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[54] **DEVICE FOR EMPTYING LIQUID CONTAINING PIPES**

8 Claims, 3 Drawing Figs.

[52] U.S. Cl. **222/166,**
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 134/67, 133, 134, 166, (Inquired)

ABSTRACT: The device comprises rotating shaft fixedly supporting a number of carrying disks. The disks have at their periphery radially arranged U-shaped recesses for receiving and lifting the pipes. The depth of recesses on consecutive disks is progressively varied so as to incline the pipe at an acute angle during the rotation of the disks.

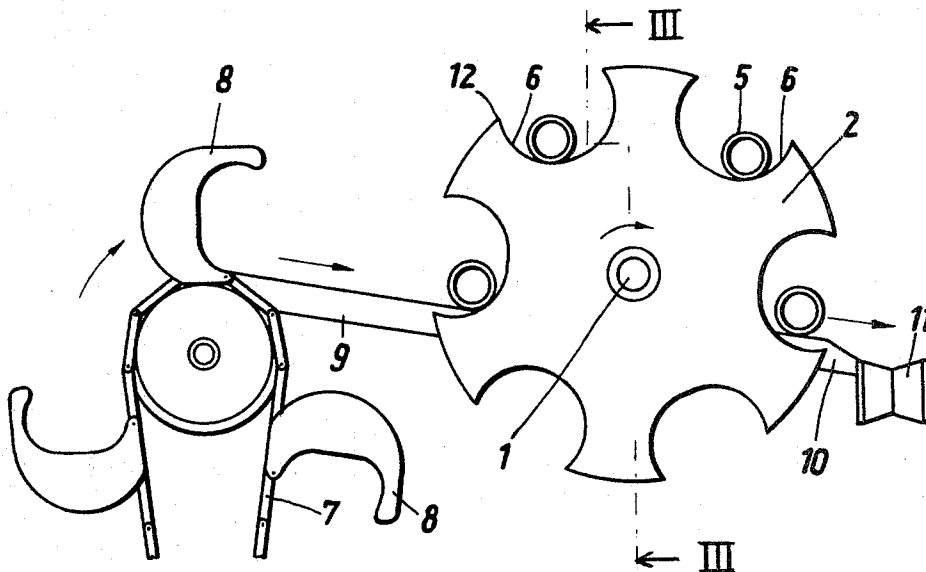


Fig. 1

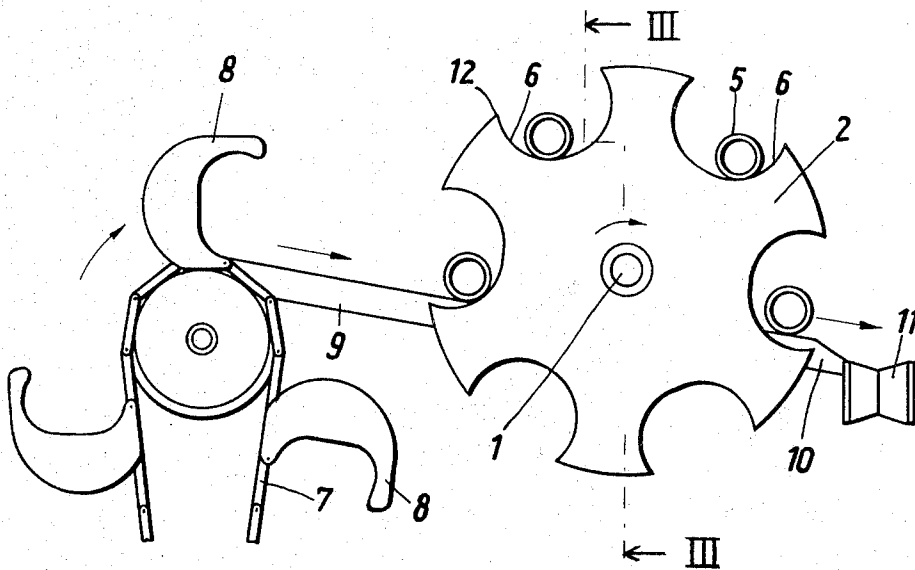
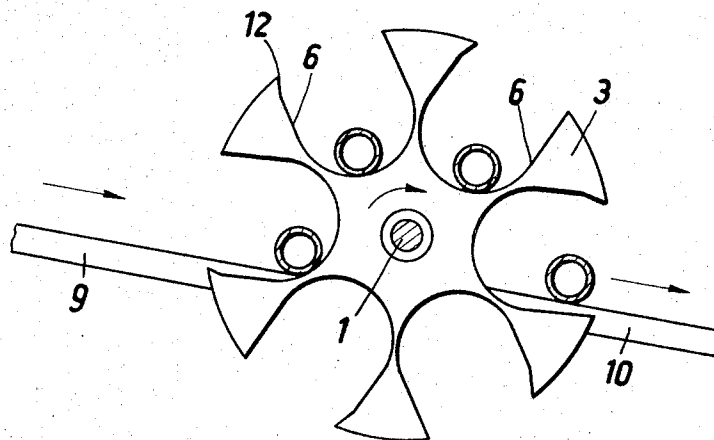


