

Jan. 7, 1941.

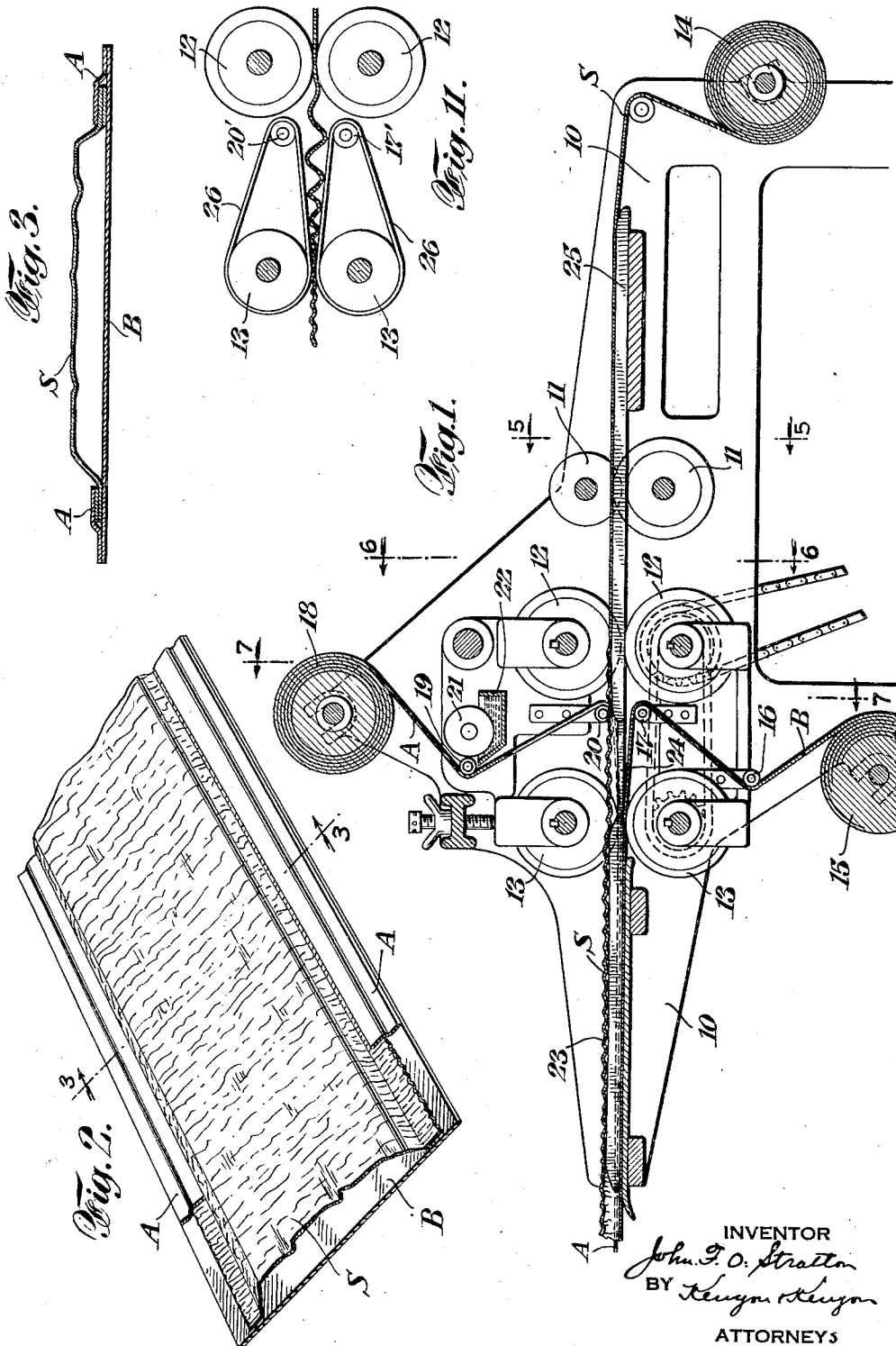
J. F. O. STRATTON

2,228,236

CRUMPLING MACHINE

Filed April 29, 1939

3 Sheets-Sheet 1



INVENTOR
John F. O. Stratton
BY *Kuyon Kuyon*
ATTORNEYS

Jan. 7, 1941.

