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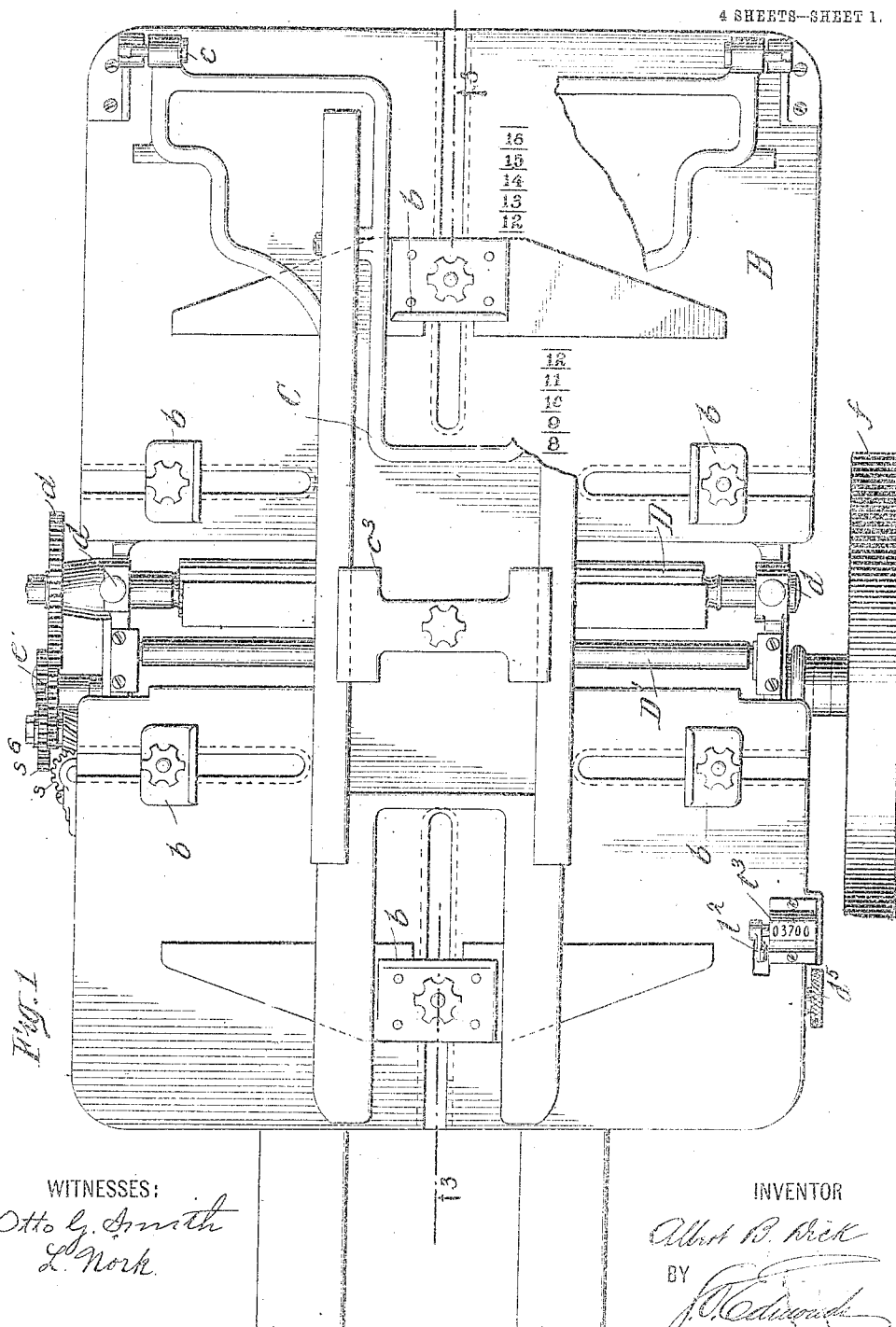
PATENTED JULY 31, 1906.

A. B. DICK.

FOLDING MACHINE.

APPLICATION FILED JULY 6, 1905.