Fig. 2



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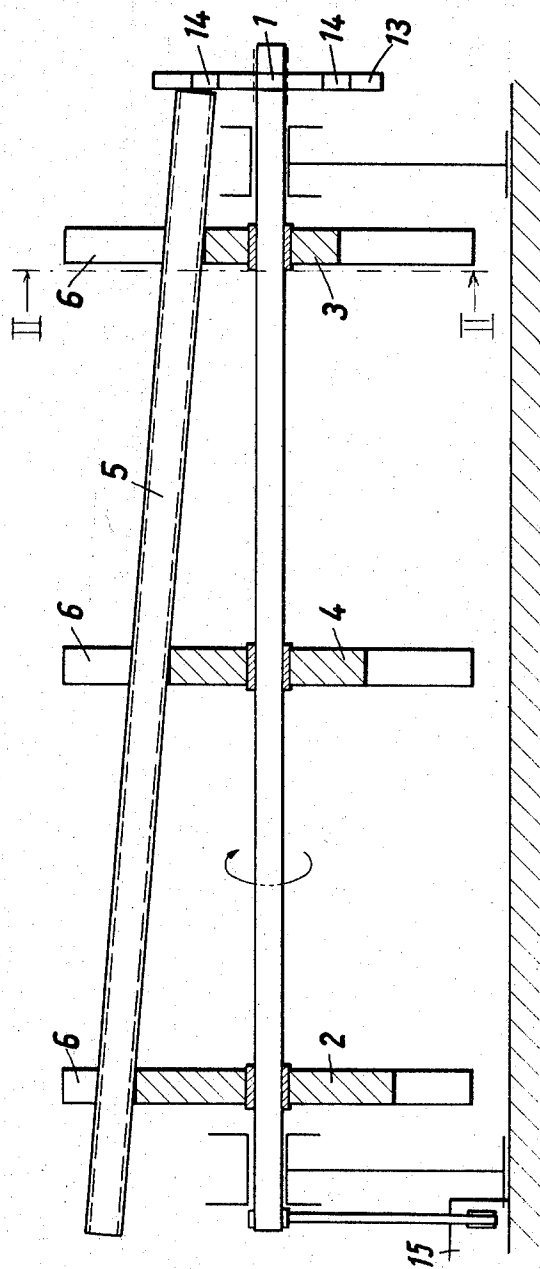
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Fig. 3



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DEVICE FOR EMPTYING LIQUID CONTAINING PIPES

The present invention relates in general to processing of elongated tubular objects. More particularly, the present invention relates to a device for pouring out a tempering medium or rinsing liquid contained in processed pipes.