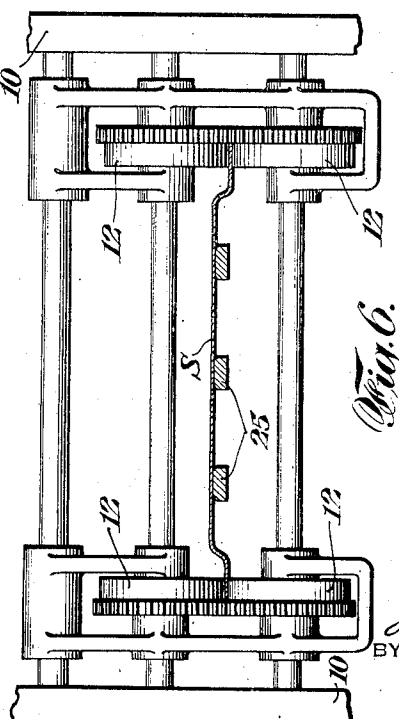
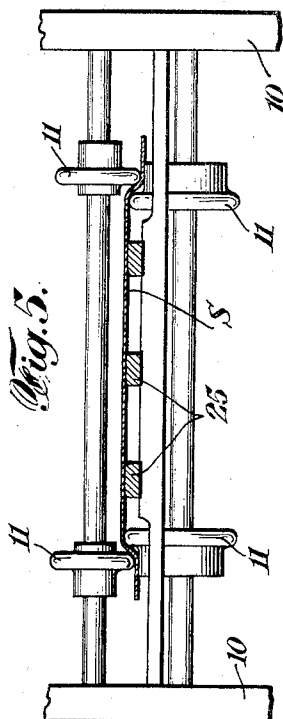
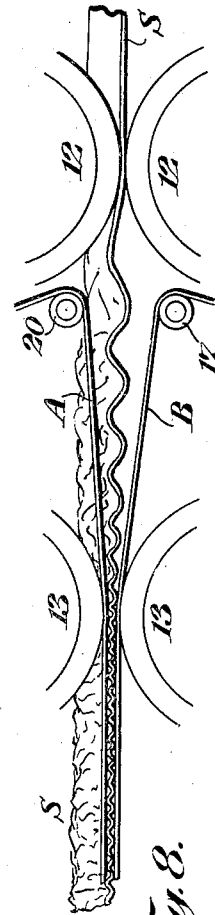
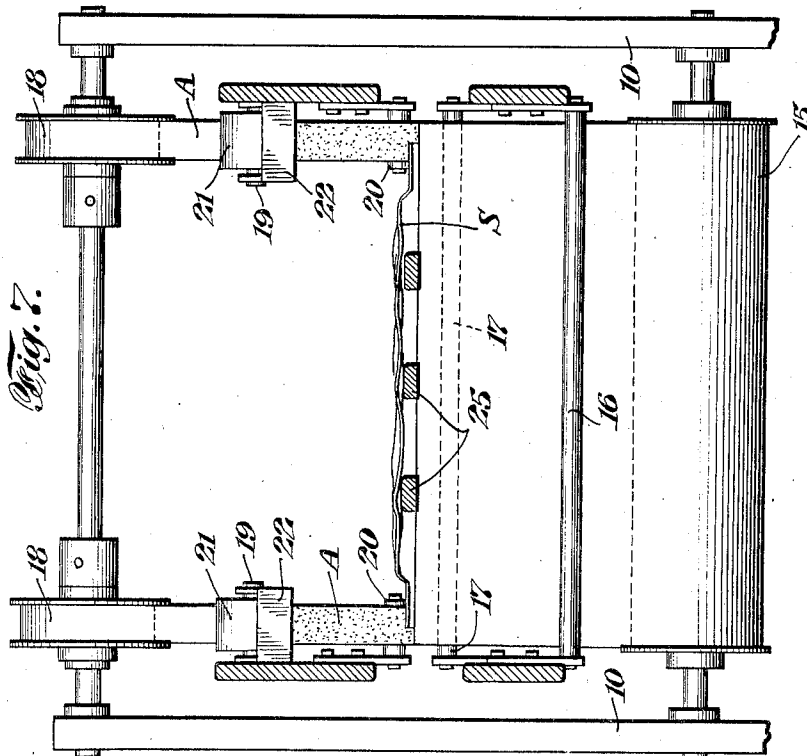
J. F. O. STRATTON

