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Köerner et al.

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[54] **SHEET PRINTING AND STAMPING MACHINE**

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[51] **Int. Cl.**..... **B41f 19/02**

[58] **Field of Search**..... 101/23, 24, 137, 136, 140, 101/174, 177, 183, 184, 232, DIG. 19; 271/53 MG; 83/300, 303

[56] **References Cited**

UNITED STATES PATENTS

2,110,980	3/1938	Swift, Jr.	271/53 MG
2,130,977	9/1938	Timson et al.	271/53 MG
2,192,908	3/1940	Harrold et al.	271/53 MG
2,377,447	6/1945	Pepreburne et al.	271/53 MG
2,699,333	1/1955	Claybourn et al.	101/232
2,754,118	7/1956	Kaddeland	271/53 MG
3,422,757	1/1969	Grobman et al.	101/232
3,611,925	10/1971	Kulwicki	101/183

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[57] **ABSTRACT**

During the manufacture of printed cardboard sheets, it is an advantage when the printing machine is coupled with the stamping machine. In such a machine, in accordance with the invention, the rollers of the stamping apparatus have the same equal diameter. Since the rollers in the stamping machine may be larger than in the printing machine, the diameter of the stamping rollers is assumed to be up to 1.5 times greater than the diameter of the printing rollers of the printing apparatus, which perform one revolution in each working cycle. Since the number of revolutions of all rollers of the coupled printing and stamping machine must be the same in order to maintain the operating cycles, the peripheral speed is necessarily different. This difference in the peripheral speed, is equalized by a transfer roller which operates at two different speeds during each revolution according to the peripheral speeds of the printing rollers and stamping rollers.

