

April 4, 1933.

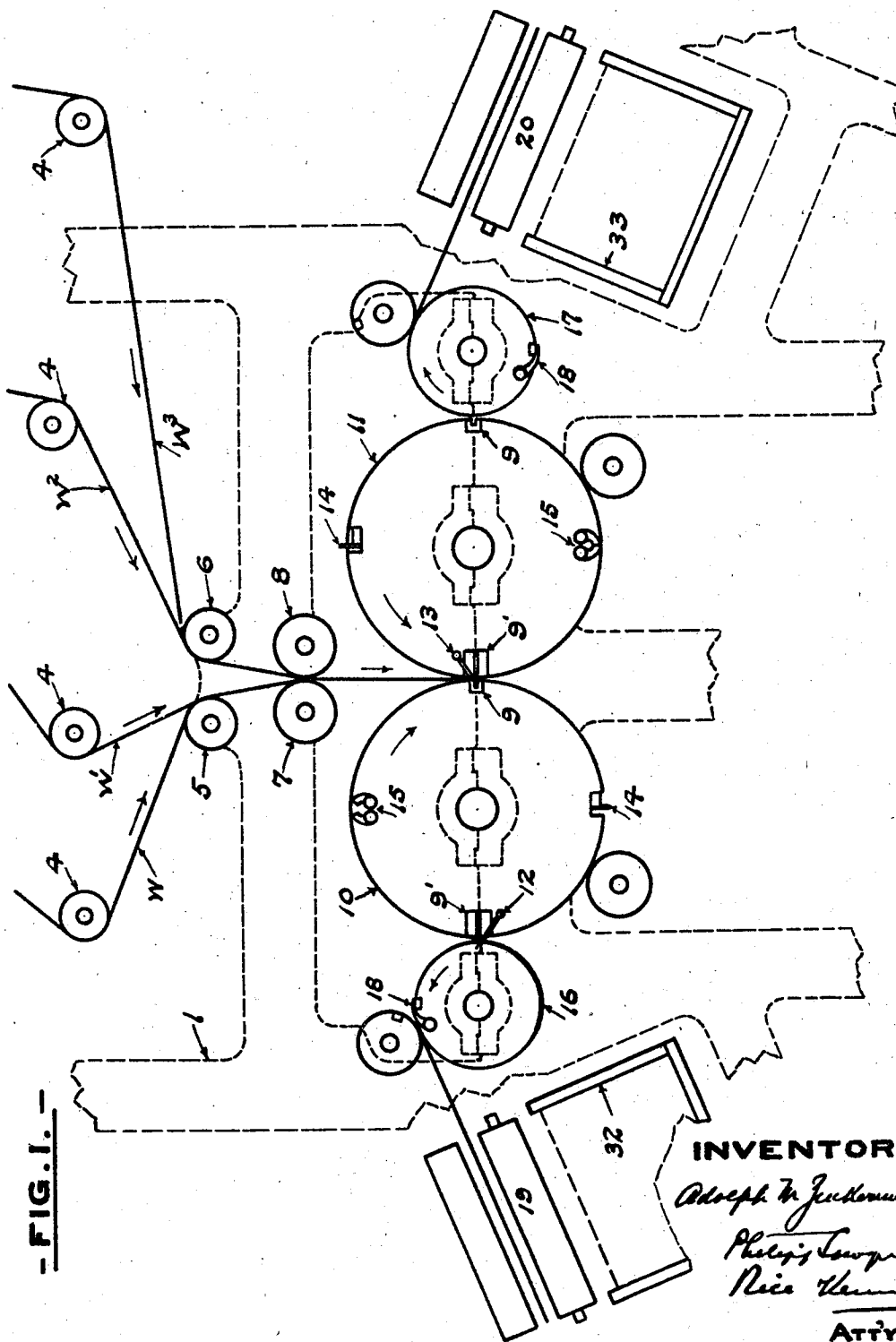
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FOLDING MECHANISM