2,228,236

CRUMPLING MACHINE

Filed April 29, 1939

3 Sheets-Sheet 2



INVENTOR
John F. O. Stratton
BY *Kellogg Kellogg*
ATTORNEYS

Jan. 7, 1941.

J. F. O. STRATTON

2,228,236

CRUMPLING MACHINE

Filed April 29, 1939

3 Sheets-Sheet 3

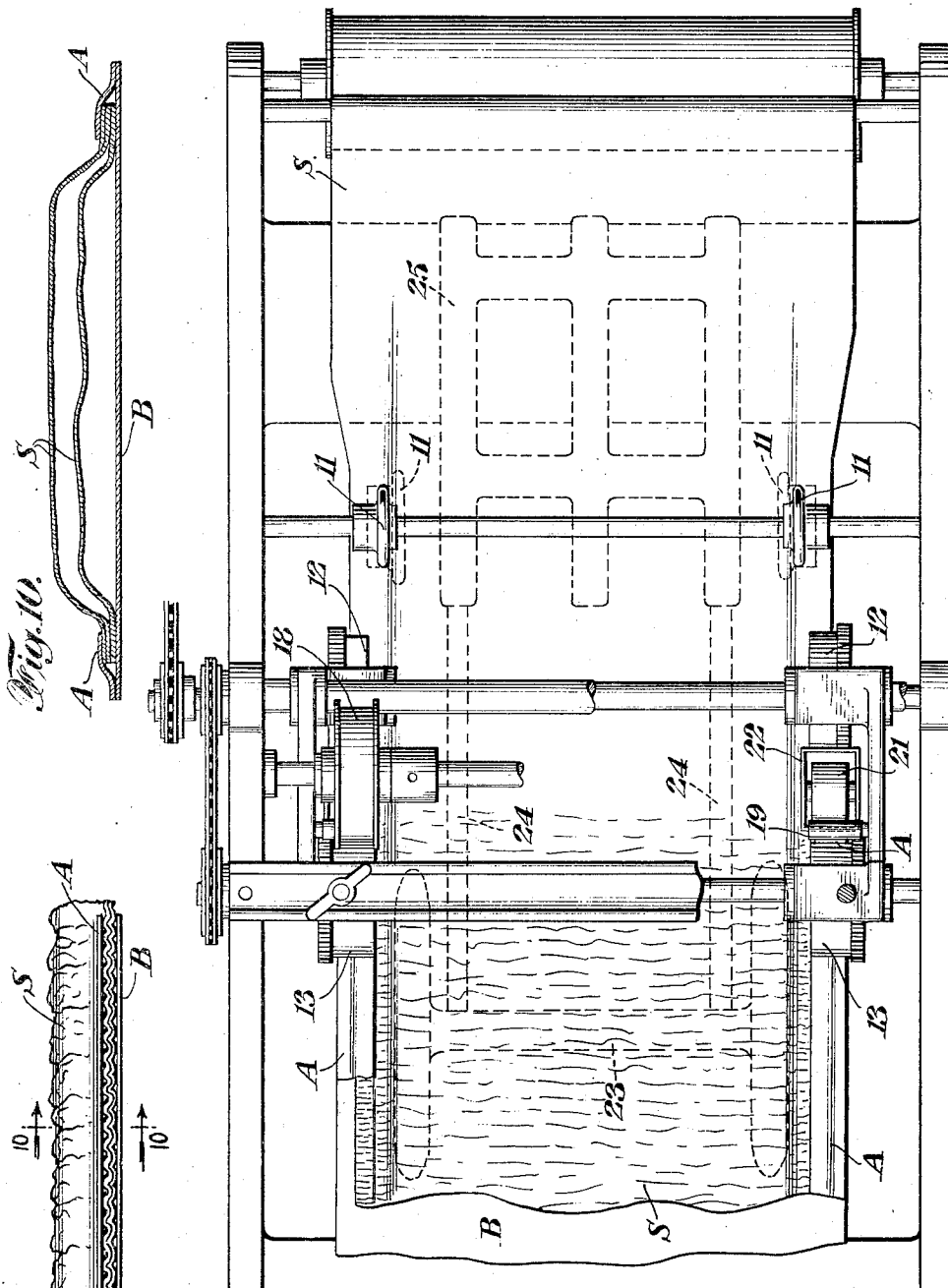


Fig. 9.

Fig. 10.

INVENTOR
John F. O. Stratton
BY *Kenny & Kenny*
ATTORNEYS

UNITED STATES PATENT OFFICE

2,228,236

CRUMPLING MACHINE

John F. O. Stratton, Flushing, N. Y.

Application April 29, 1939, Serial No. 270,944

9 Claims. (Cl. 154—32)

This invention relates to crumpling machines and particularly to a machine for crumpling a sheet of material such, for example, as thin metal foil.

An object of this invention is a machine of simple construction which will effectively crumple a continuously fed sheet of material such, for example, as metal foil and in one modification, will attach the crumpled sheet material to a backing sheet with the major portion of the crumpled sheet in spaced relation to the backing sheet.

One form of apparatus embodying the invention comprises a pair of co-operating forming rollers in combination with a pair of positively driven feed rolls spaced from the forming rolls and adapted to draw the sheet to be crumpled between the forming rollers, the latter rollers being shaped to offset the edges of said sheet relative to the center portion thereof. From the feed rollers, the sheet of material is passed to a third pair of rollers or crumpling rollers positively driven at a peripheral speed less than the peripheral speed of the feed rollers. Guides above and below the sheet lead to the nip of the third pair of rollers and are in diverging relation to each other in the direction of the second pair of rollers. By reason of the difference in the peripheral speeds of the feed and crumpling rollers, the sheet is irregularly offset and is guided in such condition between the crumpling rollers with the results that it is discharged from such rollers in