3 Claims, 3 Drawing Figures

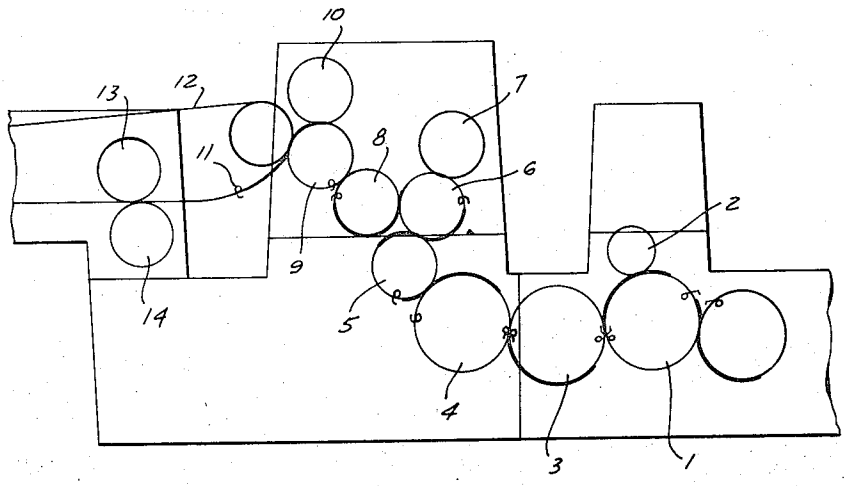


FIG. 1

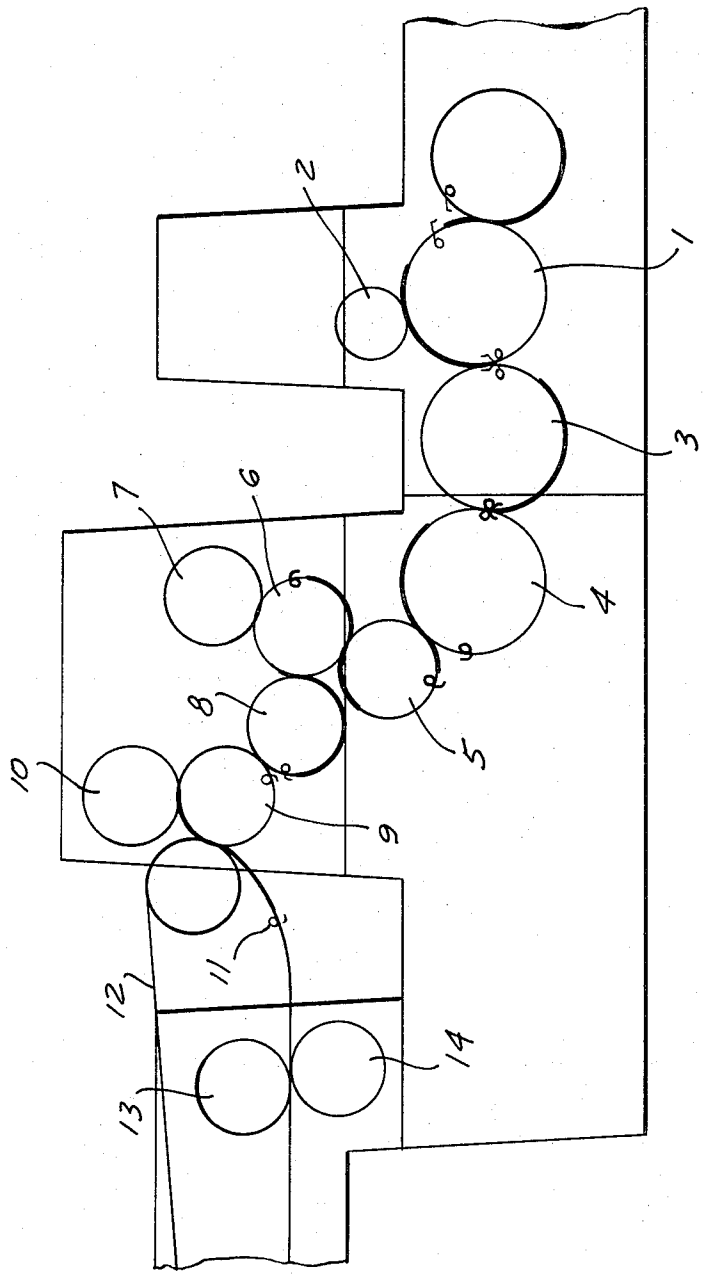
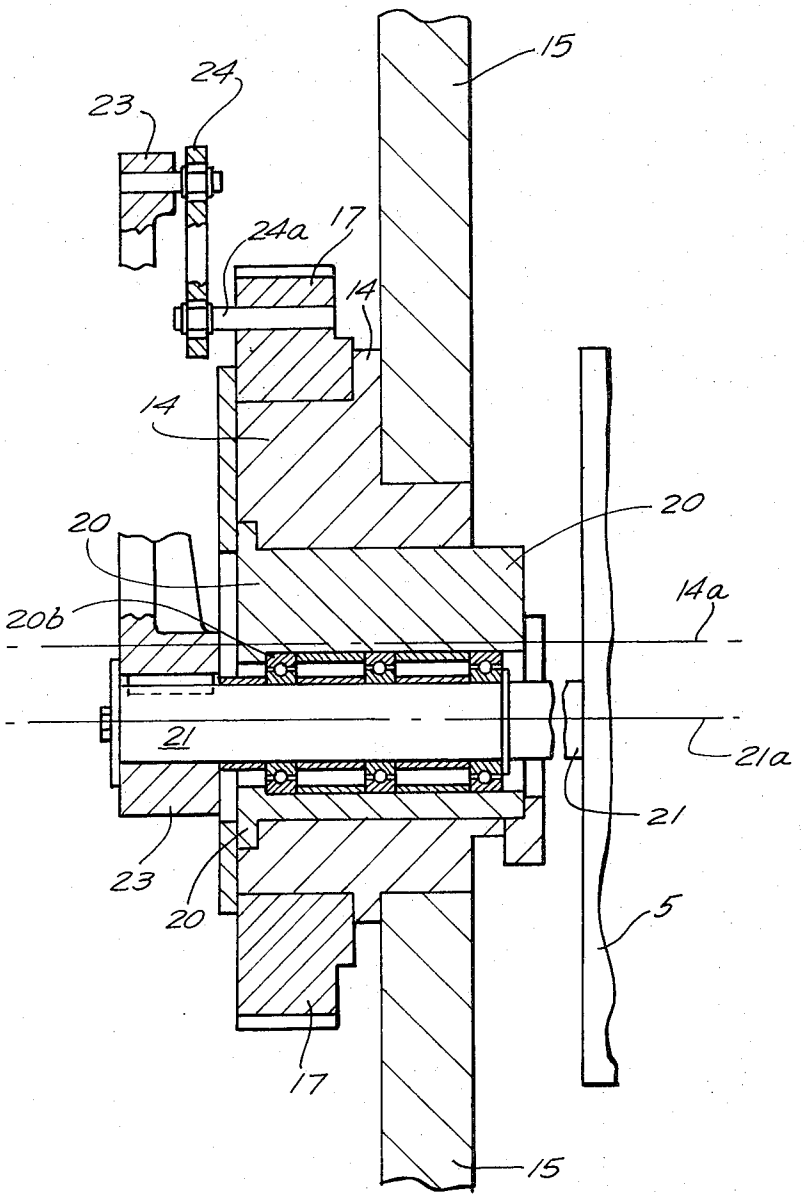


