

F. P. HILDEBRANDT.  
PAPER CUTTING AND FOLDING MACHINE.  
APPLICATION FILED FEB. 19, 1914.

1,112,288.

Patented Sept. 29, 1914.

4 SHEETS—SHEET 1.

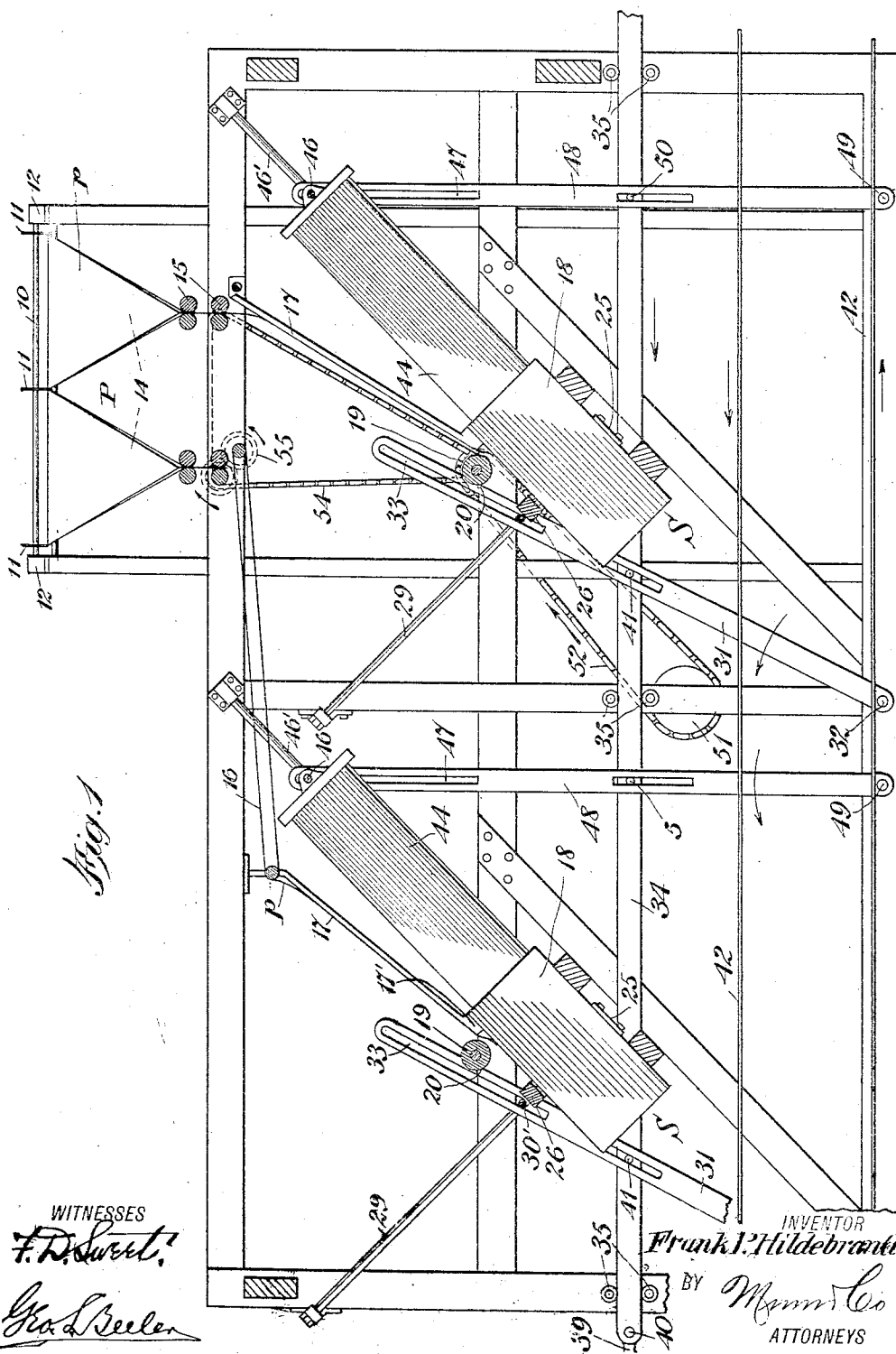