4 SHEETS--SHEET 1.



WITNESSES:

Otto L. Smith
L. Nork

INVENTOR

Albert B. Riek

BY

BY *J. H. Edwards*
ATTORNEY

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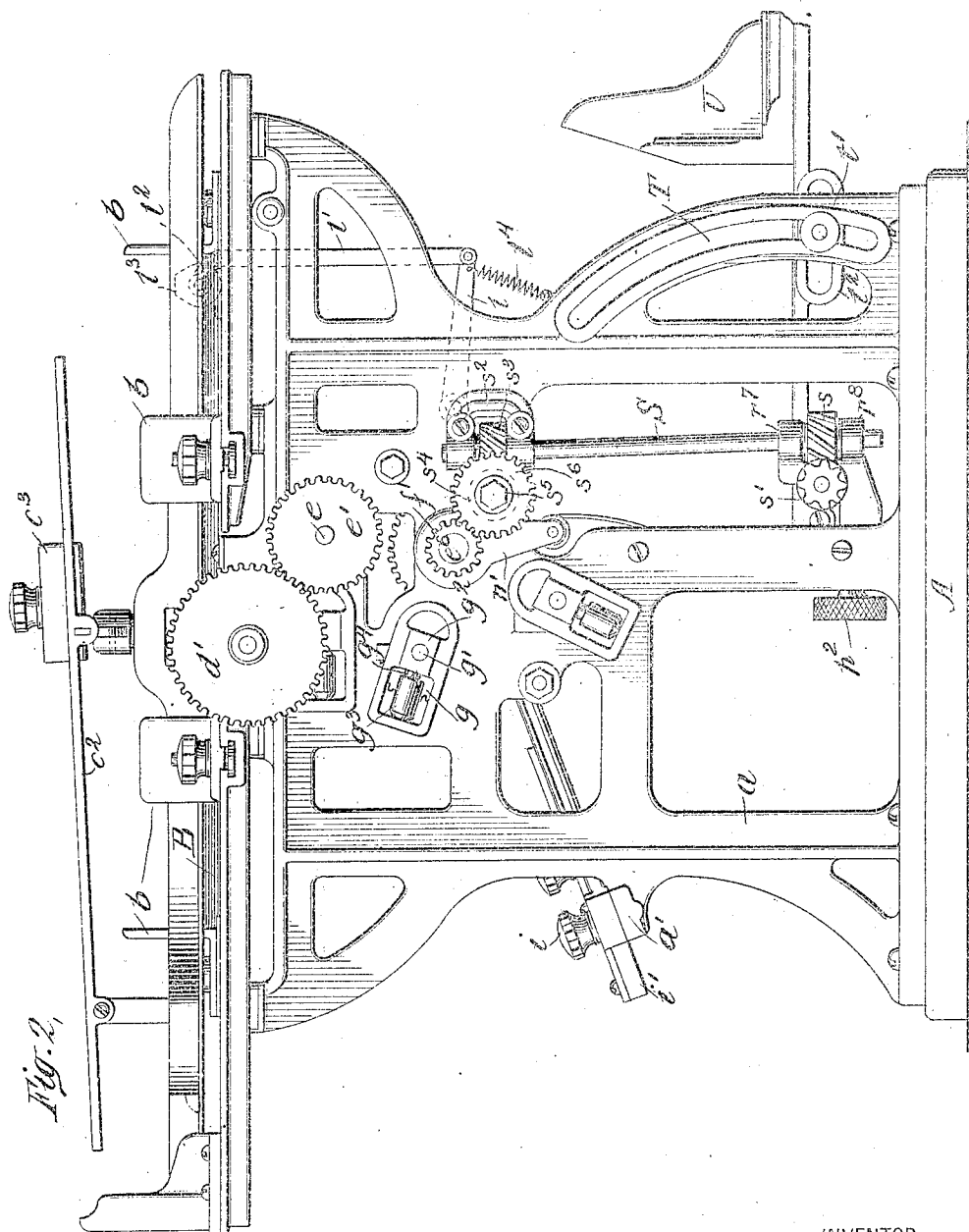


Fig. 2.

WITNESSES:

Otto G. Smith
L. Hark

INVENTOR

Albert B. Dick

BY

J. P. Edmunds
ATTORNEY

No. 827,512.