FIG. 2



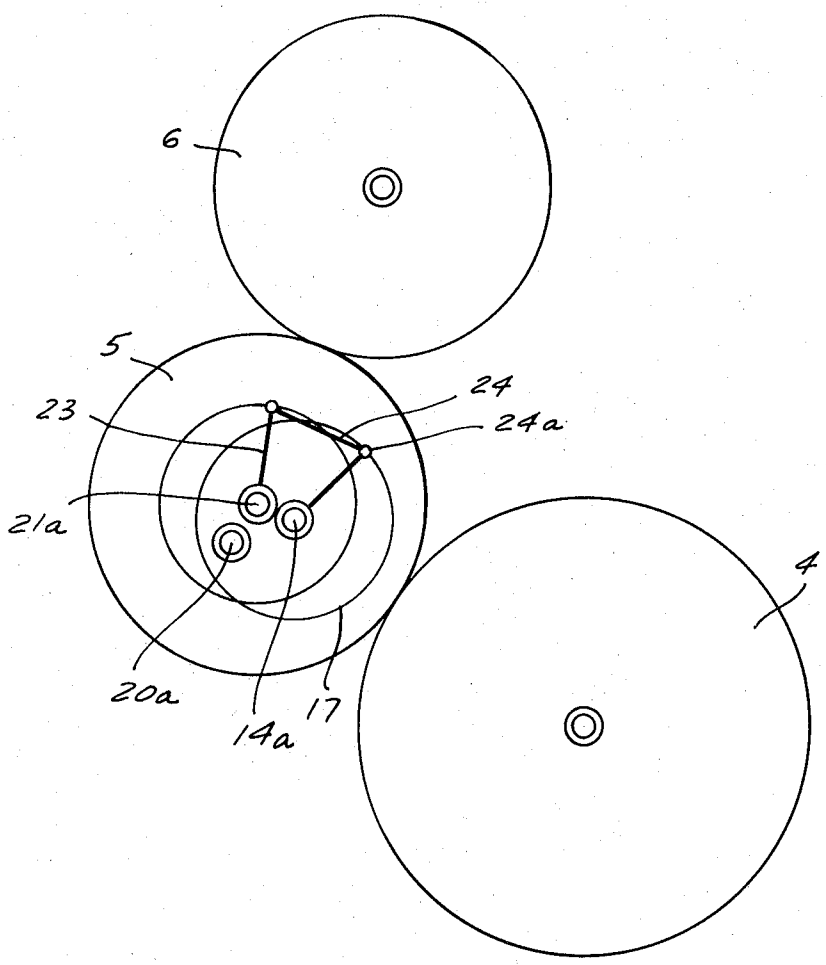


FIG 3

SHEET PRINTING AND STAMPING MACHINE

BACKGROUND OF THE INVENTION

The present invention relates to a combined printing and stamping machine including a stamping apparatus for grooving, stamping, and breaking out of portions of a cardboard sheet which has been imprinted in a printing apparatus which is driven together with a stamping apparatus.

