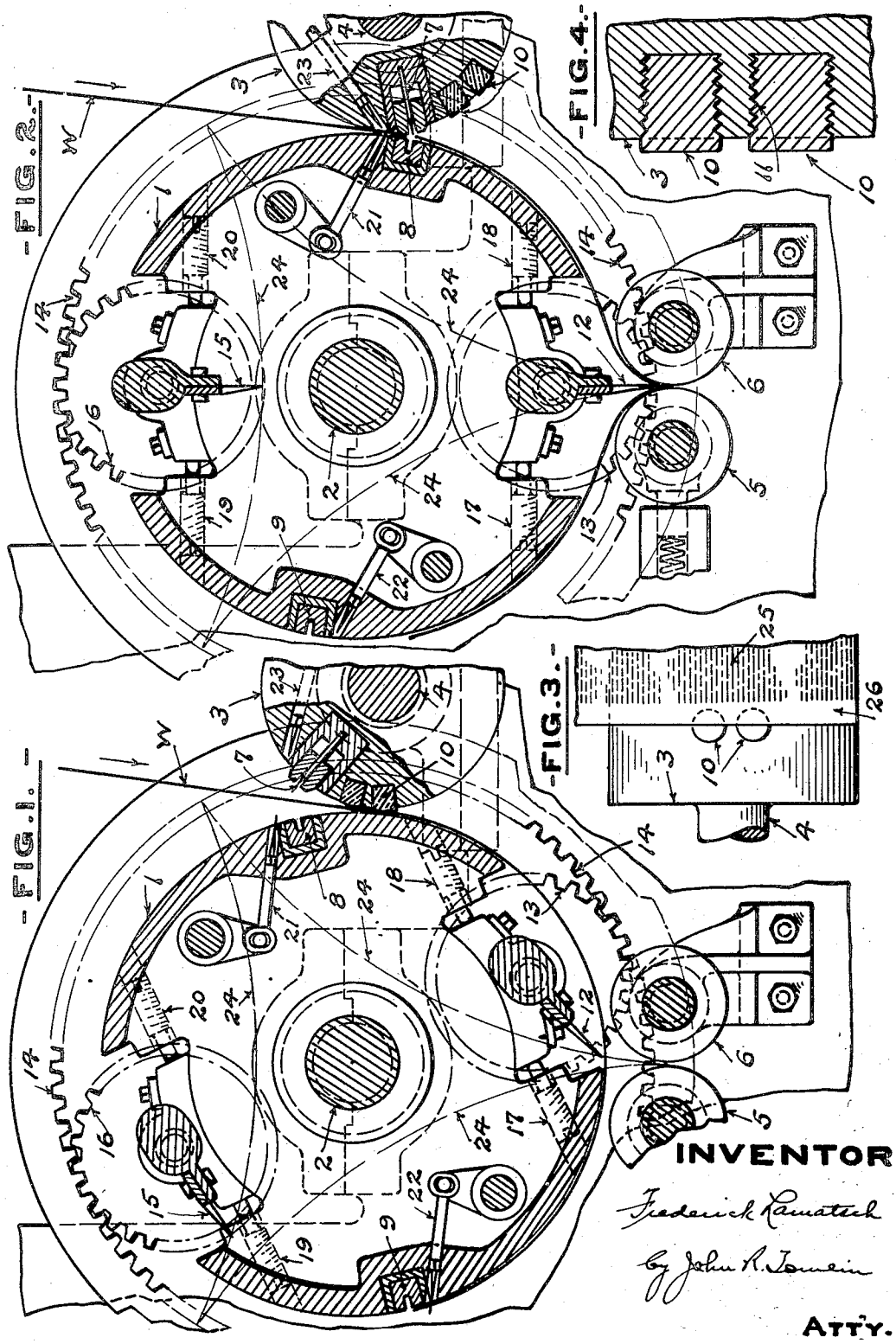
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ROTARY CUTTING AND FOLDING MECHANISM FOR PRINTING MACHINES

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ROTARY CUTTING AND FOLDING MECHANISM FOR PRINTING MACHINES

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1 Claim. (Cl. 270—77)

This invention relates to improvements in rotary cutting and folding mechanism for printing machines and one of its objects is to provide means for holding a web, sheet or group of printed sheets in exact and proper location with respect to the transporting and cutting mechanism, so that it is severed at the place desired in order to provide the required widths of the top and bottom margins thereof.

Another object is to provide means for holding a sheet or group of sheets which has been severed from a web in accurate position with relation to the transporting and folding mechanism, in order that the fold shall be made centrally with the ends in registry or with the fold located in position desired.

Another object of this invention is to provide means whereby the above mentioned objects may be attained whether the speed of the mechanism is slow, fast, varying or that of usual and speedy operation.

Another object is to provide nippers for holding a sheet or group of sheets against a rotating cylinder, each nipper being made of one piece of inherently and integrally elastic material, as such is cheap, effective, simple in action, easily installed and replaced, and without any complicated assembly of parts.