In the heat treatment of pipes, the latter have been immersed by means of a suitable conveyor into a container filled with quenching water or oil. After this treatment, the residual liquid contained within the pipes must be removed prior to the conveying of the pipes to a subsequent processing station. For this purpose, there have been provided two conventional hoisting units, each supporting one end of the pipe. The hoists have been arranged in such a manner as to carry the pipes in an inclined position so that the liquid contained in the pipes can pour out.

Such known hoisting devices are also employed for the immersion of the pipes into the processing container.

In another prior art device, the pipes are individually lifted by means of hoisting devices from the processing container and placed side-by-side on a support which is composed of a number of takeoff stands. These stands are arranged in two opposite rows spaced apart about the length of the pipe. The liquid outflowing from the pipes is collected into a storage tank. The forward transport of the pipes is effected by means of transversal pulling or like transport devices which are situated between the two rows of the takeoff stands.

The disadvantage of such known emptying devices resides in that they require for their installation a considerable space both in height and in breadth. Moreover, such prior art devices do not facilitate a continuous operation.

The object of the present invention is to remove the above described disadvantages of pipe emptying devices.

According to the present invention, the object is attained by providing a rotating horizontal shaft corresponding in length to the processed pipes on which shaft are mounted with at least two carrying discs spaced axially one from another. On the periphery of each disc, there are provided a number of curved, preferably U-shaped, radial recesses. The inlets of the recesses in respective discs are arranged in alignment parallel to the shaft so as to receive each pipe in a horizontal position. Radial distances from the center axis of the shaft to bottom vertex points of the recesses at consecutive discs are decreased so that the connecting line of the vertex points forms a straight line which is inclined to the shaft at an acute angle.

The device according to this invention may be designed to cooperate with a conventional hoist of a processing container. For example, the pipes are lifted from the container by means of known pulloff or tow hooks arranged on an endless chain conveyor and discharged onto a short chute upon which they roll into inlet openings of the aligned recesses of the rotating discs. The rotating movement of the discs, which may be intermittent or continuous, is synchronized with that of the feeding device from the container. Consequently, the hoisted pipes may keep rolling into free recesses as they occur at the delivery end of the chute without interruption of the working process. At the delivery end of the chute the pipes are lying in a horizontal position. Due to different distances of bottom vertex points of the aligned recesses from the center points of corresponding discs, the horizontal position of the pipes becomes during the progress of rotation of the discs increasingly inclined and maximum inclination of each pipe occurs when the angular displacement of the shaft is 90° from horizontal. Upon the angular displacement of the shaft through 180°, the pipes lie in a horizontal position again and roll out from the recesses of the discs over an inclined chute onto an edge runner or table roller which forwards the pipes to another processing station. The liquid which pours out from the pipes is in a conventional manner collected into a storage tank.

In order to avoid during the tilting of the pipes any axial shift thereof with respect to the recesses of the discs, there can discs, rigidly secured to the end of the driving shaft a limit-stop device such as, for example, an abutment disc having openings

located opposite the respective pipe ends. Generally, for the purpose of the present invention, it has been found quite sufficient to adjust the distances of bottom vertex points of the U-shaped recesses from the center points of respective discs in such a manner that the angle between the connection line of consecutive bottom vertex points and the shaft is smaller than the angle of internal friction between the abutting materials of the supporting area in the recesses and the pipe surface.

In accordance with another characteristic feature of the present invention, the outside diameters of the carrying discs are equal. This feature makes it possible that the pipes may fall into the recesses at the reception site, and out of the recesses at the discharge site of the discs without any disturbances. According to a further feature of this invention, the supporting areas in the recesses of each disc may be provided with a protecting coat of plastic or the like material in order to prevent the pipes from damage.

To facilitate the taking off of the pipes and to prevent unintended discharging thereof from the recesses, the inlet side of each recess has a small noselike overhang inclined into the inlet opening.