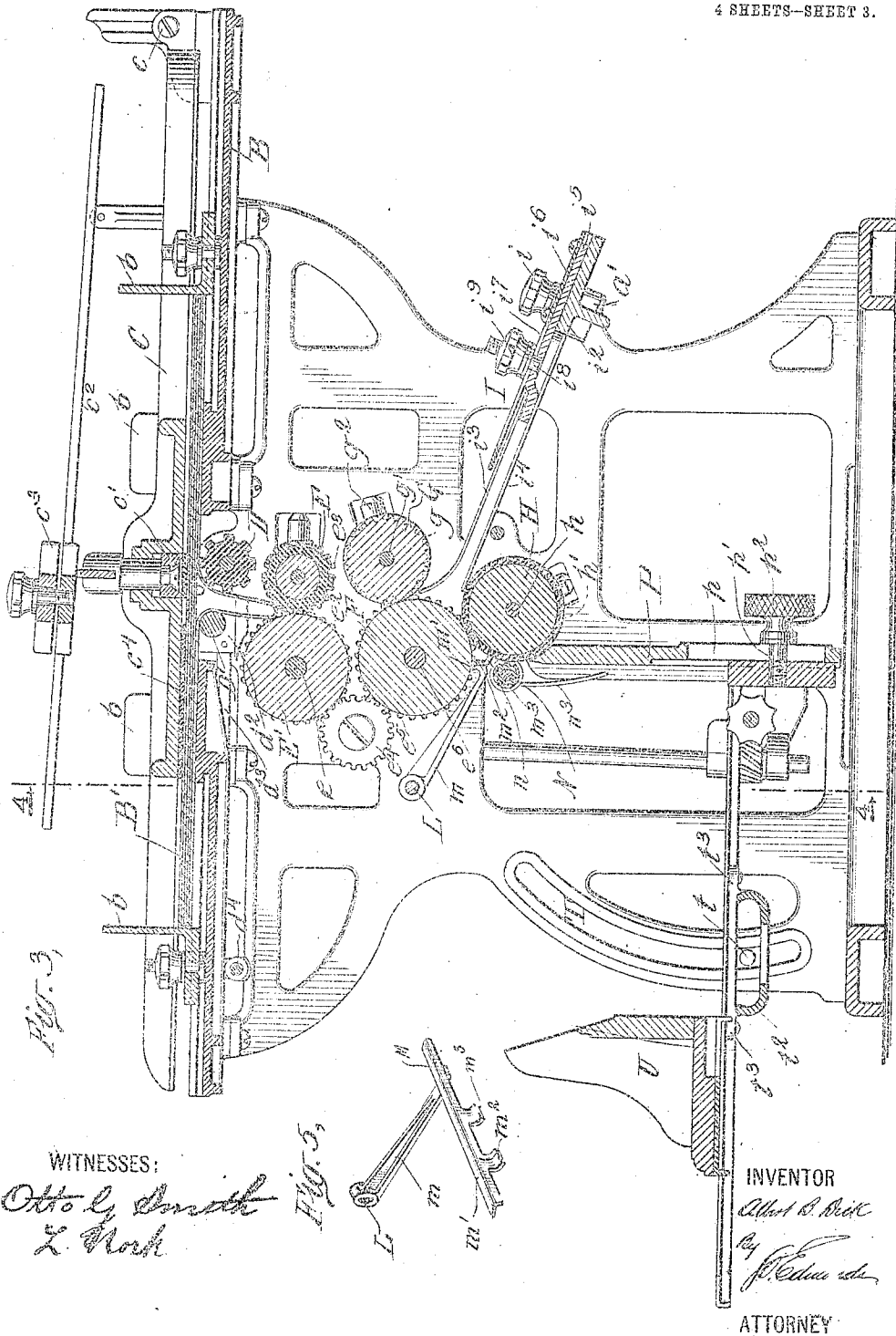
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4 SHEETS--SHEET 3.



WITNESSES:

Otto L. Dunkel
L. H. H. H.

