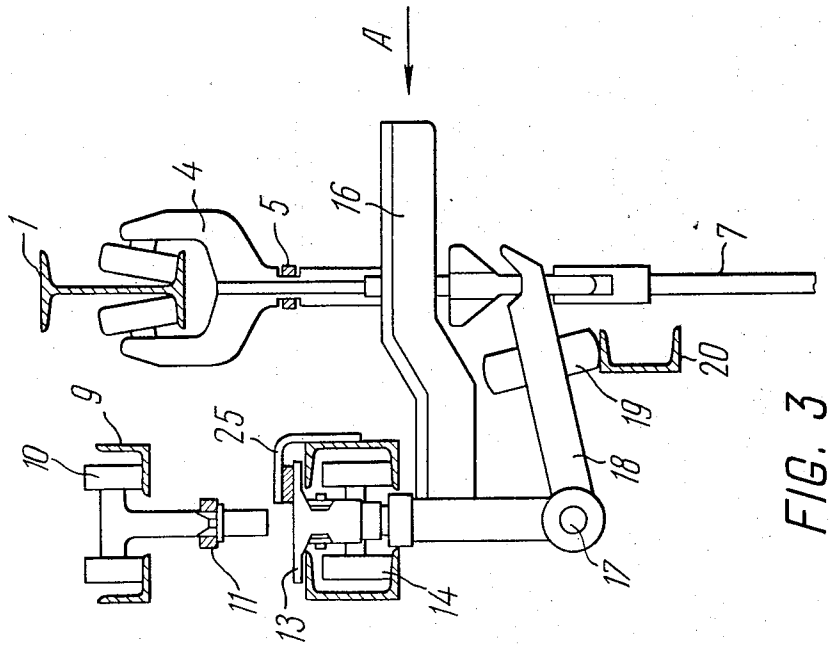


FIG. 3

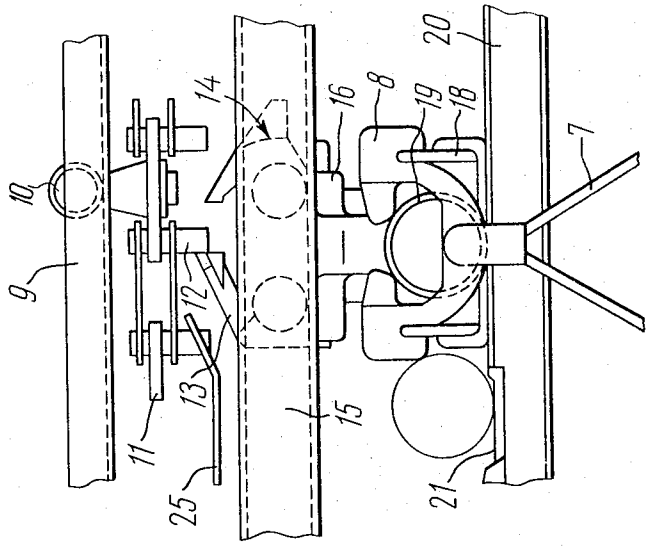

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16
8
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18
7
12
13
11
15
25
21

FIG. 6

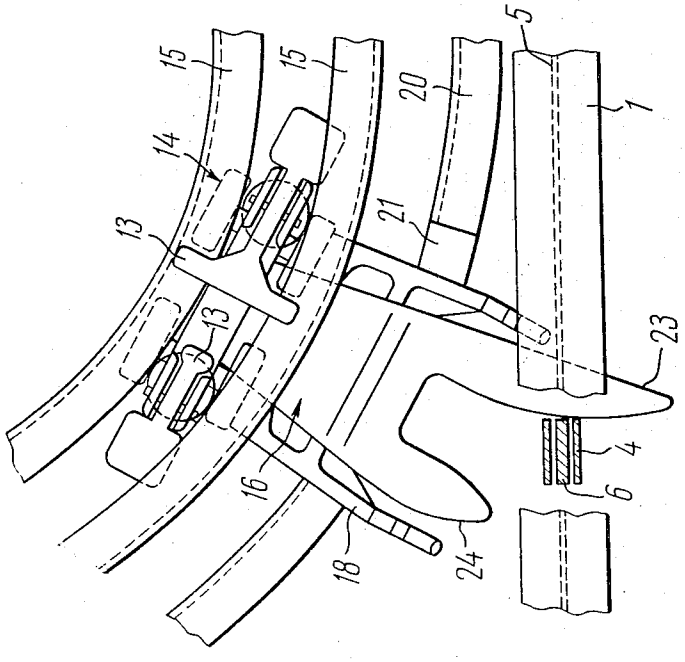

15
15
14
13
13
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5
1
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23
16
18
24
4
6

