United States Patent

Gay

[15] 3,685,711

[45] Aug. 22, 1972

[54] **TENSION ADJUSTER FOR SLIT METAL SHEETS**

[72] Inventor: **Pierre André Gay**, La-Tour-En-Jarez, France

[73] Assignee: **Compagnie des Ateliers et Forges de la Loire,** Paris, France

[22] Filed: **Sept. 8, 1970**

[21] Appl. No.: **70,067**

[52] **U.S. Cl.** **226/191,** 226/195, 242/75.2, 242/56.2

[51] **Int. Cl.** **B65h 23/18**

[58] **Field of Search**.....226/195, 190, 191, 192, 193, 226/194, 177, 185, 109, 39; 29/124; 242/75.2, 56.2

[56] **References Cited**

UNITED STATES PATENTS

3,386,679	6/1968	Foulon et al.	226/195 X
2,292,851	8/1942	Tykal	226/185 X
3,468,494	9/1969	Gaudin	242/75.2
3,111,285	11/1963	Coker et al.	226/195 X
3,547,332	12/1970	Gaudin	242/75.2

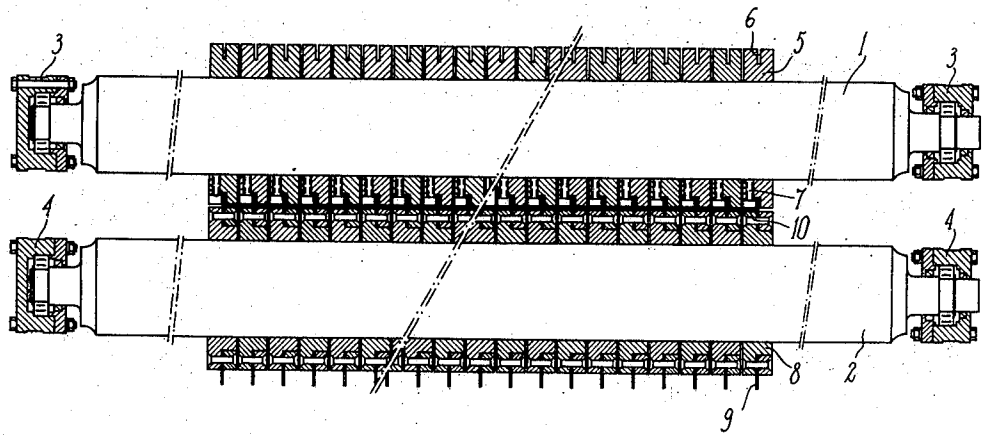
Primary Examiner—Allen N. Knowles

Attorney—Wenderoth, Lind & Ponack

[57] **ABSTRACT**

This device for adjusting the tension of an initially tensionless sheet consisting of a plurality of slit strips in a sheet-mill, so that the tension applied to said sheet is distributed in a manner substantially proportional to the width of each slit strip, the speeds of said slit strips differing slightly from one another.

