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PACKAGING OF FILM SHEETS

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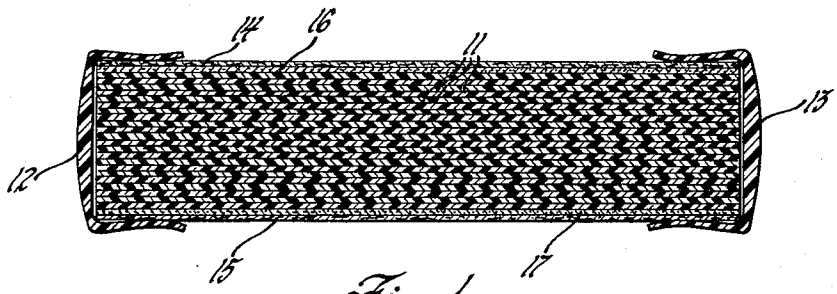


Fig. 1

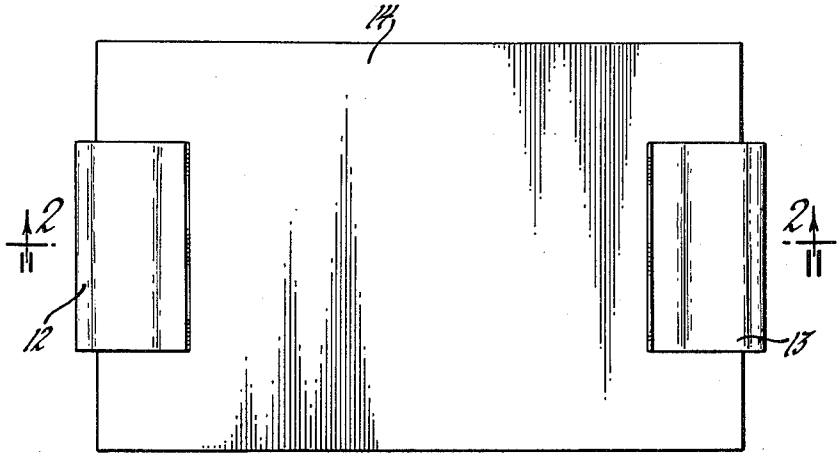


Fig. 2

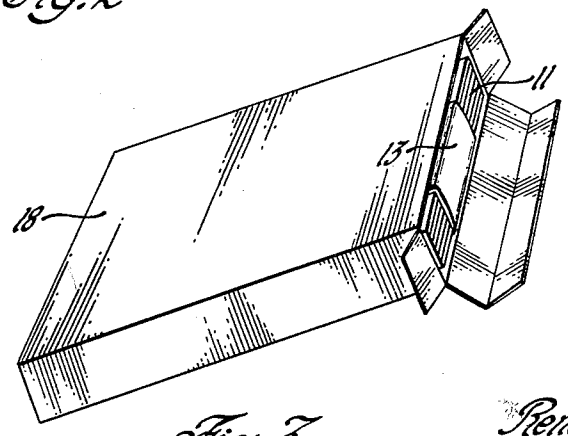


Fig. 3

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PACKAGING OF FILM SHEETS

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The present invention relates to a method for packaging X-ray film sheets, and more particularly to an improved method for packaging X-ray film sheets which are emulsified on both sides, without necessitating the use of interleaves.

It is already known to pack stacked X-ray film sheets in such a way that each film sheet is provided with a paper interleaf, which prevents the sensitive emulsion surface of the film sheets from being damaged by rubbing against each other, e.g. during handling, transporting and the like.

In connection with the ever increasing number of apparatus for the automation of operations involving X-ray film sheets, more particularly the loading of film sheet cassettes, there is a still greater tendency to use packed stacks of X-ray film sheets without interleaves between the film sheets, so called N.I.F. film, i.e. not interleaved film. Consequently, the automatic operation of such apparatus can be simplified considerably. Obviously, the absence of interleaves between the film sheets, eliminates the risk of chemical fog which could possibly arise due to the effect of certain chemical substances which are present in the paper interleaves and which may react with the emulsions of the film sheet.

By omitting the paper interleaves for the purpose of avoiding such chemical interaction the known drawbacks of damaging the emulsion surface due to the mutual rubbing action of the film sheets against each other appears again.

In an attempt to eliminate this damaging effect, special care has been taken in packaging the X-ray film sheets. For this purpose the stack of X-ray film sheets is packed in a wrapping paper tightly enveloping the stack, whereupon it is placed in a cardboard box which also closely surrounds the stack. According to another known method the stack of film sheets, after having been wrapped in a paper envelope, is additionally secured by applying a number of strips or by tightly wrapping tape e.g. self-adhesive synthetic tape, around it. In this manner the X-ray film sheets are firmly pressed together so that their relative mobility is limited.

But in using this way of packaging, damaging of the emulsion surface still occurred especially when the film stacks are subjected to movement over a rather long period of time, e.g. during transportation by truck. Moreover, the latter way of packaging is cumbersome and requires rather much handling, thus influencing the cost price unfavorably.