crumpled condition. The guides above referred to may be endless belts constituting permanent parts of the machine or may be strips of material which are passed through the crumpling rollers with the crumpled sheet and are combined with it to form a finished product consisting of a backing sheet to which the crumpled sheet is attached along its edges only.

Other objects, novel features and advantages of this invention will become apparent from the following specification and accompanying drawings, wherein:

Fig. 1 is a vertical section through one form of machine embodying the invention;

Fig. 2 is a perspective view of a product resulting from the operation of such machine;

Fig. 3 is a section on the line 3—3 of Fig. 2;

Fig. 4 is a plan view of the machine shown in Fig. 1;

Figs. 5, 6 and 7 are sections respectively on the lines 5—5, 6—6, 7—7 of Fig. 1;

Fig. 8 is an enlarged fragmentary side elevation;

Fig. 9 is a side elevation of a modified form of product obtainable by operation of the machine;

Fig. 10 is a section on the line 10—10 of Fig. 9, and

Fig. 11 is a fragmentary side elevation of a modification.

A suitable frame 10 supports a pair of rotatable forming rollers 11, a pair of rotatable feed rollers 12 and a pair of crumpling rollers 13. Means are provided for positively driving the rollers 12 and 13 and such means are so arranged that the peripheral speed of the rollers 12 slightly exceeds the peripheral speed of the rollers 13. A roll 14 of sheet material S such, for example, as metal foil is supported at one end of the machine and the sheet S passes in succession between the forming rollers 11, the feed rollers 12 and the crumpling rollers 13, the sheet S being drawn between the forming rollers 11 by the feed rollers 12 and the forming rollers 11 being supported for free rotation. As shown in Fig. 5, the rollers 11 are of such configuration that they offset the marginal edges of the sheet with respect to the center portion thereof.