Fig. 5

INVENTOR

Albert B. Reiss

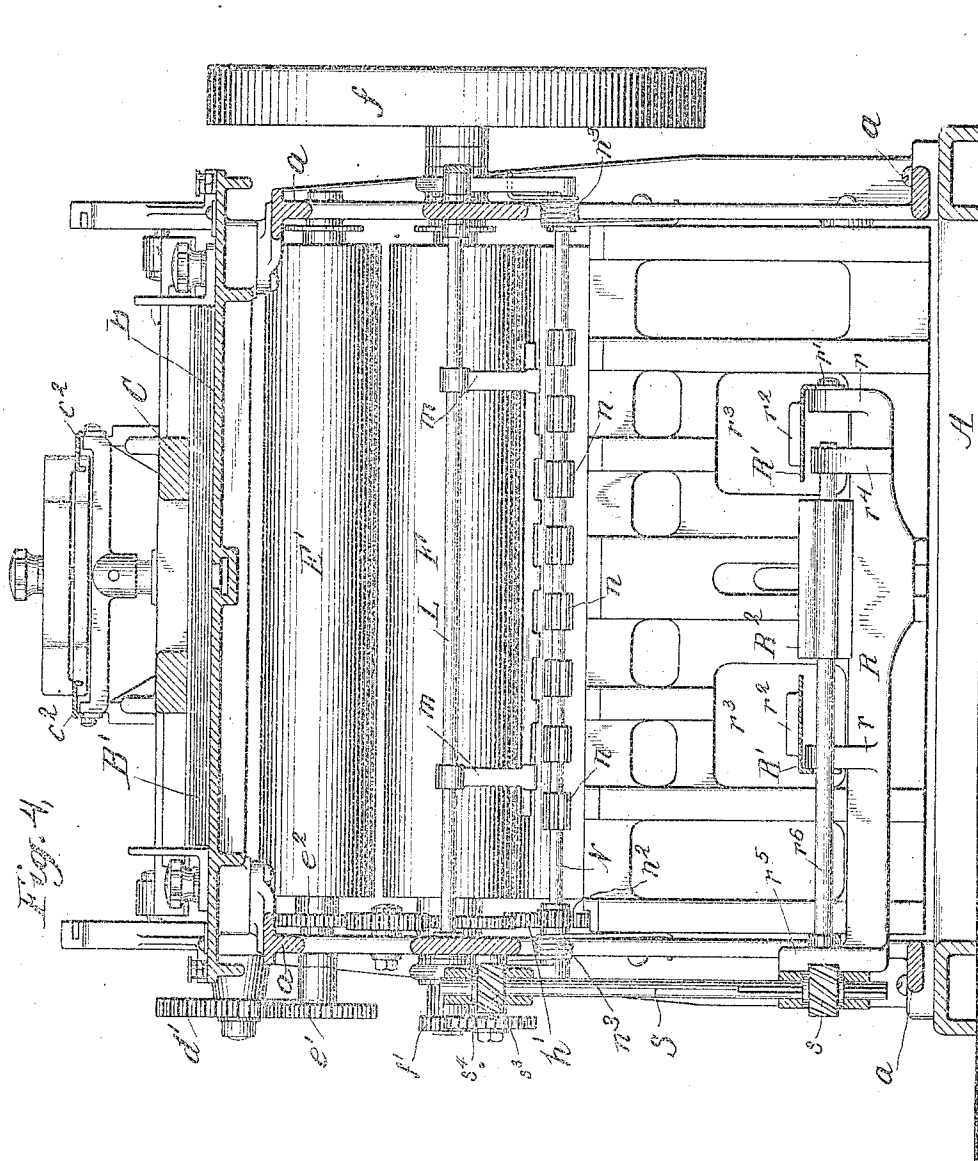
ATTORNEY

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4 SHEETS—SHEET 4.



WITNESSES:
Otto L. Smith
L. W. McK

INVENTOR
Albert B. Dick
BY
J. E. Edwards
ATTORNEY

UNITED STATES PATENT OFFICE.

ALBERT B. DICK, OF LAKE FOREST, ILLINOIS, ASSIGNOR TO A. B. DICK COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

FOLDING-MACHINE.

No. 827,512.

Specification of Letters Patent.

Patented July 31, 1906.

Application filed July 6, 1905. Serial No. 268,453.

To all whom it may concern:

Be it known that I, ALBERT B. DICK, a citizen of the United States, residing at Lake Forest, in the county of Lake and State of Illinois, have invented a certain new and useful Improvement in Folding-Machines, of which the following is a specification.

The object of the present invention is to provide durable and efficient mechanism for folding sheets of paper and other material, preferably at high speed.

A further object of the invention is to provide various adjustments for a mechanism of this character whereby maximum latitude of operation may be permitted with regard not only to the quality of the material to be folded, but also the size thereof.

A further object is to provide means whereby the folded sheets will be delivered consecutively from the machine in an orderly manner and without injury.