In order to avoid these disadvantages an improved method of packaging stacks of wrapped film sheets has now been found, according to which the film sheets are mutually immobilized in the stack by providing, at least on two opposite sides of the film sheet stack, a U-shaped clip. This clip is designed in such a way that owing to its elasticity and its profile the film sheets are pressed well together, but without a disadvantageous increase of mechanical fog at those areas where the film sheets are pressed against each other.

This manner of packaging excludes almost entirely any damaging of the emulsion surface of the film sheets. Moreover, this packaging method is also very important in regard to the reproducibility, since practically every human factor and every manufacturing variable are eliminated.

Further advantages of the film sheet packaging method according to the invention will be apparent from the following description when taken in conjunction with the accompanying drawings, in which an embodiment of the invention is shown by way of example only, and in which:

FIG. 1 is a longitudinal section taken along line 1—1 on FIG. 2.

FIG. 2 is a plan view of a stack of X-ray film sheets according to FIG. 1.

FIG. 3 is a perspective view of a stack of X-ray film sheets packed in a cardboard box.

Referring now to the drawing, FIGURES 1 and 2 illustrate a stack of 125 X-ray film sheets emulsified on both sides, each 8" x 10" in size, and packed according to the method of the present invention. For this purpose two U-shaped polyvinyl chloride clips 12 and 13 are slipped over the two opposite short sides of the stack 11 of the film sheets. The clips 12 and 13 do not directly contact the upper or lower film sheet but are pressing against cardboard sheets 14 and 15 and against the protective paper sheets 16 and 17 respectively, provided on the outside of the stack. The protective sheets 16 and 17 are made of a dust-free and chemically inert paper in order to prevent the damaging of the outer emulsion side of the lower and upper film sheet of the stack. The carboard sheets 14 and 15 protect the outer film sheets against damaging by pressing or pushing; they also facilitate the handling of the stack of film sheets when applying the clips 12 and 13.

After the X-ray film sheets have been treated in the aforesaid manner, the stack of film sheets is packed in an aluminum envelope which is hermetically closed whereupon the stack is slid into a cardboard box 18 (FIG. 3).

When using the film sheets it is actually not necessary to remove the film pack from the box. Indeed, if the wrapping envelope is opened at one side for example, and the clip 13 is taken off, some film sheets can be released by a short pulling movement whereby the pressure of the clip 12 on the lower part of the film sheets, at the bottom of the box 18, is overcome. Now the film sheets can easily be removed one by one from the box.

In case of an automatic handling of the film sheets the clips 12 and 13, the cardboard sheets 14 and 15 and the protective sheets 16 and 17 are removed, whereupon the stack of film sheets is introduced into the apparatus.

The clips 12 and 13 are manufactured from polyvinyl chloride which has been extruded into an U-shaped configuration. Such U-shaped polyvinyl chloride stock is preferably stored in lengths of 12 meters and is afterwards used by cutting or sawing off shorter lengths corresponding to the different sizes of X-ray film sheets to be packed. Both extremities of the shorter lengths are ground to remove sharp edges and burrs.

By an appropriate selection of the length of an U-shaped clip it is possible to effect the packaging of various standard-sized X-ray film sheets with only a few types or sizes of clips.

Furthermore, it is also possible to use clips of short lengths and to fit two or more clips at the end of a side of the film sheets, e.g. close to the corners.

It is evident that the clip opening is adapted to the thickness of the film stack which in turn depends on the thickness of the film sheets and the number of film sheets in a stack. Since both elements undergo but little variations, the range of clips may be limited.

It is quite evident to provide the legs of the clip at their inner side with a ribbed or roughened surface to prevent the clip from sliding off.

It is clear that for the manufacture of the clip, according to the present invention, besides polyvinyl chloride also other synthetic materials may be considered, provided that they are sufficiently elastic and, eventually, chemically inert. Moreover, the clips made of synthetic mate-

rial may also be manufactured by injection molding so that there would no longer be any need for either cutting or sawing the stock into reduced lengths, nor for griding off the edges. Furthermore, it is also possible to manufacture the clips from ordinary steel, from steel covered with a small layer of synethetic material, and from other suitable materials and combinations.

The clip according to the present invention is not only intended for use with X-ray film sheets. It is obvious that the described way of packaging can also be used for packaging X-ray film sheets emulsified on only one side, for graphic film, and for similar uses.

What is claimed is:

1. A protective packaging for a stack of film sheets, particularly X-ray film sheets, comprising a paper sheet placed against the top and bottom film sheets of said stack, a cardboard sheet placed against said paper sheet at the top and bottom sides and preformed gripping means of resilient material at opposite ends of said stack to prevent relative movement of said sheets.

2. A protective packaging according to claim 1 wherein said gripping means is adapted to engage the longitudinal sides of said stack of film sheets and corresponds in length to the longitudinal sides of said stack.

3. A protective packaging according to claim 1 wherein said gripping means is adapted to engage the transverse

sides of said stack of film sheets and corresponds in length to the transverse sides of said stack.

4. A protective packaging according to claim 1 wherein said gripping means corresponds in length to a portion of the length of said longitudinal side.

5. A protective packaging according to claim 1 wherein said gripping means corresponds in length to a portion of the length of said transverse side.

6. A protective packaging according to claim 5 wherein a plurality of gripping means engage said film sheets on at least one side of said stack.

7. A protective packaging according to claim 1 wherein said gripping means are generally U-shaped in configuration.

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