FIG. 5

DEVICE FOR TRANSPORTATION OF LOADS BETWEEN OPERATIONS

BACKGROUND OF THE INVENTION

This is a continuation of U.S. Pat. application Ser. No. 163,712, filed July 19, 1971 now abandoned.

The present invention relates to the field of mechanical handling equipment for machine building, and more particularly to equipment for the transportation of loads between operations.

There are known devices for the transportation of loads between operations comprising guide tracks along which carriages move carrying a traction member and hooks for the attachment of hangers with loads. Between said guide tracks there is arranged an overhead transfer conveyor serving to transfer a load from one guide track to the other. The conveyor is provided with an endless traction member to which pushers moving trolleys are secured. Each trolley is provided with a fork having a front and a rear tooth of equal length. This fork engages with a carriage on a guide track when a hanger with a load is being removed from (or attached to) a hook. In addition, each trolley is provided with a lever for gripping the hanger with its load and holding it when it is being carried along the overhead transfer conveyor. This lever is supported through a roller on master guides arranged near and along the route of the overhead transfer conveyor. In the zone of removing a hanger from its hook these guides have an upward slope in the direction of motion of the traction member, and in the zone of attachment of the hanger to a hook the guides have a downward slope.

In the said devices it is very difficult to ensure the required accuracy of stopping a trolley carrying a hanger with its load in the zone of engagement thereof with a carriage on a guide track for transferring the load to this track at considerable speeds of the trolley, since there are no means for fixing the stop of the trolley in the zone of its engagement with the carriage.

This inaccuracy of stopping the trolley in the zone of engagement may lead to the failure of the carriage to engage with the fork or to its engagement with the rear tooth, which will result in abnormal functioning of the device.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a device for the transportation of loads between operations that will ensure accurate fixing of a trolley with its load at the place of its transfer from the overhead transfer conveyor to a guide track which in turn, will ensure reliable operation of the device.

Another object of the present invention is to increase the zone of engagement of a trolley with a carriage, which will make it possible to reduce the dynamic loads when a trolley with its load is stopped in the zone of engagement.

In accordance with these objects, there is proposed a device for the transportation of loads between operations, comprising move, tracks along which carriages carrying a traction member move,, hooks for attaching hangers with a load being secured to the carriages, and an overhead transfer conveyor arranged between said guide tracks. The conveyor is provided with a traction member having pushers for moving trolleys, each of which has a fork with front and rear teeth that in the zone of engagement enter into contact with said carriage, and a lever for gripping the hanger supported on master guides arranged near and along the transfer conveyor, the guides having in the engagement zone slopes for lifting or lowering the lever when transferring a hanger, wherein, according to the invention, the master guides in the zone of engagement of the carriage with a trolley have a shaped groove fixing the trolley in this zone, the front tooth of the fork being made longer than the rear one which makes it possible to select a length of the shaped groove that ensures a reduction in the dynamic loads when a trolley stops with its load.

The device for the transportation of loads between operations according to the present invention makes it possible to increase the speed of the loaded trolleys, while simultaneously increasing reliability when a load is being transferred to a guide track from the transfer conveyor. Thus, in turn, makes it possible to sharply increase the output of the device for the transportation of loads between operations.