In carrying out the invention in a preferred form I employ a bed adapted to receive a sheet pile and a pressure device overlying such bed and coacting with said pile to apply yielding pressure thereon. Operating through an opening in said bed I employ a rotary separator, by means whereof the sheets are separated from the under side of the pile and passed thence to feed-rolls, thence between passing and pressing rolls to a guide wherein the sheets are successively buckled, and thence between one of such passing and pressing rolls and another roll adjacent thereto into a stacking device. Coacting with the roll last referred to is a movable guide operated by the advancing edge of the folded sheet to assure the passage of such edge between said roll and an adjacent guide-roll, such sheet passing downwardly therefrom over a stripper-plate to the stacking device, said guide-roll operating not only to direct the line of movement of the folded sheet, but also to maintain an open space between the stripper-plate and the last previously-delivered folded sheet. The delivery apparatus is so constructed as to be readily adjustable at one or more points—as, for instance, adjacent to the stripper-plate and at a distance therefrom—and combined therewith I employ a forwarding-roll coacting with the under edges of the folded sheets to pass them

upon the ways forming part of said delivery apparatus.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of a folding-machine illustrating my invention. Fig. 2 is a side elevation thereof. Fig. 3 is a central vertical section on the line 3 3, Fig. 1. Fig. 4 is a sectional view on the line 4 4, Fig. 3, and looking in the direction of the arrows adjacent to such line; and Fig. 5 is a detail hereinafter to be referred to.

A designates the base of the machine, upon which is supported the frame, comprising mainly the two side members *a*. Upon the latter is supported the bed B, having the side and end guides *b* for coaction with the sheet pile B', laid upon said bed. Overlying the sheet pile and hinged at *c* to the bed B is a pressure device C, the lower side whereof is preferably faced with rubber, as shown at *c'*, said pressure device including the cross-bar *c'*, directly overlying the separator mechanism, the ways *c''*, and the sliding-weight *c'''* mounted thereon.

D designates a separator-roll, preferably of rubber or having a rubber periphery, longitudinally fluted or corrugated. The shaft of said separator-roll is mounted in the side frames *a a*, as shown at *d*, one end of said shaft carrying the pinion *d'*. Adjacent to said separator-roll D and adjustable relatively thereto is an idler-roll D', the ends whereof are journaled in bearing-blocks *d''*, connected by arms *d'''* with cranks on the shaft *d'*, which shaft is operated by finger-piece *d''''* to move said idler-roll toward or from the separator-roll D.

E E' designate a pair of coacting feed-rolls, the roll E being of rubber and having a longitudinally fluted or corrugated exterior and the roll E' being preferably metallic. The shaft *e* of the feed-roll E' is mounted in suitable bearings in the frame members *a*, one end projecting through its coacting frame member and being provided at its extremity with the pinion *e'*, which meshes with the pinion *d'*. Carried also by that end of the shaft *e*, but inside the frame, is another pinion *e''*, which coacts with a pinion *e'''*, mounted on the shaft of the feed-roll E. The last-named shaft is mounted in the frame mem-

bers *a* in the same manner as is the shaft of one of the pressing and passing rolls presently to be described, and since the mounting of the latter is more clearly shown in the drawings further description of the mounting of the shaft of said feed-roll E is here omitted.

The pinion *e*² meshes with an idler-pinion *e*⁴, carried on the inner face of one of the frame members and meshing with a pinion *e*⁵, mounted upon the shaft *e*⁶ of one of the pressing and passing rolls F, which roll is preferably metallic. Said shaft *e*⁶ is here shown as the main shaft of the machine, the ends thereof being journaled in the frame members *a* and passing through the same, one end of said shaft being provided with the drive-wheel *f* and the other with a pinion *f*¹, the function whereof will be presently explained. The pinion *e*⁵ meshes with a pinion *g*, mounted upon the shaft *g*¹ of the pressing and passing roll G, which coacts with the pressing and passing roll F. Said shaft *g*¹ is mounted at its ends in the frame members *a* in manner similar to the mounting of the feed-roll E, this including at each end the use of a bearing-block *g*², in which the shaft end is journaled and which has sliding movement in an opening in the frame member and a yielding pressure device coacting with said block and comprising the barrel *g*³ and the spring-pressed plunger *g*⁴, operating therein and tending to force said bearing-block and the shaft end journaled therein toward the roll F. This provision with regard to spring-pressed coaction of the pressing and passing rolls F G is also true with respect to the feed-rolls E E'.

