

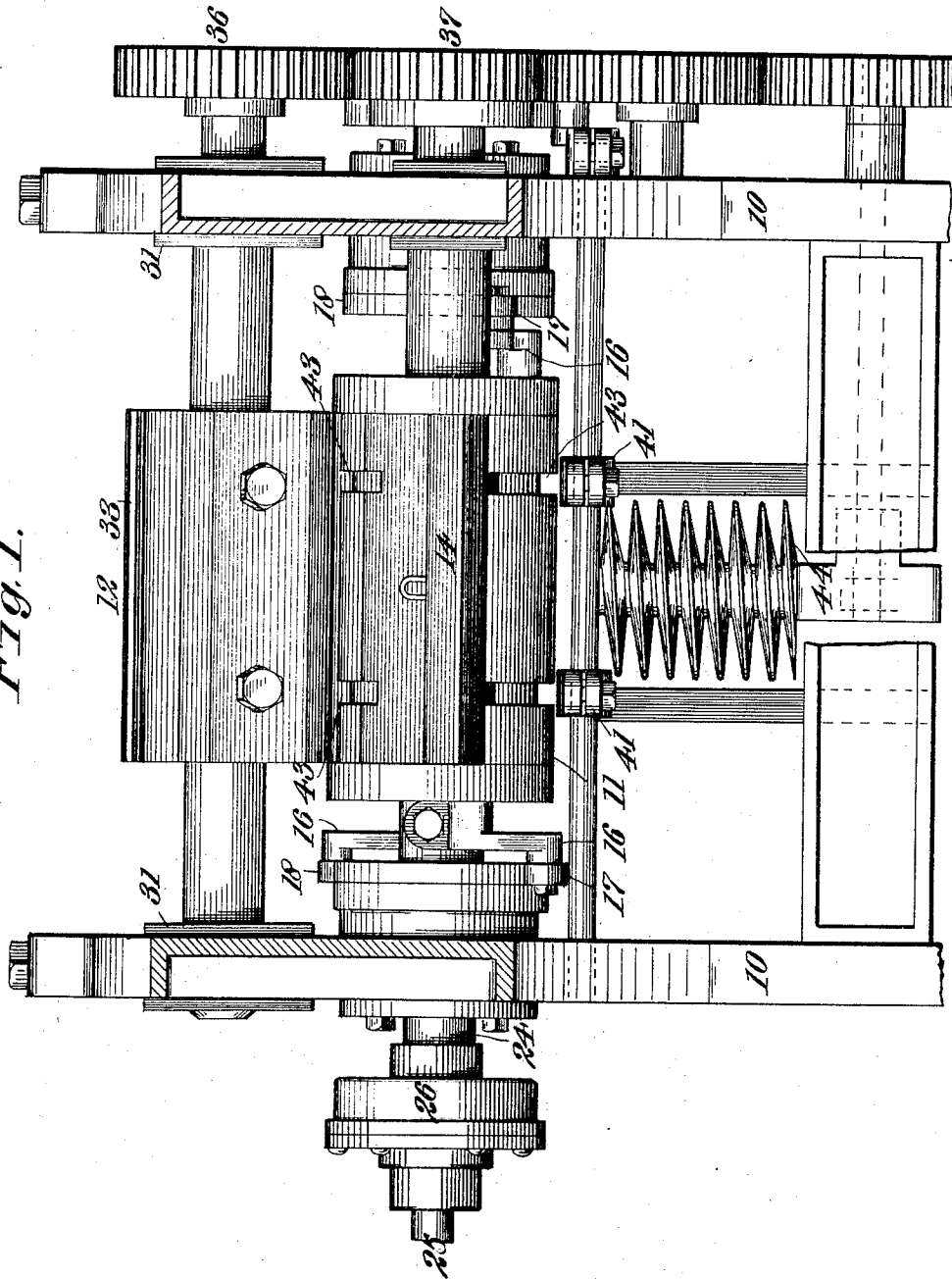
E. G. WENNERBLAD.
INTERFOLDING MACHINE.
APPLICATION FILED OCT. 7, 1919.

