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MECHANISM FOR STRAIGHTENING SHEET MATERIAL

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FIG. 1

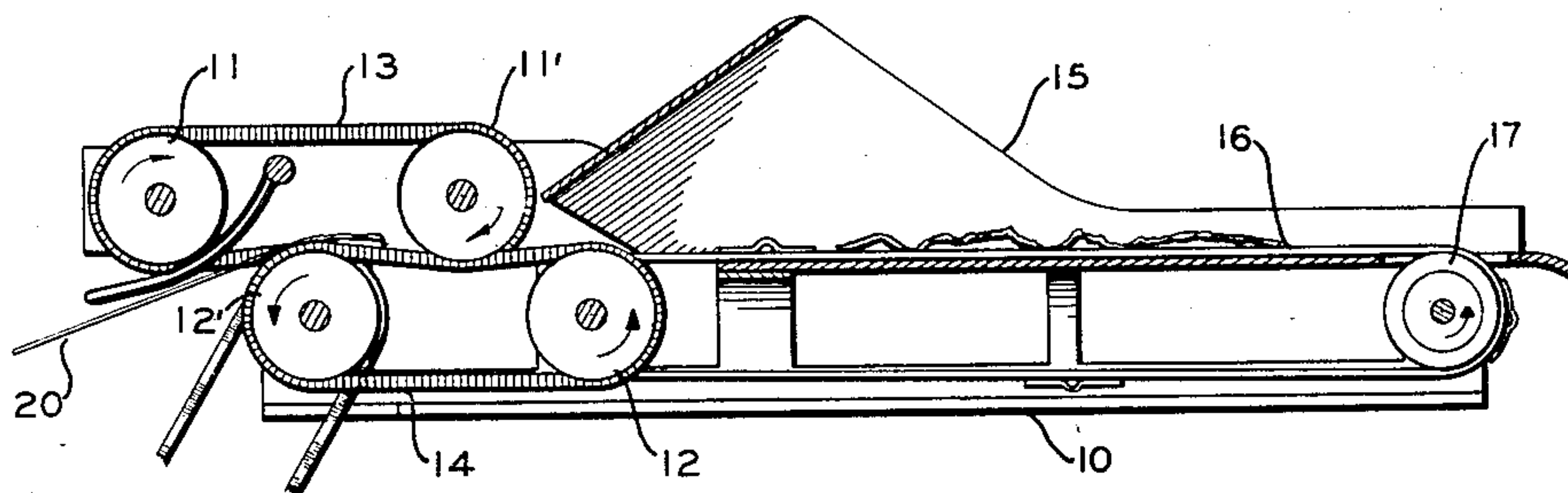
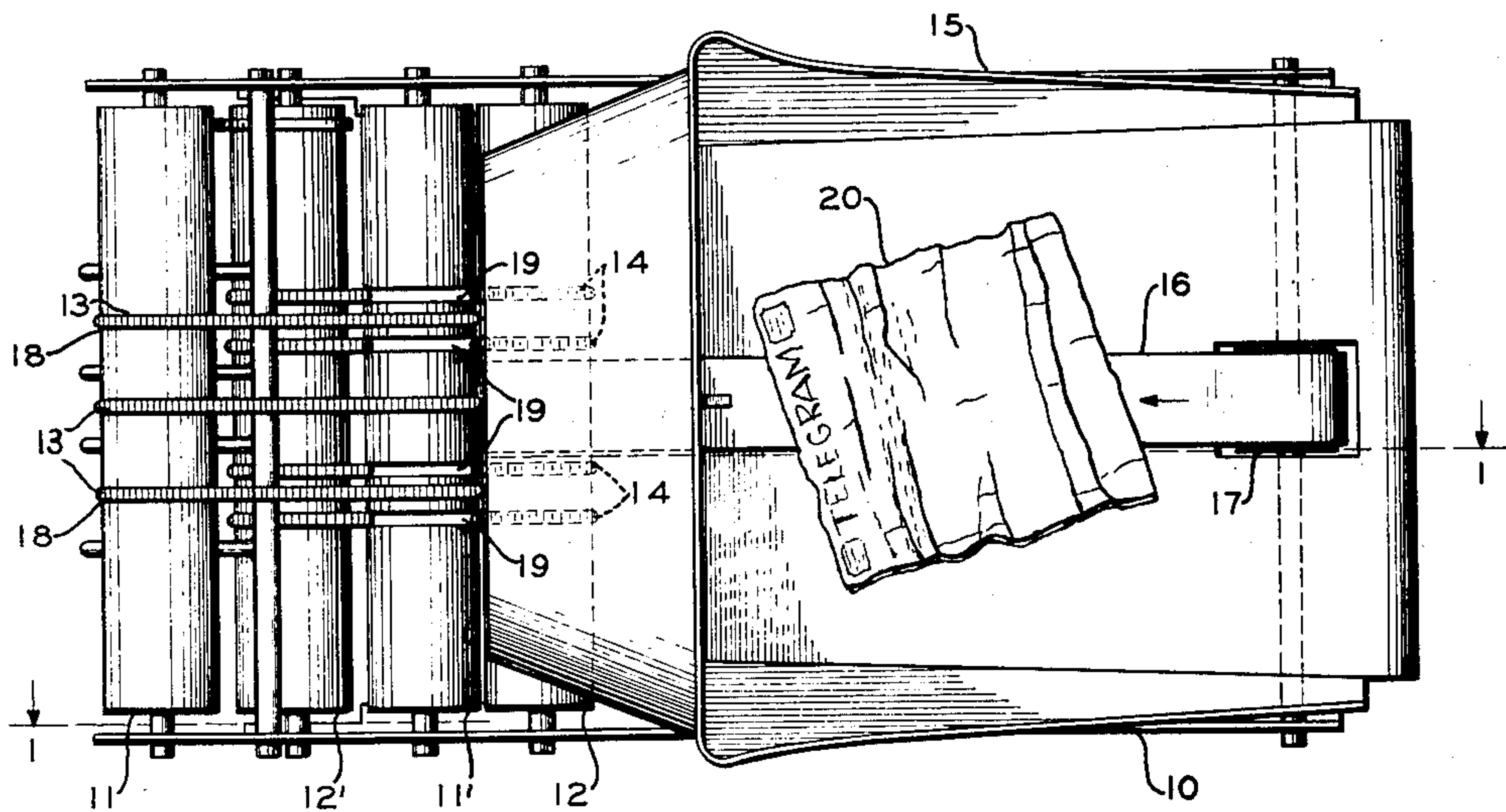