Rotary stamping apparatus is known in which the printing, grooving, slotting, and stamping of sheets is effected in a single run through the combined machine. This type of machine includes several units which are slidably mounted on rails, and which can be combined, as required. Machines of the prior art are incapable of making complicated prints or multicolor prints, since a precise positioning of the sheet cannot be assured.

SUMMARY OF THE INVENTION

It is an object of the invention to simplify the construction of a rotary combined printing and stamping machine having cutting tools, stamping tools, grooving tools and breaking out tools, and other auxiliary devices, in order to reduce the cost of operation.

In accordance with the invention, the rollers for grooving, stamping and breaking out rotate one revolution during each working cycle, and have the same diameter even if connected to printing machines in which the rollers have different diameters. The equal diameters of the stamping rollers are up to 1.5 times the diameter of the printing cylinders which rotate once for each working cycle. Between the output roller of the printing machine and the input roller of the stamping machine, a sheet transfer roller rotating at two different speeds during each revolution is provided. The peripheral speed of this transfer roller is, during receiving a sheet from the output printing roller, equal to the peripheral speed of the same, and during supply of the sheet to the input roller of the stamping apparatus, equal to the peripheral speed of the input roller, and of all other rollers of the stamping apparatus.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary schematic side view illustrating a combined printing and stamping machine according to the invention;

FIG. 2 is a fragmentary schematic axial section illustrating a transmission operating at two different speeds during each revolution, and being adjustable; and

FIG. 3 is a fragmentary end view illustrating the cooperation of the transfer roller with the output roller of the printing apparatus, and the input roller of the stamping apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1, a combined printing and stamping machine whose printing apparatus includes

two printing rollers 2 and 1 of different diameter for imprinting a sheet, not shown, which is transported by a transporting roller 3 provided with grippers to another transporting roller 4 also provided with grippers. A sheet transfer roller 5 receives the sheet from the output roller 4 of the printing apparatus, and transfers the sheet to the input roller 6 of the stamping apparatus which is the counterpressure roller of a grooving roller 7. The sheet, which may be made of cardboard, arrives in grooved condition at the transporting roller 8 and is transferred to the counterpressure roller 9 of the pair of stamping rollers 9, 10 which make cutouts in the cardboard sheet so that the useful printed parts of the cardboard sheet are connected with each other only by small bridges. The gripper means 11 of an endless conveyor chain 12 grips the sheet and transports the sheet to the break-out rollers 13 and 14 in which the used printed part and waste are separated.

Since in accordance with the invention, the stamping roller means 6, 7; 9, 10; 13, 14, have a diameter which is up to one and a half times greater than the diameter of the printing roller 2 which rotates one revolution during each working cycle, it follows that the peripheral speeds of the rollers are different. The different peripheral speeds of the two groups of cylinders, and more particularly between the output roller 4 and the input roller 6, are compensated by the sheet transfer roller 5 which rotates at different speeds during each revolution so that when the sheet is transferred from roller 4 to roller 5, the peripheral speed of roller 5 is equal to the peripheral speed of roller 4, while during delivery of the sheet by the transfer roller 5 to the input roller 6 of the stamping apparatus, the peripheral speed of the sheet transfer roller 5 is equal to the peripheral speed of the input roller 6.

The different peripheral speeds of transfer roller 5 are necessary since this permits the use of stamping rollers 6, 7, 9, 10, 13, 14 having all the same diameter, which may be up to 1.5 times the diameter of printing roller 2. This is an advantage, because printing machines are built in rows corresponding to the sheet formats. A printing machine designed for a large sheet format must have a printing cylinder 2 designed for a large sheet, and vice versa.

Due to practical considerations, the printing machine for the greatest format has a printing roller 2 and stamping rollers having the same diameter, but when the stamping machine is connected with a printing machine for the smallest sheet format, the rollers of the stamping machines have a diameter up to 1.5 times the diameter of the printing roller 2.