The foregoing objects and many of the attendant advantages of this invention will become more apparent by reference to the following detailed description of an example of one embodiment of the invention taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a schematic illustration of the emptying device of this invention, in end elevation;

FIG. 2 is a detail vertical section of the line II-II of FIG. 3; and

FIG. 3 is a longitudinal vertical section of the device on the line III-III of FIG. 1.

With reference to the drawings, the pipe-emptying device of the present invention comprises driven shaft 1 on which are fixed carrying discs 2, 3 and 4 having equal outside diameters. The discs are fixedly mounted on the shaft to rotate therewith and spaced one from another so that the distance between the discs nearest each end of shaft 1 is somewhat less than the length of the pipes to be handled. Each of the discs is provided at its periphery with U-shaped recesses 6. The inlets of recesses at consecutive discs are aligned to form a parallel line with the shaft 1. Carrying disc 2 is secured to the adjacent one end and carrying disc 3 adjacent the opposite end of shaft 1, and the distances of bottom vertex points of U-shaped recesses 6 in the disc 2 to the center point of the latter are greater than corresponding distances in the disc 3. Consequently, the connection line of the bottom vertex points of aligned recesses forms with the axis of shaft 1 an acute angle which should be smaller than the friction angle of abutting materials of the supporting surface of the recesses 6 and of pipe 5.

The feeding of the pipes to be emptied is accomplished by means of takeoff hooks 8 secured to endless chain 7. At the inversion point of the chain, the hook 8 releases the pipe which subsequently rolls over chute 9 into open and unoccupied recesses of the rotating discs. Each recess is provided at its intake side with a small noselike protrusion or overhang 12 inclined into the inlet opening of the recess to prevent the pipe from an unintended discharge.

The carrying discs 2 and 3, as well as the intermediate carrying disc 4, rotate around their axes together with the shaft 1 in the direction as shown by the arrows. Due to increasing depths of recesses of consecutive discs 2, 4 and 3, the pipe 5 during the progress of the rotation becomes gradually inclined from its initially horizontal position to a maximum inclination at the 90° position of the shaft. The liquid contained within the pipes keeps at the same time pouring out. Upon the turn of the shaft about 180° the pipe is on a horizontal position again and rolls out onto an inclined chute 10 and therefrom onto an edge runner or roll conveyor 11. The shaft is driven in a conventional manner by driving device indicated generally at 15.

The shaft may, if desired, be provided at one end thereof with abutment disc 13 having apertures 14 for passage of the

draining liquid, the disc 13 preventing the pipes from axial displacement in the recesses.

The bearing surface of each recess 6 may be coated with a protective and/or cushioning layer (not shown) of a suitable plastic material or the like, as noted above.

I claim:

1. A device for emptying liquid-containing pipes, comprising a rotating shaft, at least two carrying members fixedly secured in a spaced relation one to the other on said shaft to rotate therewith, each of said carrying members being provided on its circumference with at least one recess extending radially to a distance from the axis of said shaft, said recess at respective carrying members being aligned to receive and support said pipes, and said distances of the bottom points of the recesses from the axis of the shaft being at consecutive carrying members progressively decreased in order to insure during the progress of rotation of the shaft a gradual inclination of the pipe at an acute angle to said axis of the shaft.

2. The device according to claim 1 wherein said recesses are U-shaped.

3. The device according to claim 1 wherein said angle of

inclination of the pipe is smaller than the friction angle of materials of supporting areas in the recesses and of supported pipes to prevent axial displacement of the latter.

4. The device according to claim 1 wherein said carrying members have equal outside diameters.

5. The device according to claim 1 wherein the pipe supporting areas in said recesses are provided with a protective coating.

6. The device according to claim 5 wherein said coating is of plastics.

7. The device according to claim 1 wherein the inlet side of each recess is provided with a small protrusion inclined into the opening to prevent the pipe from accidental radial displacement.

8. The device according to claim 1 further comprising an abutment member secured to an end of the shaft for preventing axial displacement of said pipes, said abutment member being provided with apertures for directing the outflow of said liquid.

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