H designates a delivery-roll, having, preferably, a rubber-covered periphery and mounted upon shaft *h*, the ends whereof are journaled in the frame members *a* by means of the sliding spring-pressed block construction just described in connection with the pressing and passing roll G. Mounted upon the shaft of said roll H is a pinion *h*¹, which meshes with the pinion *e*⁵ on the main shaft *e*⁶.

a' *a'* designate ears, preferably formed integral with the frame members *a*, and upon these is detachably mounted (see set-screws *i*) a cross-bar *i*¹, carrying the sheet guide or buckler L. Said cross-bar is provided with an inwardly-projecting web *i*², to which are secured the parallel guide members *i*³ *i*⁴. The free end of the latter terminates in proximity to the periphery of the delivery-roll H, while the corresponding end of the guide member *i*³ is curved and terminates in proximity to the point of coaction between the peripheries of the passing and pressing rolls F G.

*i*⁵ designates a sliding stop operating between and extending from edge to edge of the guide members *i*³ *i*⁴. Overlying said stop and a portion of the guide member *i*³ is a plate *i*⁶, secured to the cross-bar *i*¹ and having an elongated slot *i*⁷, through which oper-

ates a screw-stud *i*⁸, carried by said stop *i*⁵, and with the threaded portion whereof coacts a set-nut *i*⁹. As will be readily understood, the stop *i*⁵ may, by reason of said nut *i*⁹, be moved to any suitable point between the guide members *i*³ *i*⁴ and firmly clamped in proper position, the object of said stop being to determine the degree of traverse within the guide members *i*³ *i*⁴ of a folded sheet fed therein from between the passing and pressing rolls F G.

L designates a rock-shaft journaled at its ends in the side members *a* of the frame, one end projecting through such frame and being provided with a crank-arm *l*, the end whereof is attached to the connecting-rod *l*¹, running to the crank-arm *l*² of cyclometer P. The crank-arm *l* is normally held in the position shown in Fig. 2 by means of coil-spring *l*³. Mounted upon the rock-shaft L and projecting inwardly therefrom are arms *m*, to the inner ends whereof is secured the angular guide-plate M. Said guide-plate, as clearly shown in Fig. 5, is provided with the web *m*¹, substantially parallel with the coacting portion of the periphery of the roll F and the portion *m*² at right angles thereto and constituting a guide-stop for the advancing (folded) edge of a sheet fed between the rolls F and H. Additionally, said guide-plate M is provided with downwardly and inwardly projecting lips *m*³, terminating in close proximity to the periphery of the roll H.

N designates a guide-roll shaft having sectional guide-rolls *n*, each about coextensive in length with the distance between two adjacent lips *m*³ on the guide-plate M and opposite such space. The ends of such guide-roll shaft are mounted in hangers *n*¹, depending from the main shaft *e*⁶. Adjacent to one of the ends so mounted said shaft N is provided with a pinion *n*², which meshes with the pinion *h*¹ of the delivery-roll H. As clearly shown in Fig. 3, the guide-roll shaft N and sectional rolls *n* thereon operate in close proximity to the periphery of the delivery-roll H and are maintained by yielding pressure in this position by means of springs *n*³ *n*³, said springs also serving to maintain the pinion *n*² in coaction with the pinion *h*¹.

Lying directly below the point of coaction of the sectional guide-roll *n* and delivery-roll H is the stripper-plate P, secured in any suitable manner to the side members *a* of the frame. The upper edge of said plate terminates either in contact with or in close proximity to the periphery of the delivery-roll H, so as to receive upon its outer surface a folded sheet fed between said delivery-roll and said sectional roll. Said plate is provided with an elongated vertical slot *p*, through which works the screw-stud *p*¹ on the end of the adjusting thumb-piece *p*², said screw-stud co-acting with a threaded perforation in the de-

livery-way-supporting frame R, and which frame is therefore vertically adjustable and capable of being set at desired position by means of said thumb-piece p^2 . Said frame is provided with ears r , to which are hinged, at r' , the inner ends of the ways R' R', the extreme ends whereof are upturned, as shown at r^2 , the same extending through openings r^3 in the stripper-plate P. Said frame is also provided with two bearing-lugs $r^4 r^5$, in which is journaled a shaft r^6 , carrying between the ways R' R' the forwarding-roll R², provided with a longitudinally fluted or corrugated periphery, preferably of rubber. The periphery of said forwarding-roll extends slightly above the surface of said ways, so as to forward upon the same the folded sheets fed thereon. The extreme end of the bearing-lug r^5 is yoke-shaped, comprising the members $r^7 r^8$, and loosely journaled in said members so as to have vertical freedom of movement is a shaft S, which shaft is provided between the members $r^7 r^8$ with the spiral gear s , meshing with a corresponding gear s' on the extreme end of the forwarding-roll shaft r^6 . The upper end of said shaft is journaled in the ends of the yoke s^2 , secured to the exterior of one of the frame members a , and has keyed or otherwise secured thereto within said yoke the spiral gear s^3 , which meshes with a similar gear s^4 upon a stub-shaft s^5 , secured to the said frame member. The spiral gear s^4 is driven by a pinion s^6 , mounted upon said stub-shaft and driven by the pinion f' on the main shaft e^6 . It will therefore be seen that the support R for the inner end of the delivery apparatus may be raised or lowered (by means of adjusting thumb-piece p^2 , &c.) without interfering with the means for driving the forwarding-roll R², the yoke members $r^7 r^8$ and spiral gear s being, as above stated, free to move upon the shaft S.