Filed March 11, 1932

3 Sheets-Sheet 1



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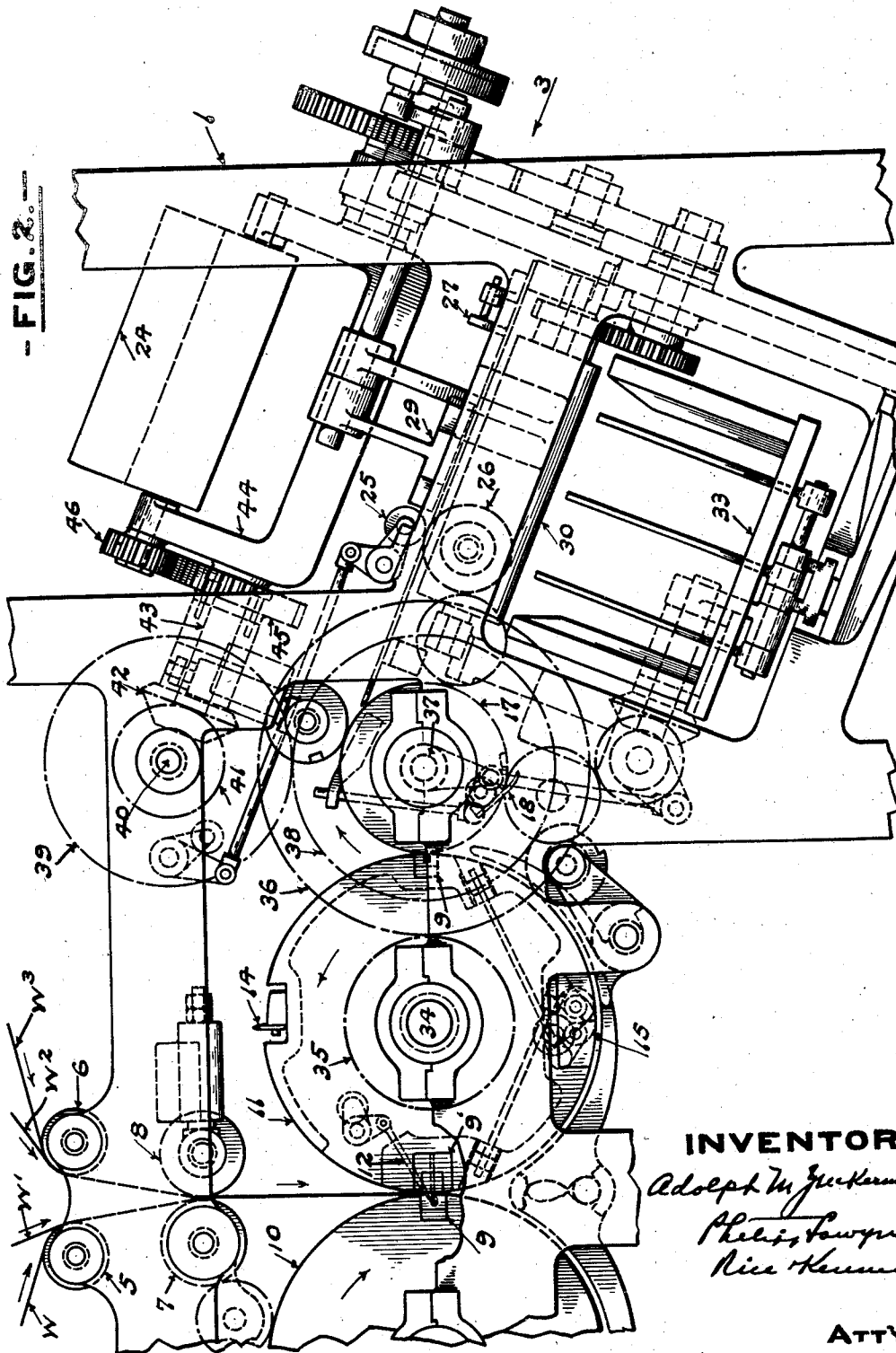
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-FIG. 2-