Fig. 1

WITNESSES

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Geo. A. Seeler

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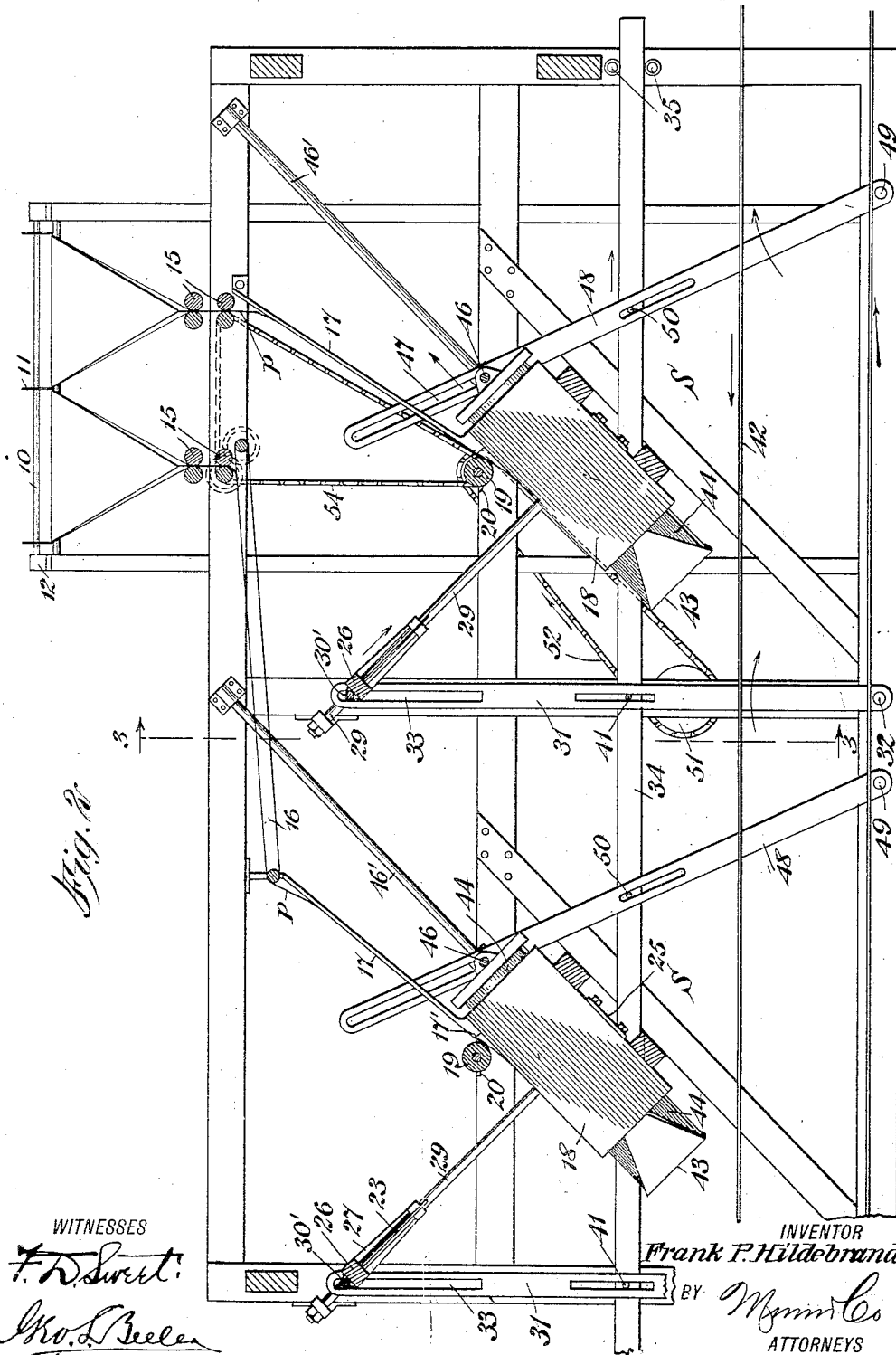


Fig. 2.