A roll 15 of backing strip material B is supported by the frame 10 and the strip B after passing around guide rollers 16 and 17 passes between the crumpling rollers 13 on the bottom side of the sheet material, the backing strip B being of slightly greater width than the width of the sheet material after its edges have been offset. A pair of rollers 18 of narrow attachment strip material A are supported by the frame 10 and after passing around the guide rollers 19 and 20 the strips A pass between the crumpling rollers 13 on the upper side of the offset margins of the sheet material. Each strip A is of such width that it only partially overlies a margin of the sheet S and the outer edges of the strips A are in alignment with the edges of the backing strip B. The guide rollers 17 and 20 are arranged between the feed rollers and the crumpling rollers and are so located that the strips B and A combine to form guides converging in the direction of sheet travel. The rollers 19 not only serve as guides, but also co-operate with rollers 21 to apply adhesive to the strips A from a source of adhesive.

A spacer 23 is arranged to lie between the backing strip B and the central portion of the sheet material S, upon discharge of the combined sheet and strips from the crumpling rollers 13. The spacer is provided with a pair of arms 24

leading to a head 25 by means of which the spacer is anchored in place.

In operation of the machine above described, the sheet material S is drawn from the roll 14 between the forming rollers 11 by the feed rollers 12 and discharged from the feed rollers into the guide means constituted by the backing strip B and the two attachment strips A and with such strips is drawn between the crumpling rollers 13. The rollers 12 offset the edge portions of the strip S relative to its central portion and the formed sheet is then delivered between the backing strip and the attachment strips at a greater linear speed than the linear speed of such strips. As a result, the strip S is caused to undulate as shown in Fig. 8 and in this condition is passed between the crumpling rollers. The crumpling rollers press down the undulations in the marginal portions of the sheet S and thus retain the center portion permanently in undulated form. Also, the crumpling rollers 13 press the strips A into contact both with the margins of the sheet S and the edges of the backing strip B with the result that the strips A firmly attach the sheet S in crumpled condition to the backing strip B. The spacer or spreader 23 serves to keep the center portion of the sheet S in spaced relation to the backing strip.

The operation of the machine just described produces the product illustrated in Figs. 2 and 3. The product shown in Figs. 9 and 10 in which more than one sheet S is attached to a backing strip is produced by passing two sheets S through the machine instead of one and utilizing an additional spacer similar to 23 between the two sheets.

By use of the modification shown in Fig. 11, there may be produced a crumpled sheet without attachment to a backing strip. In this modification, the guiding and supporting means for the backing and attachment strips are dispensed with and rollers 17' and 20' are substituted for the rollers 17 and 20 and belts 26 are provided to pass around these rollers and the crumpled rollers 13, the belts 26 serving the same purpose as the backing strip B and the attachment strips A with respect to receiving the sheet S from the feed rollers 12 and delivering the undulated sheet to the crumpling rollers 13.

Each of the forming rollers, feed rollers and crumpling rollers are of reduced diameter over their central portions so that only the margins of the sheet S are engaged by these rollers. This arrangement also provides clearance for the arms 24 by which the spreader 23 is attached to the head 25.

I claim:

1. Apparatus of the character described comprising a pair of forming rollers, a pair of feed rollers spaced from said forming rollers and adapted to draw a sheet of material through said forming rollers, said forming rollers being shaped to offset the edges of said sheet relative to the center portion thereof, a pair of crumpling rollers spaced from said feed rollers and adapted to receive said sheet therefrom, guides above and below said sheet between said feed rollers and said crumpling rollers leading to the nip of said crumpling rollers and being in converging relation in the direction of sheet travel, and means for rotating said feed rollers and crumpling rollers with the peripheral speed of the crumpling rollers being less than that of the feed rollers.

