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APPARATUS FOR DRAINING OFF EXCESS LIQUID FROM COATED ARTICLE

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Fig. 2

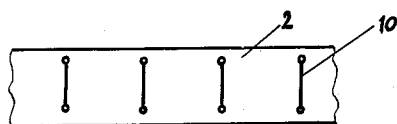
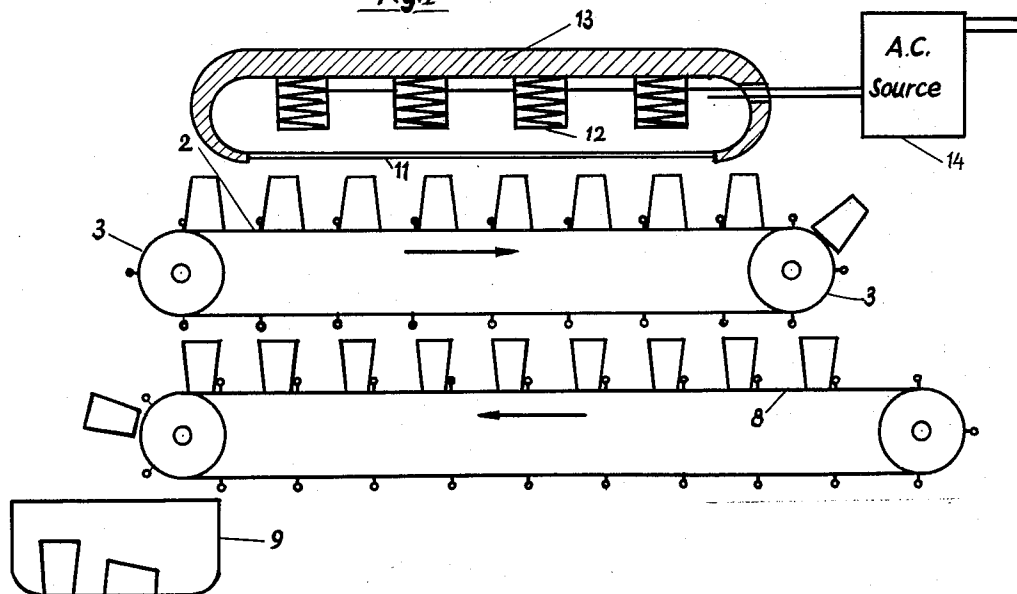


Fig. 1



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APPARATUS FOR DRAINING OFF EXCESS LIQUID
FROM COATED ARTICLES

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2 Claims. (Cl. 118—57)

This invention relates to improvements in impregnating means for containers made of paper, cardboard, or the like, and is primarily directed to the provision of means for effectively draining off superfluous impregnating solution which adheres to the container walls after they have been treated therewith by dipping or spraying.

Paper containers, such as drinking cups, shipping receptacles, and the like, which are in extensive use today, are generally impregnated or are provided with a surface coating of wax, plastics, lacquer and other water- or fat-repelling masses for the purpose of preventing the contents of such containers from penetrating into the paper walls. At the present time, impregnation is generally accomplished by mechanical means in several steps, whereby the containers to be impregnated are first pre-heated, then dipped in the impregnating solution or sprayed therewith, then either dried or cooled, depending on the kind of impregnation applied. The chief aim in impregnating is to achieve that the impregnating agent enters into all pores and crevices of the paper walls and covers the latter in a uniform, thin, uninterrupted film, but to avoid that excessive mass sticks to certain portions of the walls. It has been customary to let the containers, after they have been treated with the solution, pass a certain distance on a belt conveyor or the like where superfluous material finds time to drain off before setting takes place. Such draining-off method however does not give the assurance of uniform impregnation, because gravity alone acts too slow and only in one direction.

The object of this invention is to improve the present draining-off method by providing acoustical vibrating means which set the containers into vibrating motion while the same are passing through the draining distance. Such vibration effects that the surface tension of the still liquid coating is more readily overcome, that particles of impregnating compound are forced into pores and crevices by their own inertia, and that superfluous solution drains off considerably faster.

The practical construction of the present invention can take several forms. The acoustic means for imparting the vibration to the containers takes preferably the form of a diaphragm located above the passing containers and energized by electromagnets setting the diaphragm, the column of air beneath, and therewith the containers in vibrating motion. The frequency of vibration is preferably regulated to approach the natural frequency of the containers to be impregnated.

An embodiment of the invention is illustrated, by way of example, in the accompanying drawing, in which

Fig. 1 represents a side elevation of a conveyor carrying containers, generally indicated as drinking cups, for the purpose of draining; and shows the acoustic vibrating means in the form of a diaphragm with actuating electromagnets; and

Fig. 2 is a plan top view of a fragmentary portion of the belt showing its perforations and the spacers which prevent the cups from shifting lengthwise.

The endless-belt conveyor illustrated in Fig. 1 is assumed to be arranged as draining means in an impregnation setup. The containers, indicated as drinking cups 1, have just been coated with impregnating solution by dipping or

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spraying (means for performing this operation are not shown) and have been set, upside down, on the conveyor belt 2 traveling on pulleys 3 in the direction of the arrow. After the containers have passed conveyor 2, they drop on a second conveyor belt 8 traveling in opposite direction. This second conveyor preferably traverses a zone in which setting of the impregnation is caused. It may be a cooling zone, if wax or the like is the impregnating mass; or it may be a drying zone, if lacquer serves as impregnation. At the other end of the conveyor the finished containers drop into a storage bin 9. The conveyor belt, of which a fragmentary portion is shown as top view in Fig. 2, is of perforated material, preferably wire screen, and is provided with cross bars 10 in order to keep the containers spaced during their vibratory motion.

The acoustic vibrating means indicated as a diaphragm 11, electromagnets 12, and a supporting frame 13, are all arranged as a unit above the conveyor belt. The electromagnets, when energized by alternating current from a source indicated at 14, will vibrate diaphragm 11, which in turn will impart acoustic oscillation to the air column between diaphragm and conveyor belt and thus excite vibration in the containers lying on the belt. Such vibration effects that the still liquid impregnating solution adhering to the containers is forced into pores and crevices of the container walls and that superfluous solution drains off considerably faster, leaving a uniform thin film evenly distributed over the entire surface. This vibration by acoustic means is more efficient than mechanical action and has the additional advantage that no wear of mechanical parts by friction is caused. The source of alternating current can be a 60 cycle power supply, but it is advantageous to employ a source giving variable frequency, as indicated in the figure, so that a frequency can be selected which is most suitable for a certain case. The most efficient operation is with a frequency which corresponds substantially to the natural frequency of the containers to be vibrated, and which may, in some cases, lie well within the lower portion of the ultrasonic range. Instead of arranging a single vibratory diaphragm (loud-speaker) above the belt as indicated in the figure, it is obvious that several such units can be placed along the conveyor.

The embodiment of the invention as illustrated and described is only an example of a great number of possible constructions and other modifications will occur to those skilled in the art. Therefore, I wish it to be understood that the example shown is not to be construed as limiting to the invention as claimed in the appended claims.

What I claim is:

1. In an arrangement for impregnating paper containers or the like, a draining conveyor on which impregnated and still wet containers are placed, acoustic vibrating means above said conveyor being effective in setting the air column beneath and therewith said containers in vibratory motion to thereby accelerate the draining-off process.

2. An arrangement as in claim 1 wherein said acoustic vibrating means comprise a diaphragm, electromagnets adjacent to said diaphragm, and an alternating current source for energizing said magnets, said alternating current source being of variable frequency for adjusting the vibrating tune of said diaphragm to the natural frequency of said containers.

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