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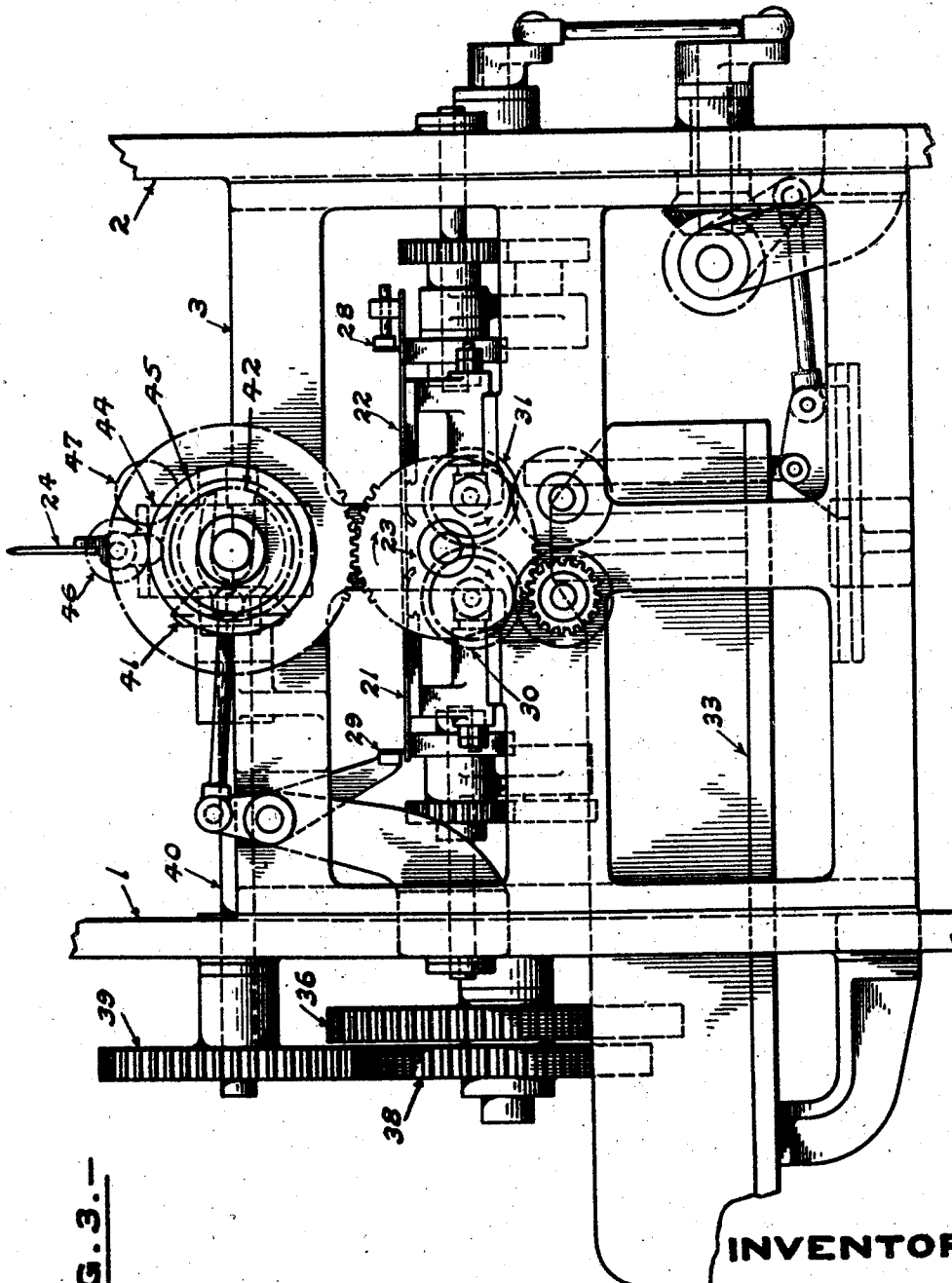
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FOLDING MECHANISM

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-FIG. 3.-

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FOLDING MECHANISM

Application filed March 11, 1932. Serial No. 598,144.

This invention relates to certain improvements in folding mechanisms.

In producing certain types of products, such as magazines, pamphlets and the like, it is desirable to produce these products at very high speeds, that is, at the full speed at which the press is capable of operating, as at maximum press speed. In certain types of the products referred to it is desirable that the products be given two folds, first a transverse or cross fold, and then a longitudinal fold, that is, a fold at right angles to the cross fold, and to produce this class of products a plurality of webs must be associated, cut into product length and folded. Where the product is to have a first transverse fold and a longitudinal fold afterwards the use of a former for the longitudinal fold is not practical, and it is preferable to use a folding cylinder for the first fold and if the second fold is longitudinal to use a chopper blade folder, that is a folder having a blade which has a chopping action and produces a longitudinal fold in the product. The speed of these chopper folders, however, is limited and they will not operate as fast as the folding mechanisms which give the product a transverse fold.

It is the especial object of the present invention to produce a folding mechanism which will operate at high speeds in which a transverse fold is given the product and a longitudinal fold also given the product, the mechanism being arranged so that time is allowed for the relatively slow chopper folder to operate without slowing down the operation of the press as a whole.

A further object of the invention is to produce a mechanism of simple form by which the desired high speed can be obtained.

With these and other objects not specifically referred to in view, the invention consists in certain novel parts, arrangements and combinations which will be described in connection with the accompanying drawings and the novel features pointed out in the claims hereunto annexed.

In the drawings,—

Figure 1 is an end view, partly broken away, of the improved folder arrangement,

the parts being shown more or less diagrammatically;

Figure 2 is a similar view, more in detail, of the right-hand portion of the mechanism shown in Figure 1 on an enlarged scale, and

Figure 3 is a side view, on an enlarged scale, of the mechanism shown in Figure 2 as seen in the direction of arrow 3 of that figure and illustrating the longitudinal folding mechanism and a delivery to which the folded products are delivered.

