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APPARATUS FOR MAKING PAPER TUBES

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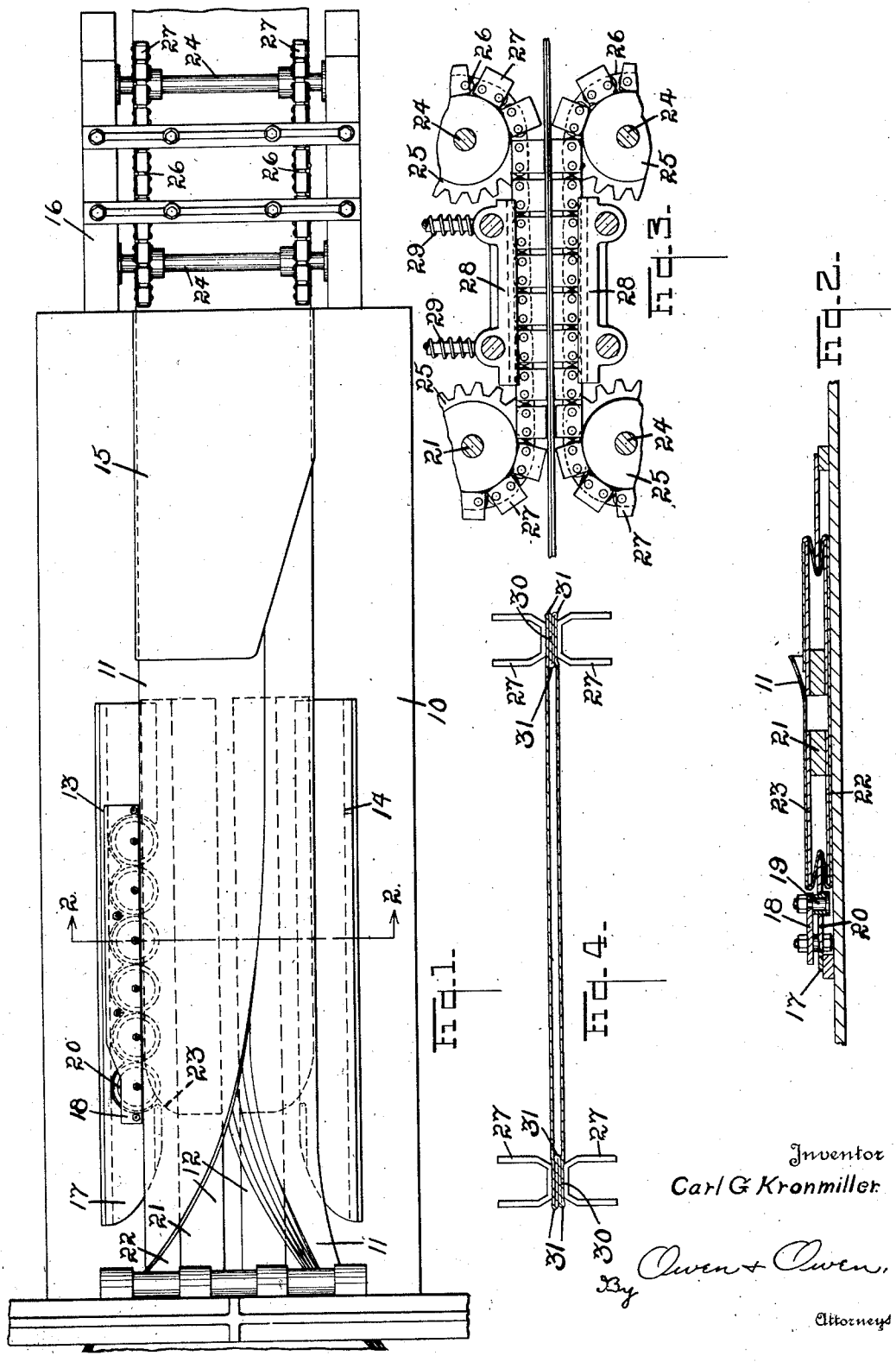

Fig. 1.

Fig. 3.

Fig. 2.

Fig. 4.

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APPARATUS FOR MAKING PAPER TUBES.

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This invention relates to apparatus for making paper tubes, and has for its object providing apparatus by which paper tubes, especially multi-ply tubes, may be made without undue friction and without exerting undue pressure upon lines along which the fabric of the tube is turned.

Figure 1 is a plan view of apparatus embodying one form of my invention; Fig. 2 is a section on the line 2—2 of Fig. 1; Fig. 3 is a side view of the tractor portion of the apparatus; Fig. 4 is a diagrammatic view illustrating the method of exerting traction upon the tube.