WITNESSES

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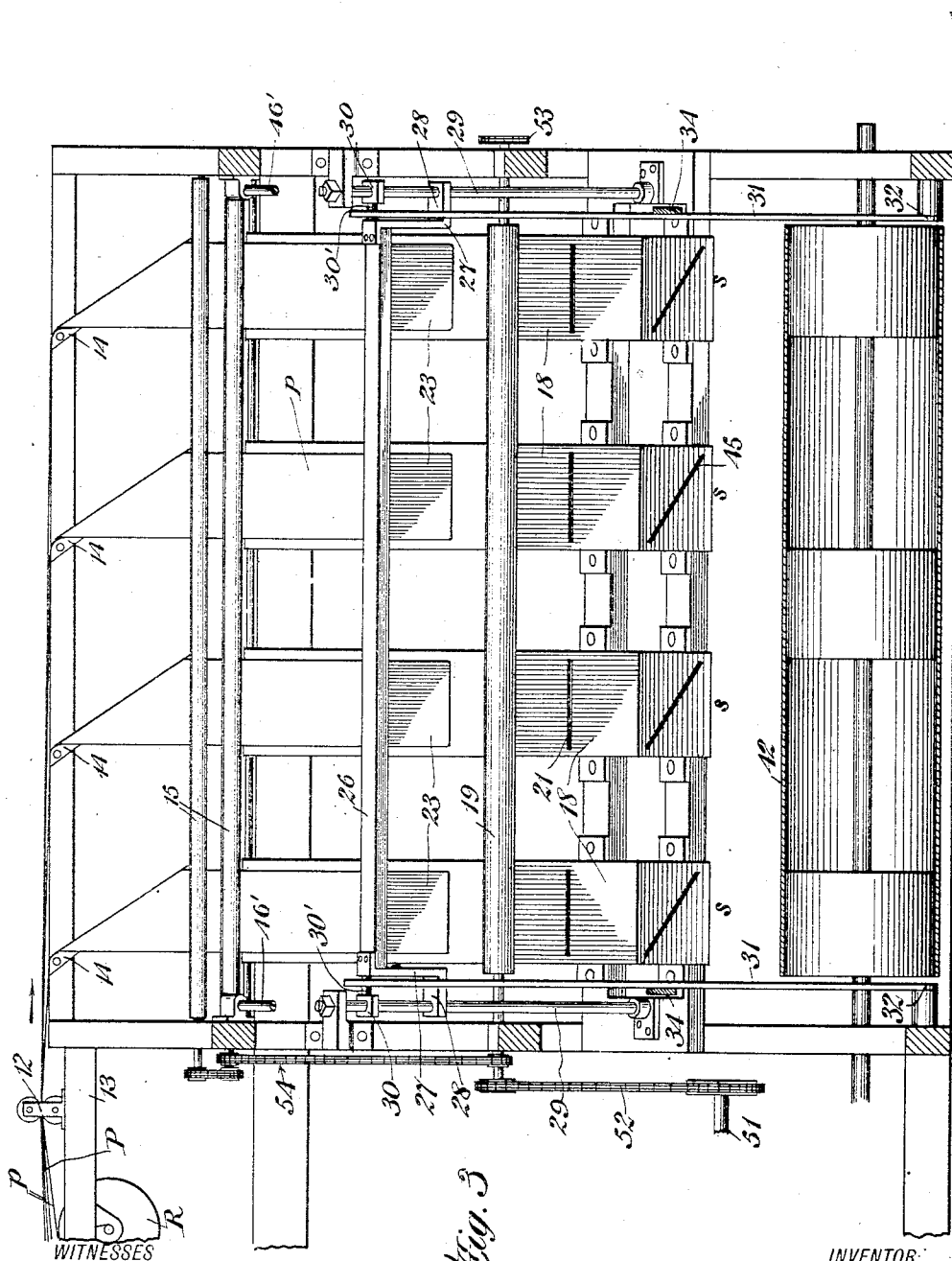


Fig. 3

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4 SHEETS—SHEET 4.