FIG. 2



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MECHANISM FOR STRAIGHTENING SHEET MATERIAL

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7 Claims. (Cl. 92—70)

This invention relates to apparatus for handling sheet material, message blanks, and the like, and particularly to mechanism or apparatus for straightening sheets of material which have become creased or rolled in handling.

The primary object of this invention is to provide apparatus for straightening a sheet of material or message blank which has been rolled or creased by forming a plurality of other creases in said message which overcome the undesired creases in the message and have the general effect of restoring the message to its original flat or unfolded form.

Another object of this invention is to provide means for feeding the sheets into the straightening apparatus. Still another object is to provide an apparatus which will pass material which is relatively rigid or which otherwise resists the creasing action of the apparatus.

Other objects will be apparent from the following description.

In handling sheets of material such as paper, and particularly blanks or sheets of material employed to convey messages or information by being transported from one place to another by means of pneumatic conveyors employing carriers in which the sheets must be rolled or folded in order to insert them into the carrier, after the sheets of material have reached their destination and they are removed from the carrier, the sheets will be in rolled or folded or creased form and as is quite well recognized they are troublesome to straighten out or restore to a substantially flat position. If the sheets are to be handled, filed, or in any way made use of to any great extent after they are transported through a carrier conveyor of the type referred to, such handling or filing will be greatly facilitated if the sheets are restored to substantially their original flat condition. This is extremely desirable if the sheets are to be transported from the pneumatic conveyor receiving station to some other point by other conveyor means such as V-trough, flat belt conveyors, or conveyors of the drag type, similar to that described in Patent No. 1,793,953, issued to F. E. d'Humy et al., issued February 24, 1931 and assigned to the Western Union Telegraph Company.

According to this invention an apparatus is provided for restoring sheets or message blanks to substantially their original flat condition by passing the blanks between sets of rollers having resilient belting therebetween and arranged in offset relation so that the rollers do not revolve

in contact with each other but rather in contact with the portion of the belting existing between pairs of rollers in the set.

For a more complete description of this invention reference may be had to the accompanying drawing in which Fig. 1 shows a sectional elevation of the apparatus and Fig. 2 a plan view of the apparatus.