BRIEF DESCRIPTION OF THE DRAWINGS

The nature of the present invention will become more fully apparent from a consideration of the following description of an exemplary embodiment thereof, taken in conjunction with the accompanying drawings, in which:

FIG. **1** is a schematic view of the device for the transportation of loads between operations;

FIG. **2** is a section of a guide track with carriages and a load;

FIG. **3** is a section through III—III in FIG. **1**;

FIG. **4** is a view along arrow A in FIG. **3**;

FIG. **5** is a top view of a trolley in the zone of engagement with a carriage;

FIG. **6** is a side view of a trolley entering the zone of engagement with a carriage; and

FIG. **7** is a view of the master guides in the zone of engagement of a carriage with a trolley carrying a load.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

The device for the transportation of loads between operations comprises two overhead guide tracks **1** and **1***a* (FIG. **1**). Between these guide tracks there is arranged overhead transfer conveyor **2** designed for the transfer of loads **3** from one guide track **1** to the other track **1***a*.

Installed on each guide track **1, 1***a* are carriages **4** carrying traction member **5** and hooks **6** onto which hangers **7** are fitted with their shackles **8.** Load **3** is attached to a hanger for transportation thereof along guide track **1 1***a* or along overhead conveyor **2.**

Overhead transfer conveyor **2** is provided with rail **9** (FIGS. **3** and **4**) along which carriage **10** moves while carrying chain traction member **11.** Secured on the traction member are pushers **12** that interact with stops **13** arranged on each trolley **14** for moving it along rail **15.**

Fork **16** entering into contact with carriage **4** in the zone of engagement is secured on each trolley **14.** Lever **18** is mounted on trolley **14** on axle **17.** The lever is designed to grip hanger **7** when it is being removed from hook **6** or attached to this hook, and also for the transportation of load **3** along overhead transfer conveyor **2.**

Lever 18 is supported on roller 19 that moves along master guides 20 arranged near and along rail 15. Master guides 20 in engagement zone "B" serve for lifting lever 18 when hanger 7 is removed from hook 6 or for lowering lever 18 when hanger 7 is attached to hook 6. For this purpose master guides 20 are designed with a slope in the zone of engagement of trolley 14 with carriage 4. To provide fixed stopping of trolley 14 carrying load 3 in the zone of its engagement with carriage 4, master guides 20 are designed with shaped groove 21 (FIGS. 5, 6 and 7), after which inclined section 22 with an upward slope is arranged.

The provision of shaped groove 21 makes it possible to reliably stop moving trolley 14 with load 3 in the zone of its engagement with carriage 4. To extend this zone of engagement, fork 16 has front tooth 23 longer than rear tooth 24.

Such a design of the fork ensures guaranteed entry of carriage 4 into the space between teeth 23 and 24, and an increased length of the shaped groove, which ensures a reduction of the dynamic loads when trolley 14 stops with load 3

The length of shaped groove 21 is determined, on one hand, to ensure the reliable engagement of carriage 4 with front tooth 23 of fork 16 on trolley 14, and on the other hand to provide free passage of carriage 4 past rear tooth 24.

The design of front tooth 23 longer than rear tooth 24 makes it possible to increase the length of groove 21, which leads to a reduction of the dynamic loads when trolley 14 stops in the engagement zone.

The device for the transportation of loads between operations functions as follows:

Carriage 4 with free hook 6 moving along guide track 1a interacts with automatic control means (not shown in the drawings) that calls trolley 14 with load 3 arranged on lever 18 supported on master guides 20. Trolley 14 is moved into the zone for entering into engagement with carriage 4 by pusher 12 of traction member 11. Upon entering the zone of engagement, front stop 13 of trolley 14 is lowered by bar 25 and thus comes out of contact with pusher 12. Bar 25 is mounted on rail 15 over zone "B" of engagement of trolley 14 with carriage 4 and passes over the entire zone. Roller 19 moves into shaped groove 21 that holds trolley 14 when it engages with carriage 4.

Carriage 4 moves past rear tooth 24 and, entering into contact with long front tooth 23, moves roller 19 out of groove 21, motion of the roller during the initial moment taking place along the section of master guides 20 having upward slope 22, in order to ensure the pressure of front tooth 23 of fork 16 to carriage 4 necessary for carriage 4 to move into the space between front 23 and rear 24 teeth of fork 16. When it enters the section where load 3 is attached, carriage 4 will be in the said space of fork 16, while the master guides now have a downward slope, upon motion along which lever 18 with shackle 8 lowers. Shackle 8 with load 3 will be attached to hook 6 of carriage 4.