Fig. 6

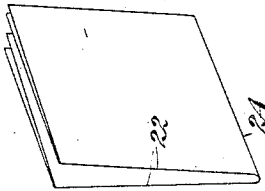


Fig. 7

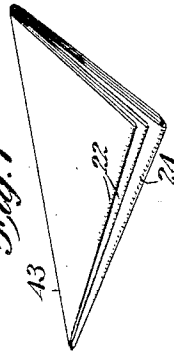


Fig. 9

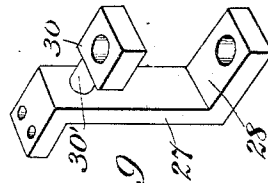


Fig. 5

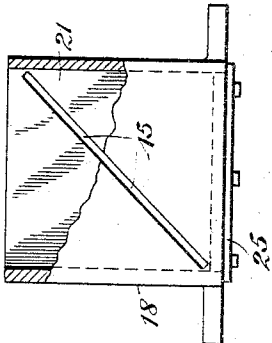


Fig. 4

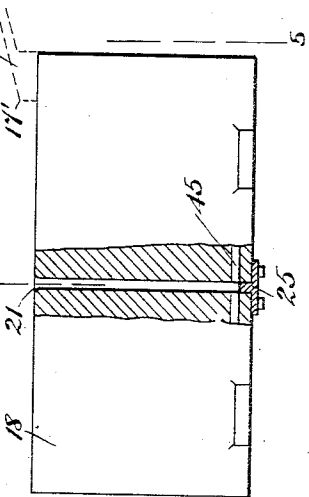
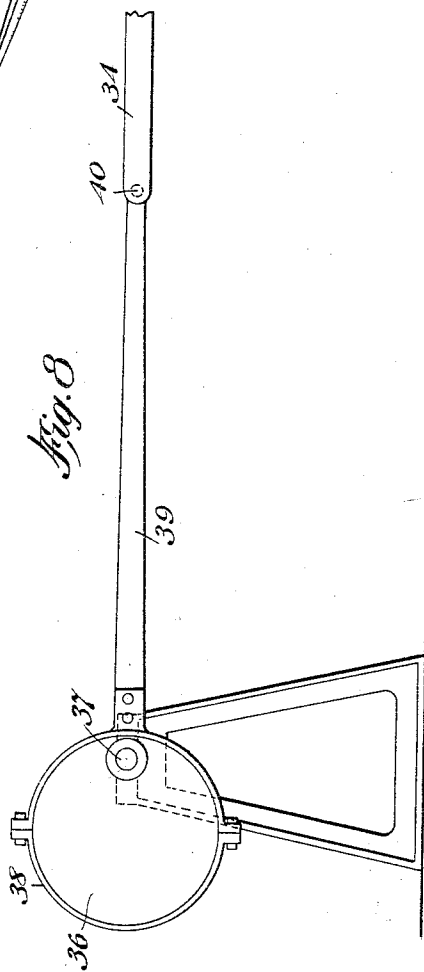


Fig. 8



WITNESSES

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# UNITED STATES PATENT OFFICE.

FRANK P. HILDEBRANDT, OF SAUGERTIES, NEW YORK.

PAPER CUTTING AND FOLDING MACHINE.

1,112,288.

Specification of Letters Patent.

Patented Sept. 29, 1914.

Application filed February 19, 1914. Serial No. 819,716.