Another object of this invention is to hold a sheet or group of sheets against a folding cylinder by or at each end thereof, thereby preventing displacement or disarrangement with relation to the mechanism, so that the folding operations are uniform and as desired.

Frictional and integrally elastic members called "nippers" which are bodily compressible and expansible, are provided and arranged to contact with the unprinted margins of the printed web or sheets after they issue from the printing machine and during their passage through the rotary cutting and folding mechanism.

It has been found that when the cutting and collecting and the folding cylinders are started and stopped and are accelerating, decelerating and rotating more slowly than their regular running speed, the group of sheets has a tendency to drag between the said cylinders, with the result that the upper or trailing portion is cut too low, thereby producing a margin which is narrower than that desired and correspondingly this produces a margin wider than desired at the bottom of the sheet.

This is partially due to a slippage of the sheets of paper with relation to their contacting cylinder, so that the rotary cutting apparatus operates to sever the web at a location nearer to its leading end, than the location of the desired cut.

In order to overcome this difficulty nippers are provided and mounted peripherally of either the folding cylinder or the opposed cutting and collecting cylinder and near, but in advance of, the cutter.

The nippers are preferably formed of elastically compressible and expansible material which also has a high coefficient of friction in order to nip or clamp the sheet or group of sheets between the cylinders, and to this end they project to a slight extent beyond the surface of the cylinder in which they are mounted. As the nippers are inherently and integrally elastic they can thus accommodate and clamp or nip any number of sheets in order that they shall travel with the cylinders at substantially the speed thereof and are thus held thereon so that the cut occurs in the location desired.

The nippers may be made of rubber, cork or material similar to laminated packing, which is comprised of alternate layers of duck or canvas and rubber, preferably with a rubber, or similar outer surface to provide ample friction.

In one of the preferred forms these nippers are shown as mounted in recesses which are provided in the periphery or wall of one of the cylinders and in order to hold them in place these recesses are provided with undercuts, corrugations or internal screw threads, so that when the nippers are forced or screwed therein, they will substantially conform to the corrugations and be firmly held in position.

The nippers may be cylindrical, square, rectangular or otherwise, but for ease of construction it is preferred that they shall be made cylindrical and inserted in drilled and tapped holes with their ends extending slightly beyond the outer surface of the cylinder.

In addition to this, the nippers are preferably so located on a cylinder that when abutting the opposed cylinder they act against the unprinted side margins of the sheets in order to thus avoid blurring or smutting the freshly printed portions should they be so located as to act upon such.

Having thus given a general description of the invention the sheet of drawing attached hereto and forming part hereof will now be referred to and in which like characters refer to like parts:

Fig. 1 is a cross sectional elevation of a folding cylinder and a partial sectional elevation of an adjacent and substantially tangent cutting or cutting and collecting cylinder of half the diam-

eter of the folding cylinder, when the parts are in position just before the web is cut;

Fig. 2 is a cross sectional elevation similar to Fig. 1 just after the web or plies thereof have been severed and when the tucking blade has presented them to the grasp of the folding-off rollers;

Fig. 3 is a side elevation of the end of a cylinder showing two nippers in contact with the unprinted side margin of a group of sheets; and

Fig. 4 is an enlarged cross section of part of a cylinder with a pair of nippers mounted and held in internally corrugated or tapped holes or recesses provided in the cylinder wall.

Referring now to the various characters of reference on the drawing:

The folding cylinder, indicated at **1**, is mounted on the shaft **2** and arranged adjacent and substantially tangent thereto, with its axis substantially parallel to that of cylinder **1**, is the cutting or cutting and collecting cylinder **3**, secured on the shaft **4**, these cylinders being provided with means for their co-operative rotation, not shown. The folding-off rollers are indicated as **5** and **6**, one of which is preferably spring-mounted as shown in order to yieldingly contact against its companion and thereby grasp the fold of the group of sheets, pull it from the folding cylinder and double it centrally preparatory to delivery. In order to accomplish this expeditiously and without hindrance, the folding-off rollers **5** and **6** are co-operatively rotated at surface speeds somewhat greater than that of the folding cylinder **1**, from which they withdraw the sheets.

Mounted in the cutting and collecting cylinder **3** is the male portion of a cutter or knife, indicated as **7**, provided with the usual cheek blocks and holder, and co-operating therewith is a corresponding or female abutment or portion of the cutting means indicated as **8**, mounted in the folding cylinder **1**, and in addition to this another abutment or female knife **9** is also provided on the same cylinder opposite thereto. It will be noted that the folding cylinder **1** is substantially twice as great in diameter as the cutting or cutting and collecting cylinder **3**, so that one knife on the latter will co-operate successively with its two cutting mates **8** and **9** on the folding cylinder.