5 Claims, 3 Drawing Figures



PATENTED AUG 22 1972

3,685,711

SHEET 1 OF 3

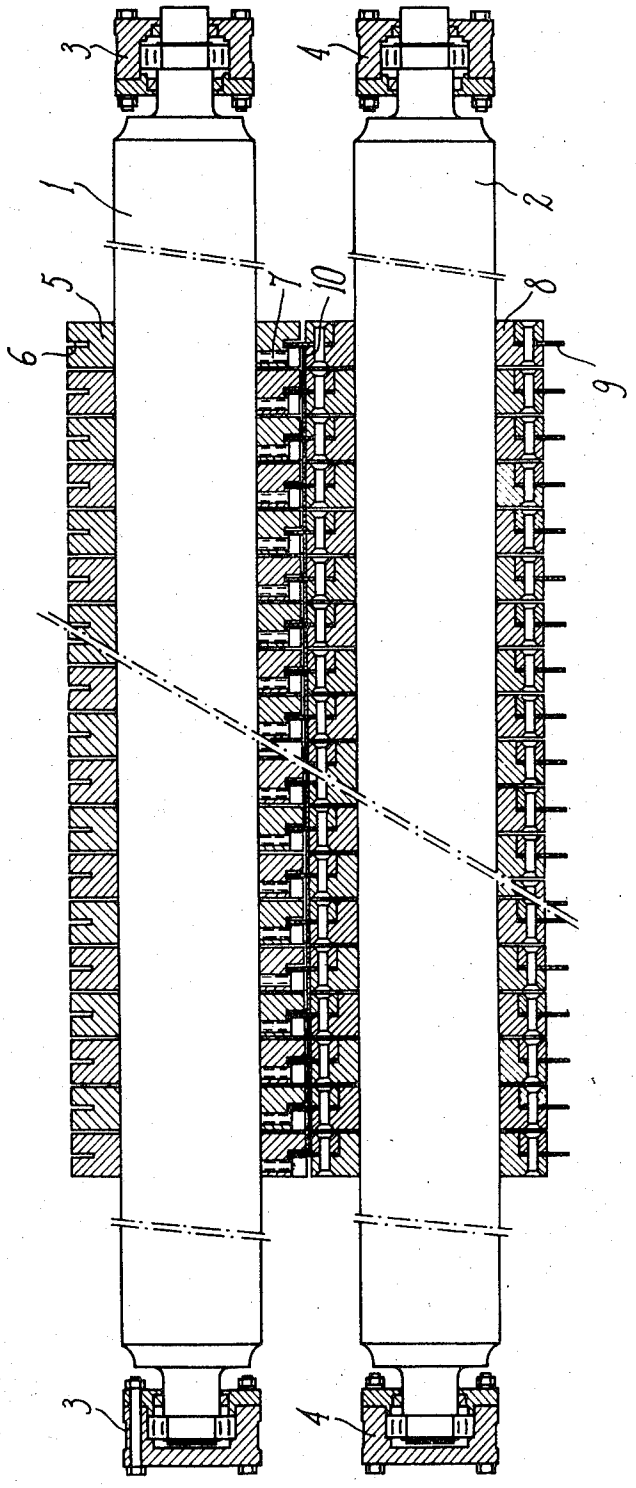


FIG. 1

PIERRE ANDRE GAY,
Inventor

By Wenderoth, Lind & Ponack

Attorneys

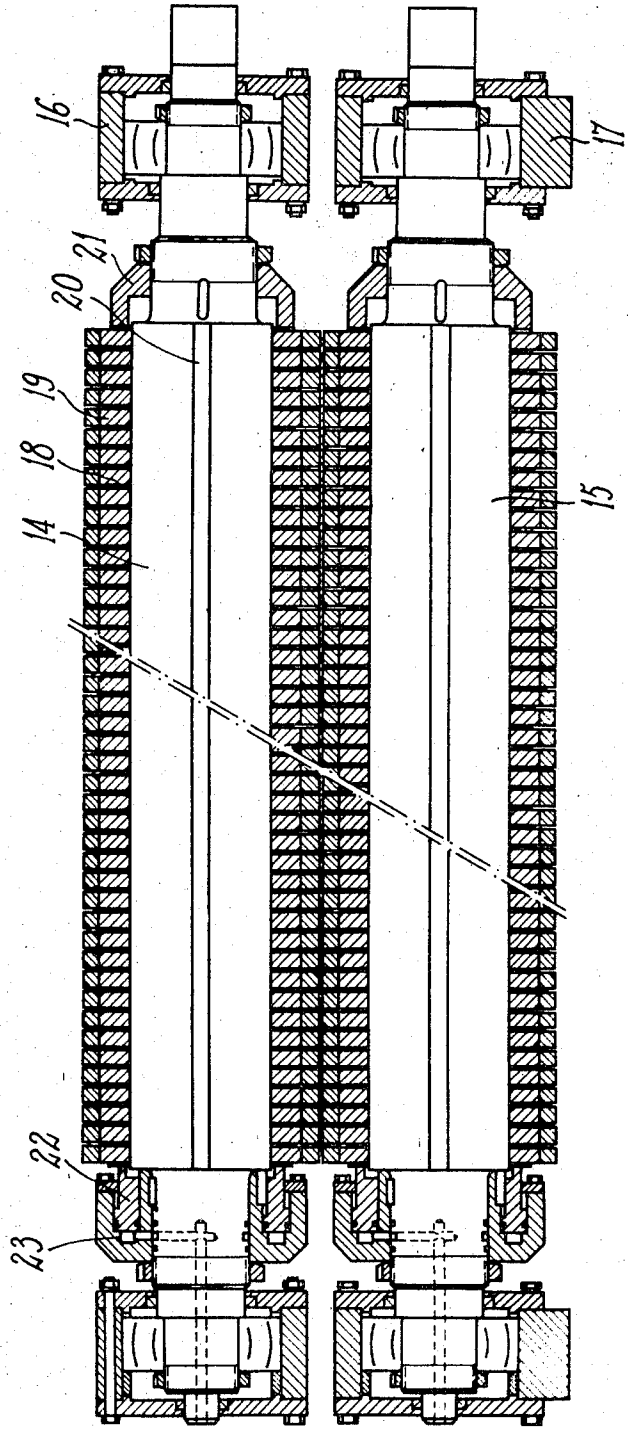


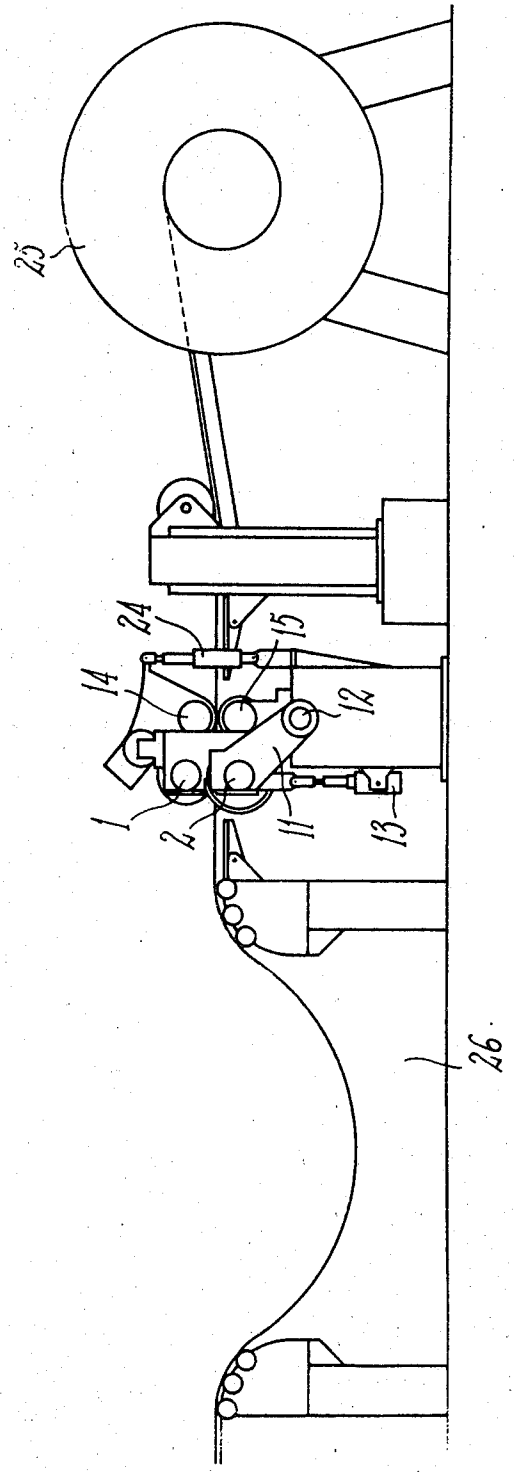
FIG. 2

PIERRE ANDRE GAY,
Inventor

By Wenderoth, Lind & Ponack

Attorneys

FIG. 3



PIERRE ANDRE GAY,
Inventor

By Wenderoth, Lind & Ponack

Attorneys

TENSION ADJUSTER FOR SLIT METAL SHEETS

This invention relates to slitting machines or slit lines of the type used for slitting sheet-mill products into narrow strips suitable for making miscellaneous articles, and has specific reference to improved means for regulating the value and distribution of tension of an initially tensionless sheet consisting of a plurality of slit strips.

It is known that the function of a slit line is to slit a relatively wide sheet or strip into a plurality of narrow strips. This line comprises essentially an unrolling unit for uncoiling the continuous wide sheet, shear means for cutting this sheet into a plurality of narrow strips, and other means for coiling up the slit strips.

A hitherto unsolved problem arising in these slit lines is the proper coiling of slit strips.

In fact, before the slitting operation the sheet is neither perfectly flat, nor of strictly uniform thickness. As a result, the slit strips have neither constant lengths nor constant thickness.

Furthermore, to perform a satisfactory slitting operation the tractive efforts exerted on the slit strips must be kept at a very low value just downstream of the shearing means.

The problem of coiling slit strips is equivalent to the problem of coiling a plurality of unstressed strips having slightly different thicknesses, which travel at slightly different speeds (these speed variations being due to variations in length caused in turn by the insufficient flatness of the initial wide sheet or strip) and have to be coiled under tension. In fact, a coil must compulsorily be formed under a certain stress in order to obtain a proper shape thereof and to avoid the relative slip of its turns during the subsequent uncoiling thereof.

This invention is therefore concerned primarily with tension adjustment means adapted to exert on an initially unstressed sheet consisting of a plurality of slit strips a tension which is distributed in a manner substantially proportional to the width of each slit strip, the speeds of these slit strips differing slightly from one another.