Upon the further motion of trolley 14 along rails 15, front stop 13 moves out from under bar 25, and under the action of its own weight occupies its working position. Trolley 14 is picked up by pusher 12 of traction chain 11 and is transported along rails 15.

Lever 18 now ocupies its lower position. The removal of load 3 is similar to its attachment, the only difference being that trolley 14 is called by the automatic control means interacting with load 3 being transported along guide tracks 1, while the master guides in the load removal zone have a smooth upward slope that ensures lifting of the levers, and, consequently, removal of shackle 8 with load 3 from hook 6 of carriage 4. Hence carriage 4 with the load 3 moving along tracks 1 and acting upon the automatic control means (not shown in the drawings) calls trolley 14 which then moves along rail 15 by pusher 12 secured on traction member 11 up to a definite zone of the turning portion of rail 15, where the trolley 14 stops. The zone is determined by the position of the teeth of fork 16. The front tooth of fork 16 locates across track 1 in the zone of movement of carriage 4, whereas the rear tooth is arranged outside the zone of movement of carriage 4.

Lever 18 is deflected to the lower position due to the height of master guide 20.

Stopping trolley 14 in the definite zone is effected with the aid of bar 25 secured on rail 15.

In the zone of disengagement of pusher 12 and stops 13, traction member 11 is offset inside with respect to the rail axis, and pusher 12 guides trolley 14 outside the inner edge of wide stop 13, and bar 25 is so arranged along the rail axis so as not to interfere with the motion of pushers 12.

At the disengagement zone, bar 25 has a gentle rise to lower the front wide and rear narrow stops 13, thus disengaging trolley 14 from pusher 12.

Trolley 14 enters the load removing zone before carriage 4 and waits for the latter. As soon as carriage 4 with the load enters the removing zone it becomes engaged with the stationary front tooth of fork 16 thereby starting the guidance of trolley 14 along the turning section of rail 15. During the combined travel with carriage 4, trolley 14 passes from the turning position of the rail to that parallel to track 1. Carriage 4 in this case locates between the front and rear teeth of fork 16, whereas lever 18 is under the respective surfaces of shackle 8.

While moving with carriage 4, lever 18 commences rising owing to master guide 20 having a gentle rise; said lever takes shackle 8 with the load and lifts it above hook 6. The load removing operation is thus completed, and at this section track 1 is parallel to rail 15.

After removal of the load, the trolley 14 reaches the turning portion of the transfer conveyor. Located here is the end of bar 25 retaining stops 13 in the lowered position. Pusher 12 commences to move trolley 14 along the rails 15. The front tooth of fork 16 deflects forwardly and to the side, and the rear tooth of the fork passes to the rear and to the side of the carriage 4. Levers 18 with the load move aside from carriage 4.

Thus, members 16 and 18 do not interfere with movement of carriage 4 after the load is transferred.

What is claimed is:

1. A device for the transportation of loads between stations comprising: first and second overhead guide track means; first carriage means arranged on each of said guide track means; a first traction member means secured to said first carriage means; hook means secured to said first carriage means; hanger means for carrying said loads and attached to said hook means; an overhead transfer conveyor means arranged between said first and second guide track means and including; second carriage means of said conveyor; overhead track means wherealong said second carriage means

move; a second traction member means secured to said second carriage means; pusher means secured to said second traction member means; trolleys interacting with said pusher means for motion thereof; rail means whereon said trolleys move; a fork means secured to each of said trolleys, said fork means having a front and rear tooth for engagement with said first carriage means of said overhead guide track means to ensure synchronous travel of said trolley with said first carriage means when said hanger means is removed from or attached to said hook means; a lever mounted on said trolley to grip said hanger means when it is being transferred from the first carriage means of said first guide track means to the first carriage means of said second guide track means; master guide means on which said lever is supported, and having a shaped groove disposed in the zone of engagement of said first carriage means with said trolley carrying one of said hanger means with the load, the groove being used to stop the trolley; said front tooth of said fork means being made longer than the rear tooth, and the length of said shaped groove being selected so as to ensure reduction of the dynamic loads when the loaded trolley is stationary; said master guide means being disposed so as to lift and lower said lever when said hanger means with the load is removed from or attached to said hook means.

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