T T designate arc-shaped slots formed opposite each other in the frame members $a a$, and within these slots operates a cross-rod t , one end whereof is provided with a head t' , the other end being threaded and provided with a set-nut similar to the nut p^2 , whereby after said cross-rod t has been moved to any desired position within the slots T it may be there securely clamped. Carried by said cross-rod and between the said members of the frame is the supporting-bracket t^2 , having ears t^3 , to which the ways R' R' are secured, as shown in Fig. 3. Operating upon said ways is the sliding block U, movable hereover toward and from the stripper-plate P. It will therefore be seen that any desired inclination of the ways R' R' may be secured by means of either one or both of the two independent adjustments herein described. In the specific form of the mechanism disclosed the guide-roll n should coact with the upper edge of the folded sheets in

order to pass such upper edge rearwardly, and thereby open a space rearward of the stripper-plate P for the reception of the next succeeding folded sheet. Inasmuch as sheets of different sizes are to be folded, it is desirable that the inner end, whether with or independent of the outer end of the delivery-ways, should be adjustable toward and from said guide-roll n . This is accomplished by the mechanism described, it being possible to readily elevate or depress the inner end of the guideways and to secure the same in adjusted position by means of the set-nut p^2 . The outer end of said ways may, if desired, be correspondingly changed by means of the slots T, cross-rod t , and supporting-bracket carried by said cross-rod.

The operation of the machine has been to some extent explained in connection with the foregoing description of the parts. The lowermost sheet is fed from the pile by means of the separator-roll D, buckled, as illustrated in Fig. 3, and passed downwardly to the feed-rolls E E', which thereupon grasp the buckled portion and feed the sheet downward to the pressing and passing rolls F G, after passing through which the advancing (buckled) edge passes into the sheet-guide I until its movement therein is arrested by the stop i^2 , whereupon the sheet is again buckled and fed to the grip of the rolls F H. The advancing (folded) edge strikes against the lips m^3 and operates the rock-shaft L, which thereupon records the passing of such sheet upon the cyclometer P. Such edge is thus guided downwardly between said roll H and the sectional roll n and passed to the ways R', the upper edge being moved outwardly (away from the stripper-plate P) by means of said sectional roll. This operation being continued, the sheets of the entire pile are successively folded and stacked upon said ways, the sliding block U being moved outwardly therefrom by the accumulation of such folded sheets and the action of the forwarding-roll R².

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In a folding-machine, the combination with a bed adapted to receive a sheet pile and a separator coacting with the under side of such pile, of feed-rolls underlying said separator, pressing and passing rolls underlying said feed-rolls, and a sheet-guide underlying said last-named rolls and adapted to receive a sheet therefrom, buckle the same and feed such sheet between one of said last-named rolls and a delivery-roll, substantially as set forth.

2. In a folding-machine, the combination with a bed adapted to receive a sheet pile and a separator coacting with the under side of such pile, of feed-rolls underlying said sep-

arator, pressing and passing rolls underlying said feed-rolls, and a sheet-guide underlying said last-named rolls, provided with an adjustable stop and adapted to receive a sheet from said last-named rolls, buckle the same and feed such sheet between one of said last-named rolls and a delivery-roll; substantially as set forth.

3. In a folding-machine, the combination with a frame, of a bed carried thereby and adapted to support a sheet pile, a sheet-separator coacting, through an opening in said bed, with the under side of such sheet pile, feed-rolls underlying said separator, pressing and passing rolls underlying said feed-rolls, all of said rolls being mounted in said frame, and a sheet-guide underlying said pressing and passing rolls, detachably secured to said frame and having an adjustable stop therein, said guide being adapted to receive a sheet from said pressing and passing rolls and to buckle said sheet and permit the same to be passed from the machine between one of said pressing and passing rolls and a delivery-roll coacting therewith; substantially as set forth.