A tension adjustment device according to this invention consists basically of two pairs of rolls, namely:

one pair of rolls for guiding the slit strips,

one pair of braking rolls.

A typical form of embodiment of a tension adjuster according to this invention will now be described by way of example with reference to the attached drawings in which:

FIG. **1** illustrates the pair of guide rolls;

FIG. **2** illustrates the pair of braking rolls;

FIG. **3** illustrates the tension adjuster in the slitting line.

As illustrated in FIG. **1**, the guide rolls consist of a pair of shafts **1**, **2** mounted in bearings **3** and **4** respectively.

A series of rings **5** formed with relatively deep notches **6** are slipped on shaft **1**, and adapted to be set in a variable position on said shaft **1** to which they are secured by set screws **7**.

Other rings **8** each provided with a disk **9** engaging one of said notches **6** are slipped on the other shaft **2**.

Thus, passages of adjustable width and each adapted to guide a slit strip are formed between the guide rolls.

A typical slit strip is designated by the reference numeral **10**.

Power means (not shown) are provided for driving the guide rolls at the strip speed.

The relative spacing of rolls **1** and **2** may be controlled by suitable and known means in order to facilitate the operation.

Thus, FIG. **3** shows by way of example the shaft **2** as being mounted to an arm **11** carried by a pivot **12** and adapted to be rotated about the axis of said pivot **12** by a fluid-actuated cylinder **13**.

The pair of braking rolls illustrated in FIG. **2** comprises a pair of shafts **14**, **15** carried by bearings **16**, **17** respectively.

A series of different and alternating rings **18**, **19** are stacked on these shafts **14**, **15**. Rings **18** are locked against rotation on shafts **14**, **15** by suitable key means, but adapted to slide axially therealong. These rings **18** are locked in relation to the relevant shaft by a key groove **20** formed in this shaft. The other rings **19** are free to rotate and move axially in relation to the shaft. These rings may advantageously be coated with resilient material such as rubber on their outer surface. The ring stacking is compressed between a fixed abutment **21** and a movable abutment **22** constituting the piston of a fluid-actuated cylinder **23**.

The braking rolls are so driven that their peripheral speed is slightly inferior to that of the strip. They can be urged towards each other by another fluid-actuated cylinder **24** (FIG. **3**).

When a strip is pressed between these rolls it is braked by the rings **19** engaging same and in frictional contact with the rings **18** driven at the roll speed. This braking effort is adjustable by modifying the pressure exerted by the cylinder **23** and proportional to the number of rings **19** engaging the strip, and therefore slightly proportional to the width of said strip if the rings **19** are relatively thin.

FIG. **3** illustrates the end of a slitting line equipped with a tension adjuster according to this invention. After slitting the initial sheet the slit strips are coiled by a coiling machine **25** pulling these strips through the device of the present invention by extracting them from a loop pit **26**.

What I claim is:

1. A device for adjusting the tension of slit strips comprising on the one hand a pair of guide rolls having shafts, one of said rolls comprising rings secured in an adjustable position on its shaft, said rings having radial notches formed therein, the other of said rolls comprising rings slipped on its shaft each provided with a disk coacting with one of said notches of said first named roll, the gap left between said two rolls having the shape of a sequence of rectangles constituting the cross-sectional contours of the slit strips, said rolls being driven to have a substantially zero relative speed in relation to the strip and, on the other hand a pair of braking rolls comprising a series of stacked rings, which are friction driven independently of each other from a shaft rotatably driven at a speed so that if the rings do not slip on their friction surfaces their peripheral speed is inferior to the strip speed.

2. A device for adjusting the tension of slit strips comprising a pair of guide rolls provided with adapters capable of giving to the gap left between said two rolls substantially the shape of a sequence of rectangles reproducing the succession of rectangles constituting the cross-sectional contours of the slit strips, said rolls

being driven to have a substantially zero relative speed in relation to the strip and a pair of braking rolls having a series of stacked rings frictionally driven independently of each other from a shaft rotatably driven at a speed so that if the rings do not slip on their friction surfaces their peripheral speed is inferior to the strip speed.

3. A device as set forth in claim 2, wherein said stacked rings comprise a first series of rings stacked on their shafts rotatably driven therefrom but adapted to move axially, and a second series of rings alternating with said first series of rings adapted to rotate and move axially in relation to their shaft.

4. A device as set forth in claim 3, wherein said braking rolls are pressed against each other by a fluid-actuated cylinder.

5. A device as set forth in claim 3, wherein fluid-actuated cylinders are connected to said stacked rings to adjust the braking force.

* * * * *