The preferred form of this apparatus embodies a framework 10 arranged to support upper and lower pairs of rollers 11, 11'; 12 and 12' having several belts 13 and 14, preferably of the round formation traveling around the respective pairs of rollers. The framework also supports a tray 15 having a suitable feeding belt 16 traveling therein for feeding the sheets between the respective pairs of rollers. The feeding belt passes around the return roller 17 at the outward end of the tray. The whole assembly may be driven by suitably driving one of the rollers.

I have found belting of the coil spring type to be most suitable for this type of apparatus. The belting on the upper and lower sets of rollers are offset from each other and arranged somewhat in alternate relation. The upper pair of rollers is illustrated as being provided with three belts while the lower pair is provided with four belts. While the positioning of the belts with respect to each other might be other than that illustrated, it is preferred to arrange the lower belts in pairs spaced rather closely to the belts on the upper rollers. The number of belts employed may be increased or decreased as desired. The upper and lower rollers are displaced horizontally from each other so that one of the upper pair is positioned substantially midway between the lower pair and one of the lower pair substantially midway between the upper pair. The position of the rollers is also such as to engage the portion of the belt extending between the rollers with sufficient pressure to cause the sheets to be creased or conformed to the shape tending to be formed between the upper and lower sets of belts as it passes through the mechanism.

In their preferred form the rollers 11, 11', 12 and 12' are provided with grooves 18 in which the belts traveling over them run. The grooves serve to retain the belt in the proper position or distribution longitudinally of the rollers. In addition to the above mentioned grooves 18, additional grooves 19 are provided on the rollers 11' and 12' only. The latter grooves are provided at the point where these rollers engage the belts of the opposed pair of rollers. In the form il-

illustrated in Figs. 1 and 2 the upper roller 11' is provided with four grooves 19 corresponding with the four belts 14 traveling on the rollers 12 and 12'. On the other hand, the roller 12' is provided with only three grooves 19 which correspond to the three belts 13 traveling on the rollers 11 and 11'. These extra grooves serve to intensify the corrugations formed in sheets of material 20 traveling between the belts, resulting in somewhat more pronounced corrugations than would be formed by the interwoven position assumed by the sheets as they conform to the path provided by the belts.

It will be observed that the illustration in Fig. 1 shows the portion of the belt between the respective pairs of rollers as being depressed below the normal line the belt would assume. This depression is provided by drawing the pairs of rollers together so that the upper and lower rollers 11' and 12' respectively press down on the portion of the belt traveling between the opposed pairs of rollers. As a sheet is carried through the straightening device, two actions are performed upon it. The first is the corrugations impressed in the sheet by the position it takes between the belts and rollers. The second operation is brought about by the fact that the portion of the belts traveling in the plane between the rollers 11' and 12' is out of alignment with the general direction of travel of the sheet. This causes the portion of a sheet between the rollers 11' and 12' to be bent upward at the roller 11' and downward at the roller 12' at the same time that it takes the corrugated form imposed by the belts. As it proceeds through the device, this bending action traverses the whole sheet. This results in the sheet being forcibly bent backward and forth while it is held in a substantially corrugated shape, causing the corrugations to be quite definitely set into the sheet by the stress imposed upon the corrugated portion of the sheet as it follows the path just described. The total net result is that a sheet fed into the apparatus, which had been folded or creased to such an extent as to prevent the sheet from lying flat, will have a series of small corrugations set into the sheet which overcome any creases or folds previously formed in the sheet and renders the whole sheet substantially flat in outline.

This straightening of the sheets is particularly advantageous where the sheets are to be assorted or handled or conveyed in loose form in open trough conveyors such as what is known in the art as V-trough conveyors. Sheets of material such as message blanks, which have been folded and transported through a pneumatic tube conveyor system and which must later be conveyed further by an open trough conveyor system are very difficult and almost impossible to handle over the latter type of conveyor system if they have not been straightened or flattened out or otherwise been restored to substantially their original flat and somewhat rigid condition. It has been found in use that the apparatus described herein will restore creased or folded telegram blanks or similar sheets to such a flat and rigid condition that they will pass through open trough type of conveyors with substantially the same facility as fresh or unfolded sheets.

From the foregoing description it will be observed that according to this invention an apparatus of a simple and effective form has been provided for rendering creased or folded sheets substantially straight by imposing other creases

or corrugations therein in a somewhat regular form which overcome the irregular creases and corrugations to which the sheet may have been previously subjected. Although this invention has been described primarily in connection with its application to telegram or message blanks, it may be employed to perform a similar function in connection with substantially any type of thin sheet material by suitably modifying the apparatus described.