*To all whom it may concern:*

Be it known that I, FRANK P. HILDEBRANDT, a citizen of the United States, and a resident of Saugerties, in the county of Ulster and State of New York, have invented a new and Improved Paper Cutting and Folding Machine, of which the following is a full, clear, and exact description.

This invention relates to machines operating to cut and fold paper, and has particular reference to machines of this type adapted to cut and fold automatically paper napkins or the like.

Among the objects of the invention is to provide a power driven automatic machine which will receive paper from a roll or rolls, slit the same into a plurality of strips, and then cut and fold the squares or sections of each strip to form, in rapid succession, folded napkins of any suitable form.

The foregoing and other objects of the invention will hereinafter be more fully described and claimed and illustrated in the drawings forming a part of this specification in which like characters of reference indicate corresponding parts in all the views, and in which—

Figure 1 is a side elevation of parts of a preferred form of this invention, the supporting frame and other parts being in section; Fig. 2 is a view corresponding to Fig. 1 but with the parts in different positions; Fig. 3 is a vertical transverse section on the line 3—3 of Fig. 2; Fig. 4 is a side view of one of the folding blocks partly broken away; Fig. 5 is a transverse view of said block on the broken line 5—5 of Fig. 4; Figs. 6 and 7 show different forms of a napkin folded by this machine; Fig. 8 is a detail of part of the driving mechanism to be described below; and Fig. 9 is a detail perspective view of one of the guide brackets for the reciprocating bar which carries certain of the folding members.

The several parts of the device may be made of any suitable materials, and the relative sizes and proportions, as well as the general design of the mechanism, may be varied to a considerable extent without departing from the spirit of the invention hereinafter more fully described and specifically claimed.

The machine shown herein by way of illustration of a preferred embodiment of this invention includes a plurality of series of folding blocks or forms, two of such se-

ries being shown at S, S', and each series comprises, as illustrated, four of said blocks and associated parts, each of the blocks and the associated parts constituting a folding device indicated at *s*. All of the folding devices are or may be of the same character and are operated preferably simultaneously by any suitable power mechanism for continuous, rapid, automatic operation. While I show but two series of folding devices and four devices in each series, it will be understood that these members may be varied indefinitely without departing from the essence of the invention.

Paper shown at P is directed from one or more rolls R toward the folding devices, the paper in one or more plies *p* passing through a slitting and trimming mechanism comprising a shaft 10 having rotary knives 11 secured thereto, said slitting devices being journaled in brackets 12 upon a frame extension 13, as shown in Fig. 3. The slitting mechanism forms the paper P into strips *p* of the width desired for full size napkins. Carrying out the description of the mechanism illustrated, the paper is presumed to be coming to the machine from four different rolls, and the width of the paper being great enough to make two strips *p*. The strips *p*, therefore, which result from the several rolls R are conducted to the folding plates 14 pertaining to the folding devices of one series S, as shown especially in Fig. 3, one of the strips *p* being guided over each of the folding plates 14. The strips *p* are directed to one series of folding devices from the folding plates and others are directed to the folding devices of the other series. As shown in Figs. 1 and 2, the strips may lead directly to the folding devices through pairs of crimping and feed rollers 15, and the other strips leading to folding devices located remotely from the first series may be conveyed by a series of endless belts 16, one for each folding device. At 17 I show an inclined guide which directs each individual strip *p* downwardly toward the folding block 18, and at 19 I show a rotary cutter roller having a blade 20 adapted to cooperate with the shoulder 17' of the guide, said shoulder acting as one blade of a pair of shears over which the paper is cut in napkin lengths by the blade 20 during the continuous rotation of the roller, the roller making one rotation of each napkin.