The apparatus is mounted upon a table 10. One or more sheets of paper 11 are fed beneath and folded over shoes 12 to form a tube. Gusset folds are formed in each side of the tube. In the apparatus shown, there is a gusset forming runner 13 which forms a gusset in the side of the tube which is folded down last, while a runner 14 forms a similar gusset in the side of the tube which is folded down first. A plate 15 folds down the top flap of the tube before the tube passes into a tractor device 16 which pulls the material through the folding apparatus.

In the device shown, runner 13 comprises a main plate 17, which has affixed to its upper surface a bearing plate 18 carrying a series of bearings 19 upon which anti-friction discs 20 are mounted.

Each of shoes 12 comprises a rail 21 having a folding plate 22 affixed to its underside. Folding plate 22 of the left shoe, as viewed in Fig. 2, is beneath plate 17 and rollers 20. A plate 23 is affixed to the upper side of rail 21 and projects above rollers 20.

It will be readily seen from Fig. 1 that the paper is first bent inward over plate 22 by means of the bevelled end of plate 17. Then the paper is pressed outward and downward over the upper sides of rollers 20 by means of plate 23. Finally, the upper flap is bent downward over plate 23 and into position upon the inner flap by means of plate 15.

Considerable force is necessary to draw paper through a folding device which folds it into a tube with gusset folds. This is particularly true where a number of sheets are used and a tube of comparatively great total thickness is formed. I have discovered that the point where the greatest friction is developed is where the outer flap is forced outward and downward onto the gusset forming runner. By providing anti-friction wheels at this particular portion of the outer runner, it is found that the paper may be drawn through the apparatus without undue strain.

I have found, furthermore, that it is extremely desirable to draw the tube through such a folding apparatus by means of traction exerted on the sides of the tube. This may be done by straight rollers pressing upon the tube, as the gusset-folded portions are thicker than the intermediate portions, and so the rollers apply the traction principally to the gusset-folded portions. However, in order to exert the necessary traction on the tube, the rollers must be pressed together with such force that the fabric is bent very sharply along the lines where it turns. When the fabric employed is of the character of paper, it is weakened by such severe pressure along the lines of the folds. I avoid this difficulty by pulling the tube through the machine by traction applied to the bellows-folded portions of the tubes between the lines where the fabric turns to make the bellows-folds.

One form of apparatus which may be employed for this purpose is somewhat diagrammatically disclosed in the drawings, it being understood that other forms of apparatus may be employed, which will accomplish substantially the same results. In the form shown, there are four shafts 24, two above and two below the line of travel of the tube. Each shaft carries sprocket wheels 25 around which pass chains 26. Friction or gripping members 27 are applied to the chains. The grippers are held together along the opposed runs of the chains by plates 28, which are preferably pressed towards each other, as by means of springs 29.

As will be seen from Fig. 4, the gripping members 27 are so spaced that they press upon the bellows-folded portions 30 of the tube between the lines 31 where the fabric is turned to form the bellows-folds. In this way, sufficient traction can be applied adjacent the edges of the tubes without undue pressure along the lines where the fabric is turned.

While I have disclosed with some detail

one form of apparatus embodying my invention, it will be understood that modifications may be made within the terms of the appended claims.

What I claim is:

1. In apparatus of the character described, means for forming a gusset fold in a tube, comprising a runner plate having anti-friction discs set therein along a portion of its length, the outer edges of said discs being substantially tangent to a straight line extending along the outer edge of the runner plate.

2. In apparatus of the character described, means for forming a gusset fold in a tube, comprising an internal runner plate around which the fabric is turned to form one of the outer turns of the gusset fold, an outer runner plate beginning after the first said plate and around which the fabric is folded to form the inner turn of the gusset fold, and a second inner runner plate around which the fabric is folded to form the other outer turn of the gusset fold and beginning after the outer runner plate, said outer runner plate being provided with anti-friction rollers at substantially the point where the last said inner runner plate begins.

3. In apparatus for forming sheets of fabric into tubes having bellows-folds, inside runner plates adapted to extend into the upper and lower portions of the gusset fold, and outside runners adapted to extend into the infolded portions of the gusset folds, there being anti-friction rollers along a portion of the outer runner which is adjacent the side of the sheet which is folded down last, the upper inner runner starting at a point substantially above where said anti-friction rollers begin.

In testimony whereof, I have hereunto signed my name to this specification.

CARL G. KRONMILLER.