The resilient nippers are indicated as **10**, and may be either single or arranged in pairs as illustrated, and these are secured in recesses in the cylinder wall provided with internal corrugations or screw threads **11**. These nippers may be forced or screwed into these recesses and by reason of their compressibility and elasticity they will substantially fill the openings and conform to the corrugations or screw threads, so that they will be firmly held therein.

It should also be noted that the nippers **10** project somewhat beyond the cylinder surface as shown in Fig. 4, so that they will be elastically compressed as their rotation contacts them against the running web W to press and hold it against the companion cylinder and to prevent its drag or displacement with relation thereto.

A folding blade is indicated as **12** adapted to be rotated by the pinion **13**, which latter is rotated by the internally toothed ring gear **14** as the folding cylinder **1** rotates around its axis in the direction indicated by the arrow adjacent to the incoming portion of the web W as shown in Fig. 1.

Another folding blade **15** is provided and carried by the cylinder **1**, having a similar pinion **16** driven in the same manner. Adjusting screws **17** and **18** are provided to slightly modify the position of the folding blade **12** and its pinion **13**, and similar adjusting screws **19** and **20** serve to adjust the position of the folding blade **15** and its pinion **16**. These adjustments are usual and customary in order to properly time the movements of the folding blades so that they shall neatly and centrally tuck the sheets into the grasp of the folding-off rollers **5** and **6**.

In the cylinder **1** are mounted the collecting pins **21** and **22** which are provided with rocker arms as illustrated, adapted to project them outwardly of the cylinder surface or retract them by means of cams, not shown. When the pins, one of which is indicated as **21**, are slightly projected beyond the surface of the cylinder **1**, as illustrated in Fig. 2, they thereby impale the web W and carry it around, about to the position shown at the left-hand side of Fig. 1, whereupon the pins are hastily withdrawn and the sheets are tucked centrally between the folding-off rollers **5** and **6**, by the folding blade **12**, as indicated in Fig. 2.

The cutting or cutting and collecting cylinder **3** is provided with similar collecting pins, one of which is indicated as **23**, which, however, are only used when groups of sheets are collected thereon, but these pins are otherwise held in inoperative position when what is called straight runs are being made, namely: when the successive sheets or groups of sheets are carried only by the folding cylinder **1**, as indicated in the drawing.

The path of the edges of the folding blades **12** and **15** is indicated by the broken line **24**, and as illustrated in Fig. 3, the printed portion of the paper is indicated as **25**, and this is provided with the side margin **26**, with which margin the nippers **10** are adapted to contact to prevent smutting the printing as referred to hereinbefore.

Having thus described the apparatus its mode of operation will now be of interest, as follows:—

The folding cylinder **1** and the opposed cutting or cutting and collecting cylinder **3** are rotated in the direction of the arrow with the same surface speeds, and the web W is delivered between them as illustrated in Fig. 1.

As this rotation continues the web W is impaled on the collecting pins **22**, when they are just below the illustrated position of the pins **21** of Fig. 1, and a still further rotation causes the web to be severed by the coacting cutters **7** and **8** as shown, just after such severance, in Fig. 2.

Just before its severance the web is held firmly against the folding cylinder **1** by the elastic nippers **10** as shown in Fig. 1, thus insuring the accurate position of the cut by preventing drag or displacement of the web and to thus produce upper and lower margins of uniform or proper widths.

At about this time the leading edge of the sheet or group is still impaled on and held by the collecting pins **22** as shown at the left of Fig. 1, which, with the co-operation of the nippers **10**, holding the trailing portion as shown in this figure, holds it in correct relation to the mechanism, so that the folding blade **12** when moved from the position shown in Fig. 1 to that shown in Fig. 2 will centrally tuck it into the grasp of the folding-off rollers **5** and **6** thus insuring the correct location of the fold. As, or just before, this is done, the collecting pins **22** are withdrawn from the leading edge of the sheet or group thus allowing it to be withdrawn from the cylinder and folded without tearing at the pins, as indicated in Fig. 2.

Although I have described and illustrated my invention in considerable detail I do not wish to be limited to the exact and specific details thereof, as shown and described, but may use such modifications in, substitutions for, or equivalents thereof, as are embraced within the scope of my invention, or as pointed out in the claim.

What I claim is:

A cutting and folding mechanism including a folding cylinder and a cutting cylinder, web cutting means mounted in the peripheral portions of the cylinders and coacting to cut the web into separate sheets, pins operably carried by the folding cylinders to temporarily hold the leading edge of the web and sheets, folding rollers operably mounted adjacent the folding cylinder, a folding blade operably carried by the folding cylinder and adapted to cooperate with the folding rollers to fold the sheets from the folding cylinder, a socket formed in the cutting cylinder in advance of and immediately adjacent the cutting means, a soft yieldable nipper formed entirely of elastic material mounted in the socket and having its outer surface extending radially beyond the periphery of the cutting cylinder to engage the web and sheets, this outer surface being parallel to the peripheral surface of the cutting cylinder and coextensive with the greatest transverse dimension of the nipper.

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