Therefore, it is possible to connect printing machines for different sheet formats, and having printing rollers 2 with different diameters, with a stamping machine in which all rollers have the same diameter. The number of revolutions of the rollers which make one revolution during each working cycle, is the same for the printing and stamping machines. The consequent differences of the peripheral speeds of the printing rollers and stamping rollers are compensated by the transfer roller 5.

For this purpose, the sheet transfer roller 5 is driven by a transmission which varies the speed of the sheet transporting rollers twice during each revolution.

As shown in FIG. 2, a stationary sleeve 14 is secured to a side wall 15, and supports a gear 17 which is rotatable relative to the sleeve 14 about an axis 14*a*. The gear 17 may be connected to the stamping apparatus

and driven by the same. Sleeve **14** has an inner portion **20** which in turn has an eccentric bore in which bearings **20***b* support the journal **21** with which the sheet transfer roller **5** rotates for turning movement about an axis **21***a*. An arm **23** is secured to shaft **21** and is connected by an articulated link **24** with a pin **24***a* secured to gear **17**, so that rotary motion of gear **17** is transmitted by coupling link **24** to shaft **21** and transfer roller **5**. Since the center of gear **17** coincides with the axis **14***a*, whereas the center of journal **21** coincides with the axis **21***a*, motion transmitted by the driven gear **17** to the journal **21** via the elements **23,24,24***a* causes the transfer roller **5** to rotate at two different speeds in each revolution. The axis **21***a* could be arranged to coincide with the axis **14***a* of the sleeve **14** and gear **17**, in which case the transfer roller **5** would rotate at uniform speed, assuming that the diameter of the printing roller and stamping roller are equal. If the rotary speeds of the printing roller **2** and of the stamping rollers are different, as in the illustrated example, the axis **21***a* of the shaft **21** must be eccentric to the axis **14***a* of the gear **17**. When set in this manner, the transfer roller **5** rotates at a speed which varies during each revolution, in accordance with the peripheral speeds of the printing and stamping rollers.

FIG. **3** shows schematically the cooperation of the transfer roller **5** with the input roller **6** and the output roller **4**. Due to the link **24** and arm **23**, transfer roller **5** rotates at two different speeds during each revolution of gear **17**.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of combined stamping and printing machines differing from the types described above.

While the invention has been illustrated and described as embodied in a transfer roller driven by an eccentric transmission to operate at two different speeds during each revolution, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

We claim:

1. A sheet printing and stamping machine, comprising a printing apparatus including a printing couple having a printing roller and an impression roller forming a printing nip, said rollers having different diameters and said impression roller having sheet engaging means, and an output roller also having sheet engaging means; a stamping apparatus having a plurality of cooperating working rollers forming at least one stamping nip and including an input roller having sheet engaging means, all of the rollers of said stamping apparatus having identical diameters which are different from the diameters of said printing roller, impression roller and output roller; means for driving said printing couple at a first circumferential speed at said printing nip, and means for driving said working rollers at a second circumferential speed at said stamping nip different from said first circumferential speed; a transfer roller having sheet engaging means for receiving sheet from said output roller and for supplying said sheet to said input roller; and transmission means for driving said transfer roller during each revolution at two different speeds so that the peripheral speed of said transfer roller is equal to the peripheral speeds of said output roller and of said input roller, respectively, when said transfer roller cooperates with said output roller and said input roller, respectively.

2. Sheet printing and stamping machine as claimed in claim **1** wherein said working rollers include a pair of grooving rollers, a pair of stamping rollers, and a pair of break out rollers acting successively on the sheet, and having equal speed, one of said grooving rollers being said input roller; and wherein said output roller has a diameter greater than the diameter of said input roller.

3. Sheet printing and stamping machine as claimed in claim **1**, wherein said printing roller rotates one revolution during each working cycle; and wherein the diameter of said working rollers is up to 1.5 times greater than the diameter of said printing roller, said working rollers rotating one revolution during each working cycle.

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