Generally speaking, the invention includes in combination a plurality of folding devices to which a product in the form of associated webs and cut into suitable length is forwarded, these folding mechanisms operating at high speed, as, for instance, full press speed, and acting to give the products a transverse fold. Cooperating with these folding mechanisms are a plurality of transfer cylinders to which the products are transferred from the folding cylinders in opposite directions alternately, these transfer mechanisms being driven at a lower speed and each delivering to a chopper blade folder operating at the lower speed of the transfer cylinder, such as arrangement giving the required time for the slower moving chopper blade to act to give the products the required longitudinal fold.

While the specific mechanisms employed for effecting the objects of the invention may vary, that illustrated is a convenient one and this will now be described in detail.

It will be understood that the products are printed in web form by a suitable printing machine of any desired character, not illustrated, and the products may be formed from any desired number of associated webs. As shown, the parts of the mechanism are supported in side frames 1, 2, of any suitable configuration, these being united by suitable cross framing, indicated by the numeral 3. In the particular arrangement illustrated, four webs, marked W , W^1 , W^2 and W^3 are forwarded from guide rollers 4 to and over associating rolls 5, 6, from which the webs pass to a pair of nipping rollers 7, 8 and from there to a pair of cutting and folding

cylinders 10, 11, provided with the usual cutting knives and cutting blocks or woods 9, 9', these cutting mechanisms acting to sever or cut the webs into the desired product length.

Located in the same cylinders 10 and 11 are a plurality of folding mechanisms capacitated to give the products a cross fold, that is, a fold transverse to the direction of their run. These cylinders 10, 11 are complementary folding cylinders and are driven at high speeds, that is, at the speed of the products being forwarded to them. Each of these cylinders is provided with sheet taking devices, which are shown in the form of pins 12, 13, it being understood, however, that if desired other forms of sheet taking devices, as grippers, may be substituted for the pins. These sheet taking devices are so placed in the cylinders that the cut products are taken by them alternately.

Each cylinder is also provided with a folding blade 14 and with a pair of nipping or folding jaws 15.

While the cylinders 10, 11 contain both the cutting and the folding mechanisms, it is possible to provide separate cutting cylinders and separate folding cylinders.

From the folding cylinders 10, 11 the products having received a transverse fold are delivered alternately to two folding mechanisms by which they receive a longitudinal fold, that is, a fold parallel with the direction of their run. While this mechanism may be somewhat varied, it will include a chopper folder operating at a lower speed than the cylinders. In the particular construction shown, the products are delivered from the cylinders 10, 11 to what may be termed a pair of transfer cylinders 16, 17, these cylinders being provided with sheet taking devices in the form of grippers 18.

In accordance with the invention, these transfer cylinders are driven at a lower speed than the cylinders 10, 11, through suitable gearing, and at the speed at which the chopper blade folders operate. As shown, these transfer cylinders 16, 17 deliver to a pair of chopper blade folders, marked generally 19, 20, more fully referred to hereinafter, by which the product is given a fold parallel with the direction of its run. These chopper blades, as shown, are inclined, but it will be understood that any other desired type of chopper blade folder may be employed.

It will be seen that with this construction a non-collecting arrangement has been provided which will give the necessary time to enable the relatively slow operating chopper blade folders to function, at the same time retaining the high production speed desired, so that with this arrangement a very large number of products may be produced.

The chopper blade folders 19, 20 are shown

as inclined, and the products are forwarded to folding position in these folders without the use of tapes or the like, such construction having been found to be of advantage under certain circumstances. As shown, the construction of each folder is or may be identical and, as shown, includes an inclined product pathway in the form of a pair of metal plates 21, 22, see Figure 3, these plates being provided with a central opening 23 through which a chopper blade 24 may pass in order to effect the longitudinal fold of the product. The products are forwarded down this inclined pathway by means of a drop roll 25 and a cooperating driving roll 26, see Figure 2, against a stop 27, and the products may be side registered against side-stops 28 by the usual joggers 29, as indicated in Figure 3. The products are folded off by the blade 24 into the bite of folding rolls 30, 31, and may be delivered from these rolls to any desired delivery, as a packer box delivery of the usual type, indicated at 32 and 33.

The transfer cylinders 16, 17 are, as before stated, driven at a lower speed than the folding cylinders 10, 11, and in the particular construction shown they are arranged to rotate at one-half the peripheral speed of the folding cylinders 10, 11. The product is thus slowed down before it reaches the chopper blade folder and affords time to allow them to be jogged, that is, properly registered before they are acted on by the folding blade of the chopper folder.