4. In a folding-machine, the combination of a bed adapted to receive a sheet pile, a separator-roll coacting with the under side of said pile, pressing and passing rolls underlying said separator-roll, a sheet-guide underlying said last-named rolls provided with an adjustable stop and adapted to receive a sheet from said last-named rolls, buckle the same and feed said sheet between one of said last-named rolls and a delivery-roll, a plate adjacent to said delivery-roll and means for guiding a sheet into substantial alignment with said plate, substantially as set forth.

5. In a folding-machine, the combination with a pair of rolls and means for passing a sheet thereto, of a guide adapted to receive such sheet and buckle the same, a delivery-roll coacting with one of said rolls, its point of coaction being adjacent to the opening in said guide, a vibrating guide-plate having fingers at its edge arranged adjacent to said delivery-roll, and a sectional guide-roll coacting with a sheet passed between one of the rolls first named and said delivery-roll, substantially as set forth.

6. In a folding-machine, the combination with a pair of rolls and means for passing a sheet thereto, of a guide adapted to receive such sheet and buckle the same, a delivery-roll coacting with one of said rolls, its point of coaction being adjacent to the opening in said guide, a guide-roll having a milled or toothed periphery, and means for guiding a sheet passed between one of the rolls first named and said delivery-roll between said delivery-roll and said guide-roll, substantially as set forth.

7. In a folding-machine, the combination of a bed adapted to receive a sheet pile, a

separator coacting with the under side of said pile, a pair of rolls underlying said separator, a guide adjacent to said rolls and adapted to receive a sheet therefrom and buckle the same, a delivery-roll coacting with one of the rolls of said pair and adapted to receive the sheet from said guide, a vibrating guide-plate arranged adjacent to the line of contact of said coacting rolls and delivery apparatus into which the sheet is guided by said plate, substantially as set forth.

8. In a folding-machine, the combination of a bed adapted to receive a sheet pile, a separator coacting with the under side of said pile, a pair of rolls underlying said separator, a guide adjacent to said rolls and adapted to receive a sheet therefrom and buckle the same, a delivery-roll coacting with one of the rolls of said pair and adapted to receive the sheet from said guide, a vibrating guide-plate having a lip adapted to engage the advancing edge of a sheet passed by said coacting rolls and delivery apparatus into which the sheet is guided by said plate, substantially as set forth.

9. In a folding-machine, the combination of a bed adapted to receive a sheet pile, a separator coacting with the under side of said pile, a pair of rolls underlying said separator, a guide adjacent to said rolls and adapted to receive a sheet therefrom and buckle the same, a delivery-roll coacting with one of the rolls of said pair and adapted to receive the sheet from said guide, a pivoted guide-plate adjacent to the line of contact of said coacting rolls and a guide-roll adjacent to said delivery-roll and between which and said delivery-roll the sheet is guided by said plate, substantially as set forth.

10. In a folding-machine, the combination of a bed adapted to receive a sheet pile, a separator coacting with the under side of said pile, a pair of rolls underlying said separator, a guide adjacent to said rolls and adapted to receive a sheet therefrom and buckle the same, a delivery-roll coacting with one of the rolls of said pair and adapted to receive the sheet from said guide, a vibrating guide-plate arranged adjacent to the line of contact of said coacting rolls, delivery apparatus into which the sheet is guided by said plate, and a counting device connected to said plate, substantially as set forth.

11. In a folding-machine, the combination with two coacting rolls and means for passing a sheet thereto, of a sectional guide-roll, having recesses between the sections thereof, arranged adjacent to one of said rolls, and a vibrating guide-plate having lips coacting with the recesses in said sectional guide-roll, substantially as set forth.

12. In a folding-machine, the combination with two coacting rolls and means for passing a sheet thereto, of a stripper-plate underlying

one of said rolls, and means adjacent to the point of coaction between said rolls for guiding a sheet fed therefrom into substantial alignment with said stripper-plate, substantially as set forth.

13. In a folding-machine, the combination with two coating rolls and means for passing a sheet thereto, of a sectional guide-roll, having recesses between the sections thereof, ad-

jacent to one of said rolls, and a guide-plate having lips coacting with the recesses in said sectional guide-roll, substantially as set forth.

This specification signed and witnessed this 29th day of June, 1905.

ALBERT B. DICK.

Witnesses:

M. H. BURHART,
W. G. ARNOLD.