A transporting device for containers, particularly containers carrying liquid tests, consists of a chain the links of which have recesses for receiving the containers. The invention is particularly characterized in that each recess of links consisting of resilient material, has a side opening the width of which is somewhat smaller than the container, so that the container is fixed in the recess when it is pressed through the opening.

2 Claims, 2 Drawing Figures
DEVICE FOR TRANSPORTING CONTAINERS

This invention relates to a transporting device for containers carrying liquid tests, the device consisting of a chain the links of which have recesses for receiving the containers.

A transporting device of this type is used, for example, for the automatic distribution and examination of liquid tests of a human body, such as blood tests. Test carrying containers filled in a dosing device can then be moved by the transporting device from a sorter for test containers which are intended for the same examinations, to an analysing device.

A known transporting device of this type consists of members having shoulders and openings, whereby a shoulder fits into an opening of the adjacent member and whereby two chain links are interconnected by a test container forming a joint. In this transporting device it is therefore necessary to push the test containers from above into aligned bore holes of two adjacent chain links. This way of inserting containers is carried out by a machine with a comparatively great exertion so that this known transporting device is hardly suited for the automatic filling and distribution of test carrying containers.

It is also known to make chain links out of the test carrying containers in that each container is provided with a shoulder having an opening into which the following container is inserted. The shoulder extends at such an angle that a straight transporting chain is formed. In this transporting device as well, the joining of test carrying containers is possible only with a substantial machine expenditure.

An object of the present invention is to improve existing devices by providing a transporting device of the above-described type wherein the test carrying containers can be introduced by a machine of a comparatively simple construction, so that the transporting device is also well suited for automatic test examination.

Other objects of the present invention will become apparent in the course of the following specification.

In the accomplishment of the objectives of the present invention it was found desirable to provide each recess of links consisting of a resilient material with a side opening the width of which is somewhat smaller than the corresponding outer size of the container, so that the container is fixed in the recess when it is pressed through the opening. Thus in accordance with the present invention the containers are connected with the transporting device by being pressed sidewise into the openings of the individual links of the transporting device. This can be carried out in a simple manner by rams or the like.

An advantageous further improvement of the present invention consists in that each hinge between two chain links has at least one pin guide consisting of a pin fixed to one chain link and having a non-circular cross-section and a corresponding bore extending over its entire length and provided in the other chain link, whereby the width of the slit is greater than the smallest outer diameter of the pin and is smaller than its largest outer diameter. The slit and the corresponding pin are so located upon the chain links that two chain links can be separated by a side-wise movement of the pin out of its bore only in one specific position of the links being separated, and this position is different from the transporting direction. Thus two chain links can be separated in a simple manner, while the links are held firmly together during transport.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawing showing by way of example only, a preferred embodiment of the inventive idea.

In the drawing:

FIG. 1 is a side view of a transporting device of the present invention.

FIG. 2 is a top view of the device shown in FIG. 1; it also illustrates some of the test containers to be carried by the device.

The transporting device shown in the drawing consists of chain links 1 which are pivotally interconnected by hinges. Each link has essentially the shape of a hollow cylinder provided with a longitudinal slit 2 which constitutes a recess receiving an outwardly substantially cylindrically shaped test carrying container 3.

The width of the slits 2 of the hollow cylindrical parts of the chain links 1 is somewhat smaller than the outer diameter of the containers 3. Thus the containers 3 can be connected with the transporting device by being pressed against the slits 2 of the links 1, for example, by rams 4 shown in FIG. 2. The chain links 1 consist of a resilient material, for example, a resilient plastic material, so that the containers 3 are fixed in the recesses of the chain links 1 when they are pressed by rams 4 against the slits 2.

The connection of the containers 3 with the transporting device provided by the present invention can be carried out by simple means. Thus the device of the present invention is particularly suitable for the automatic investigation of liquid tests, particularly for stopping the containers during filling and for transporting the filled containers to an analysing device or to a sorting device for such test carrying containers with which examinations of the same type are to be carried out.

The hinge connections between the chain links 1 are provided by pins 5 located upon one side of the links and guided in corresponding bore holes provided upon shoulders 6 located upon the other side of the links, and also by pins 7 which are not round and are provided upon one side of the links; the pins 7 are guided in corresponding bore holes 8 provided in shoulders 9 located upon the other side of the links. The bore holes 8 are slits along their entire length. The width of the slits 10 is larger than the smallest outer diameter of the pins 7 and it is smaller than the largest outer diameter of the pins 7. Furthermore, the pins 7 and the slits 10 are so located in the chain links 1 that the individual chain links cannot be separated when they assume the position corresponding to that of the transporting device indicated by the arrow 11 in FIG. 2. In order to separate two chain links they must be swung relatively to each other until the pin 7 of one link is so located relatively to the slit 10 of the other link that the pin can be removed through the slit 10. Thereupon the one link can be raised from the other link, whereby the pin 5 is withdrawn from the bore of the corresponding shoulder 6.

Thus the described connection between two chain links makes possible a simple division of the transporting device at any desired location of the chain, while the chain is safely held together during the transportation of the test carrying containers. It is therefore possible by simple means to separate a chain portion which,
3,788,450

3

for example, carries containers with tests intended for the same type of examination, from the rest of the chain constituting the transporting device.

Within the scope of the present invention it is also possible to arrange several containers upon a single chain link. For that purpose each chain link must be provided with recesses the number of which is equal to that of the containers to be carried, whereby in the example illustrated the recesses have the shape of hollow cylinders due to the corresponding shape of the containers. Furthermore, within the scope of the present invention it is not necessary that the containers be pushed completely into the recesses of the chain links. It is also possible to provide the containers with holding means, such as grooves or projections fitting into corresponding parts or recesses of the chain links.

What is claimed is:

1. A transporting device for containers, particularly for containers adapted to carry liquid samples, said device comprising a chain having a plurality of links, hinges detachably interconnecting said links, each link consisting of a resilient material and having an inner recess adapted to receive a container, each link further having a side opening communicating with said recess and having a width which is somewhat smaller than the corresponding outer size of a container, whereby a container can be pushed into said recess through said opening, each hinge comprising a pin connection consisting of a pin fixed to a link and having a non-circular cross-section and a fully slit bore for the pin corresponding to said cross-section and located upon an adjacent link, the width of said slit being greater than the smallest outer diameter of said pin and being smaller than the greatest outer diameter of said pin, said pin and said slit being so located that removal of said pin through said slit can take place only in a position of the links different from the transporting direction of the device.

2. A device according to claim 1, wherein each hinge comprises a further pin fixed to one link and guided in a corresponding recess of the other link.