The cylinders may be driven in any suitable manner to effect this. In the construction shown, the parts may be driven from either the cylinder 10 or from the cylinder 11 or by a suitable prime mover, not shown, the gearing for driving the cylinders being the same on each side and illustrated in Figure 2. As there shown, shaft 34 of the cylinder 11 is provided with a gear 35 which is in mesh with a larger gear 36 on shaft 37 of the transfer cylinder 17, these gears being proportioned so that the transfer cylinder is driven at half the peripheral speed of the cylinder 11. From the transfer cylinder, the various parts of the chopper blade folder may be driven with any suitable gearing. As shown, driven by the cylinder 17 is a gear 38 which is in mesh with a gear 39 on a shaft 40, this shaft carrying a miter gear 41 in mesh with a miter 42 on the end 43 of a yoke 44. A stationary gear 45, centered on end 43, revolves the chopper blade through a gear 46 on the end of the blade and an intermediate gear 47.

While the invention has been described in its preferred form, it will be understood that certain changes and variations may be made in the specific construction and arrangements of the parts and that chopper blade folders of types other than that shown may be used if desired without departing from the invention as defined in the appended claims.

What is claimed is:

1. In a folder, the combination of a plurality of folding mechanisms operating at high speed, including sheet taking devices and folding devices acting to alternately take and fold a product, a plurality of second folding mechanisms operating at a lower speed for giving the products a second fold, and a plurality of intermediate transfer mechanisms operating at the lower speed of the second folding mechanisms by which the products are transferred thereto from the first folding mechanisms in different directions.
2. In a folder, the combination of a plurality of rotary folding mechanisms operating at high speed, including sheet taking devices and folding devices acting to alternately take and fold a product with a cross fold, a plurality of second folding mechanisms operating at a lower speed for giving the products a second fold, and a plurality of rotary intermediate transfer mechanisms operating at the lower speed of the second folding mechanisms by which products are transferred thereto from the rotary folding mechanisms in different directions.
3. In a folder, the combination of a pair of folding cylinders operating at high speed, sheet taking and folding devices on the cylinders acting to alternately take and fold a product, a pair of chopping blade folders operating at a lower speed for giving the products a fold at right angles to the first fold, and a pair of intermediate transfer cylinders operating at the lower speed of the chopping blade folders by which the products are transferred thereto from the folding cylinders in different directions.
4. In a folder, the combination of a pair of complementary folding cylinders located closely adjacent and operating at high speed, sheet taking and folding devices on the cylinders acting to alternately take and fold a product, a pair of chopping blade folders for giving the products a second fold, transfer cylinders disposed on one side of each folding cylinder by which the products are transferred to the chopping blade folders, and means for driving the transfer cylinders at a lower peripheral speed than the folding cylinders.
5. In a folder, the combination of means for forwarding and associating a plurality of webs at press speed, a pair of rotary carriers operating at press speed and having means for severing the webs into product lengths, and sheet taking and folding devices acting alternately to take and fold a product, a second pair of folding mechanisms operating at a lower speed for giving the products a second fold, and an intermediate transfer mechanism disposed on one side of each folding cylinder by which the

products are transferred to the second folding mechanisms in different directions.

6. In a folder, the combination of means for forwarding and associating a plurality of webs at press speed, a pair of rotary carriers operating at press speed and having means for severing the webs into product lengths and means for giving the resulting products a first fold, a pair of chopping blade folders, a pair of intermediate transfer cylinders acting to alternately transfer products from the folding cylinders to the chopping blade folders, and means for driving the transfer cylinder at a lower peripheral speed than the folding cylinders.

7. In a folder, the combination of means for forwarding and associating a plurality of webs at press speed, a pair of rotary carriers operating at press speed and having means for severing the webs into product lengths and sheet taking and folding devices acting alternately to take and fold a product, a second pair of folding mechanisms operating at a lower speed for giving the products a second fold, an intermediate transfer mechanism disposed on one side of each folding cylinder by which the products are transferred to the second folding mechanisms in different directions, and means for registering the products for the second fold.

8. In a folder, the combination of means for forwarding and associating a plurality of webs at press speed, a pair of folding cylinders operating at press speed and having means for severing the webs into product lengths, a pair of chopping blade folders, a pair of intermediate transfer cylinders acting alternately to transfer products from the folding cylinders to the chopping blade folders, means for driving the transfer cylinders at a lower peripheral speed than the folding cylinders, and means for registering the products for the second fold.

In testimony whereof, I have hereunto set my hand.

ADOLPH M. ZUCKERMAN.