Each block 18 is provided with a transverse slot 21 arranged perpendicular to the longitudinal axis of the block. The napkin is received upon the upper surface of the block in folded form; that is to say, the napkin is folded upon a longitudinal crease 22 by the action of the rollers 15, and coincidentally with the shearing of the napkin from the strip at the shoulder 17', a tongue 23 engages the napkin at its middle portion, forming a crease 24 by forcing the napkin in the form shown in Fig. 6 into the slot 21, the edge 24 of the folded napkin coming substantially into engagement with a block 25, closing the lower end of said slot, as shown in Figs. 4 and 5. The series of tongues 23 for each series of folding devices are carried by a bar 26 having brackets 27 extending downwardly from the ends of the bar, thence laterally parallel to the bar and terminating in feet 28 adapted to slide along fixed guide rods 29 secured to the main frame of the machine in any suitable manner. Additional guide brackets 30 extend outwardly from the brackets 27 for coöperation with the guides 29, and by virtue of the feet 28 and auxiliary brackets 30, the tongues 23 are maintained for operation in the precise plane determined by the two parallel guides 29, so that the points or lower ends of the tongues 23 will coöperate reliably with the slots 21. The shanks 30' of the auxiliary brackets are preferably rounded for coöperation with a pair of oscillating arms 31 pivoted at their lower ends at 32, the coöperation being through slots 33 in which the bracket shanks 30' slide while the arms 31 are being oscillated. Any suitable means may be employed to oscillate the arms 31 for the purpose of causing reciprocation of the bar 26 in the plane of the guides 29. For this purpose I employ an actuator bar 34 guided for reciprocations forwardly and rearwardly in a horizontal plane on each side of the machine, each of the actuators 34 being guided by any suitable number of antifriction rollers 35 connected with the main frame. The actuator bars may be operated by an eccentric 36 connected to or driven from a power shaft 37 and having an eccentric strap 38 and a connecting rod 39 leading to a point 40 on the front end of each of the bars or actuators. The connection between the actuators and the arms may be made through pin and slot connections, as shown at 41. The operation of each bar 26 and the tongues carried thereby will be so timed as to provide one complete reciprocation and return for each single rotation of the cutter roller 19. As shown in Fig. 2, the tongues 23, when out of coöperation with the slots 21, are adapted to be withdrawn far enough while continuing in constant uniform speed to allow the napkins next to be folded to

come into place to be sheared off before the points or lower edges of the tongues force them into the slots.

When napkins are desired to be folded square, as shown in Fig. 6, the blocks 25 are removed from the folding blocks 18 and the tongues 23 are employed long enough to cause the napkins to be forced entirely through the slots 21 and deposited upon a conveyer belt 42 or into any suitable receptacle provided for them. In all adaptations of the machine, the timing of the bars 26 will be such as to make proper coöperation between the points of the tongues and the napkins at the upper ends of the slots 21.

For the purpose of folding the napkins in triangular form, as shown in Fig. 7, the square forms are folded on a diagonal line 43 by means of a blade 44 operating through a diagonal slot 45 in each of the blocks 18. The slots 21 and 45 intersect each other at the middle of the block and the blade 44 for each of the folding devices is reciprocated at right angles to and in alternation with the tongue 23, whereby there will be no interference between these two elements. The adaptation of the machine illustrated is for the folding as shown in Fig. 7, and hence the blocks 25 are employed and reach within the slots 21 at a point adjacent the lower end or edge of the slots 45. A napkin being forced into a slot 21 in the form shown in Fig. 6 will be left in that position by the tongue 23 and subsequently will be engaged by the lower end of the blade 44, the blade being long enough to force the triangularly formed napkin entirely through the lower end of the block 18, as shown in Fig. 2. The several blades 44 of each series of folding devices are operated simultaneously from a cross bar 46 having slidable engagement in slots 47 of arms 48 arranged on opposite sides of the machine and pivoted at points 49, near the bottom of the main frame. These arms 48 are oscillated by the actuator bars 34 through pin and slot connections at 50. As shown in Figs. 1 and 2, the oscillating arms 31 and 48 for each series of folding devices are operated simultaneously in the same general direction, but their upper ends are so related to their pivots that each of said arms converges toward the other. In other words, each of the arms, at its uppermost limit of movement, is substantially vertical while the other arm is inclined toward it. When the napkins are to be delivered folded square, as shown in Fig. 6, the diagonally arranged blades 44 will be disconnected in any convenient manner and not used. The cross bars 46, carrying the blades 44, are guided along guide rods 46' at opposite sides of the main frame.