While this invention has been shown in but one form it is apparent to those skilled in the art that it is not so limited but is susceptible to various changes and modifications without departing from the spirit thereof, and it is desired therefore that only such limitations shall be placed thereon as are imposed by the prior art or set forth in the appended claims.

What I claim is:—

1. In an apparatus for overcoming the effect of folds or creases in sheets of material the combination of upper and lower sets of belts, corresponding sets of rollers over which said belts travel, a framework in which said rollers are mounted, said upper and lower sets of belts being disposed in alternate relation with respect to each other, said upper and lower rollers being disposed out of vertical alignment and arranged so that the portion of the belts extending between the several rollers is engaged by one of the rollers of the other set and depressed below the line of normal travel of the belts so as to cause the corrugations formed by the sheets as they travel between the upper and lower belts to be bent transversely of the corrugations for putting them under strain, whereby when the sheets are discharged they tend to retain the corrugations set therein and thereby overcome the folds or creases which may have been formed in the sheets.

2. In an apparatus for overcoming creases or folds in sheets of material, the combination of an upper and lower pair of rollers between which the sheets travel, a framework in which said rollers are rotatably mounted, a plurality of endless belts running over each of said pair of rollers, said upper and lower rollers being disposed out of vertical alignment and arranged so that the portion of the belts extending between the sides of the respective pairs of rollers is engaged by one of the rollers of one of the other pairs and depressed below the normal line of travel of the belts and grooves in said rollers where they engage the belts for guiding the same and accentuating the corrugations formed in the sheets.

3. In an apparatus for overcoming the effect of folds and creases in sheet material, the combination of a framework, upper and lower sets of rollers supported in said framework and displaced longitudinally of the framework with respect to each other, a plurality of substantially round belts arranged to travel over the rollers of each set, said sets of rollers being spaced so that one or more of the rollers of the respective sets engage the intermediate portion of the belts extending between the rollers of the other set so as to tend to hold the portion of the belts traveling between said sets of rollers in the same plane, means to feed sheets of material between the upper and lower belts, the belts on the upper side being distributed in alternate relation to those on the lower set so as to impress corrugations longitudinally of the sheets as they tend to conform to the shape of

the path embodied between the upper and lower sets of belts.

4. In an apparatus for rendering sheets of material substantially straight, the combination
5 of upper and lower pairs of rollers, a frame-
work in which said rollers are mounted, belts
arranged to run over the respective pairs of
rollers, said pairs being arranged so that one
10 pair is offset longitudinally of the travel of the
belts with respect to the other, said belts and
rollers being disposed so that the portion of the
belt between each pair of rollers is held up
against one of the rollers of the other pair for
causing the portion of the belts between the
15 rollers to travel in substantially the same plane
thereby subjecting sheets passing between the
belts to a corrugating action for imposing a
series of small corrugations in the sheet which
tend to maintain the sheet as a whole in a sub-
20 stantially flat condition.

5. In an apparatus for rendering sheets of material, which have been folded or creased, substantially straight by impressing a plurality of substantially parallel corrugations in said
25 sheets, the combination of upper and lower pairs of rollers, a plurality of belts arranged to travel over said rollers, said rollers being so arranged that the lower portion of the upper belts and the upper portion of the lower belts travel in

substantially the same plane, one roller of the upper pair being arranged to press upon the portion of the belt between the rollers of the lower pair and vice versa, said rollers embody-
80 ing grooves at the points where they are en-
gaged by both their own belts and the belts of the other pair of rollers, means for feeding sheets of material between said upper and lower belts, said belts and the grooves in said rollers
85 cooperating to hold the sheets substantially flat and impress a plurality of parallel corrugations in said sheets while they are held substantially flat thereby overcoming creases and folds formerly present in the sheet.

6. In an apparatus for overcoming the effect
90 of folds or creases in sheets of material, the combination of means for forming longitudinal creases in the sheets in one direction and means for bending the sheets transversely of
95 said creases while they are within the creased forming means.

7. In an apparatus for overcoming the effect of folds or creases in sheet material, the combination of means through which the sheets
100 pass to form corrugations in the sheets and means to set the corrugations by stressing the same transversely before they emerge from the forming means.

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