2. Apparatus of the character described comprising a pair of forming rollers, a pair of feed rollers spaced from said forming rollers and

adapted to draw a sheet of material through said forming rollers, said forming rollers being shaped to offset the edges of said sheet relative to the center portion thereof, a pair of crumpling rollers spaced from said feed rollers and adapted to receive said sheet therefrom, guide means between said feed and crumpling rollers in spaced relation to said sheet at opposite sides thereof, said guide means being adapted for feeding strips of material between said crumpling rollers above and below said sheet, means for applying adhesive to certain of said strips, and means for rotating said feed and crumpling rollers with the peripheral speed of the crumpling rollers being less than that of the feed rollers.

3. Apparatus of the character described comprising a pair of feed rollers adapted to feed a sheet of material, a pair of crumpling rollers spaced from said feed rollers and adapted to receive said sheet therefrom, guides on opposite sides of said sheet between said rollers converging in the direction of sheet travel and leading to the nip of said crumpling rollers, and means for rotating said feed rollers and crumpling rollers with the peripheral speed of the crumpling rollers being less than that of the feed rollers.

4. Apparatus of the character described comprising a pair of feed rollers adapted to feed a sheet of material, a pair of crumpling rollers spaced from said feed rollers and adapted to receive said sheet therefrom, guide means between said feed and crumpling rollers in spaced relation to said sheet at opposite sides thereof, said guide means being adapted for feeding strips of material between said crumpling rollers on opposite sides of said sheet, means for applying adhesive to certain of said strips, and means for rotating said feed and crumpling rollers with the peripheral speed of the crumpling rollers being less than that of the feed rollers.

5. Apparatus of the character described comprising a pair of forming rollers, a pair of feed rollers spaced from said forming rollers and adapted to draw a sheet of material through said forming rollers, said forming rollers being shaped to offset the edges of said sheet relative to the center portion thereof, a pair of crumpling rollers spaced from said feed rollers and adapted to receive said sheet therefrom, guide means between said feed and crumpling rollers in spaced relation to said sheet on opposite sides thereof, said guide means being adapted for feeding a backing strip between said crumpling rollers on one side of said sheet and for feeding a pair of narrow strips between said crumpling rollers on the opposite side of said sheet, said backing strip being of sufficient width to extend beyond the edges of the offset portions of said sheet and said narrow strips being fed in contact only with the offset portions and having their outer edges in alignment with the outer edges of the backing strip, and means for applying adhesive to said pair of strips.

6. Apparatus of the character described comprising a pair of feed rollers adapted to feed a sheet of material, a pair of crumpling rollers spaced from said feed rollers and adapted to receive said sheet therefrom, each of said feed rollers and crumpling rollers consisting of two spaced disks and a connecting shaft of less diameter than said disks, guides on the opposite sides of said sheet between said rollers converging in the direction of sheet travel and leading to the nip of said crumpling rollers, and means for rotating said feed rollers and crumpling rollers with the

peripheral speed of the crumpling rollers being less than that of the feed rollers.

7. Apparatus according to claim 6 characterized by spacing means arranged beyond said crumpling rollers for maintaining the central portion of said sheet out of contact with said backing strip.

8. Apparatus of the character described comprising a pair of feed rollers adapted to feed a sheet of material, a pair of crumpling rollers spaced from said feed rollers and adapted to receive said sheet therefrom, each of said crumpling rollers and feed rollers consisting of a pair of spaced disks connected by a shaft of less diameter than said disks, guide means between said

feed and crumpling rollers in spaced relation to said sheet at opposite sides thereof, said guide means being adapted to feed strips of material between said crumpling rollers on opposite sides of said sheet, means for applying adhesive to certain of said strips, and means for rotating said feed and crumpling rollers with the peripheral speed of the crumpling rollers being less than that of the feed rollers.

9. Apparatus according to claim 8 characterized by spacing means arranged beyond said crumpling rollers for maintaining the central portion of said sheet out of contact with said backing strip.

JOHN F. O. STRATTON. 15