The main portion of the machine, having reference to the folding tongues and blades and rotary cutters, will be operated from 120

a drive shaft 51 having sprocket gearing connections 52 with one of the rotary cutters 19. Any other cutters relating to adjacent series of folding devices may be connected by sprocket gearing 53 on the opposite side of the machine whereby the several series will be operated in unison from the same source of power. The crimping and gripping rollers 15 may be operated by means of sprocket chains 54 operated from any other suitable running part of the machine as, for instance, by the roller 19 driven from the chain 52. The chain 54 is shown in Figs. 1 and 2 as driving positively one roller of each pair of lowermost gripping rollers. If the upper pairs of gripping rollers require to be positively driven, any suitable gear connection between the lower and upper rollers may be provided for this purpose. The small conveyer belt for directing the strips of paper *p* to the remote folding devices may be driven positively, if necessary, by gearing such, for instance, as shown in Fig. 1 at 55.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. The herein described paper cutting and folding machine comprising, in combination, a plurality of independent folding devices, means to deliver paper in strips to said folding devices, each strip being folded along its longitudinal center, each folding device comprising a folding block and a pair of folding members operated at right angles to each other in succession and co-operating with the folding block so as to fold the paper in succession on different lines, and means to operate all of the folding devices simultaneously.

2. The herein described folding device comprising a block having a transverse slot substantially intermediate its length and perpendicular to its axis and another slot extending longitudinally therethrough and intersecting the first mentioned slot on a diagonal line, a removable stop block normally closing one end of the transverse slot, a pair of folding members acting in succession in said slots to form successive folds in a napkin, said folding members operating at right angles to each other, a pair of pivoted arms connected to the folding members to operate them positively toward and from the block, and a reciprocating member serving to actuate the arms simultaneously.

3. The herein described folding device for paper napkins comprising a block having a transverse slot and a longitudinal slot intersecting the other substantially at the middle of the block, a stop block closing the

lower edge of the first mentioned slot, a pair of folding members coöperating in succession with the slots aforesaid to successively fold a napkin, means to deliver paper in a strip to the folding device, means to sever paper in napkin lengths from the strip, and means to operate the folding members and cutting device simultaneously and at uniform rate whereby the napkins are folded and delivered from the folding device at regular intervals.

4. In a paper napkin folding machine, the combination of a series of folding devices, means to deliver strips of paper to the several devices, each strip being folded along its longitudinal center, said delivering means including guides leading to the several folding devices, said guides having sharp shearing shoulders, a roller common to all of said folding devices, cutting members carried by said roller and adapted to coöperate with said shoulders to sever napkin lengths from the several strips, one napkin for each rotation of the roller, a reciprocating member for each folding device adapted to engage a napkin thereon simultaneously with the severing thereof from the strip, a bar carrying all of said folding members, and means for operating the paper delivering and paper cutting devices simultaneously with the reciprocation of the folding member bar.

5. The herein described paper napkin folding machine comprising, in combination, a plurality of independent folding devices, means to deliver paper in strips folded longitudinally to said folding devices, each folding device comprising a rectangular folding block having a transverse slot formed therethrough parallel to its ends, a flat rectangular tongue movable into and out of said slot, said block also having a longitudinal slot extending from one end to the other and intersecting the transverse slot in a plane at right angles thereto, a flat rectangular blade movable into and out of the longitudinal slot, means to reciprocate said tongue and blade in alternation in directions at right angles to each other, means to sever a napkin length from each strip adjacent the folding block at each reciprocation of said tongue, and means to operate all of the folding devices simultaneously and continuously.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK P. HILDEBRANDT.

Witnesses:

JOSEPH O. MCCABE,

WILLIAM H. MACMULLEN.