1,358,665.

Patented Nov. 9, 1920.

4 SHEETS—SHEET 1.

Fig. 1.

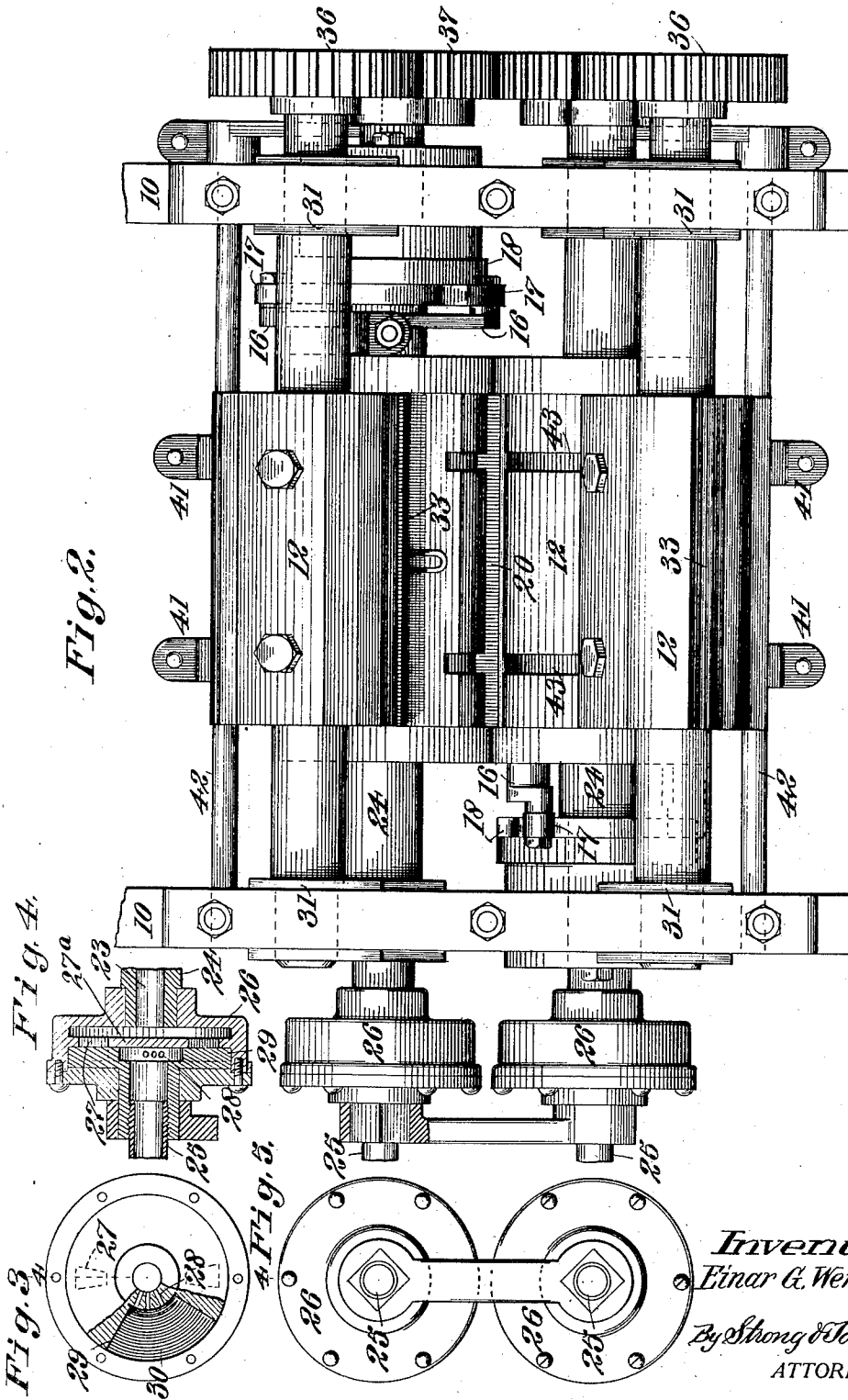


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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 6.

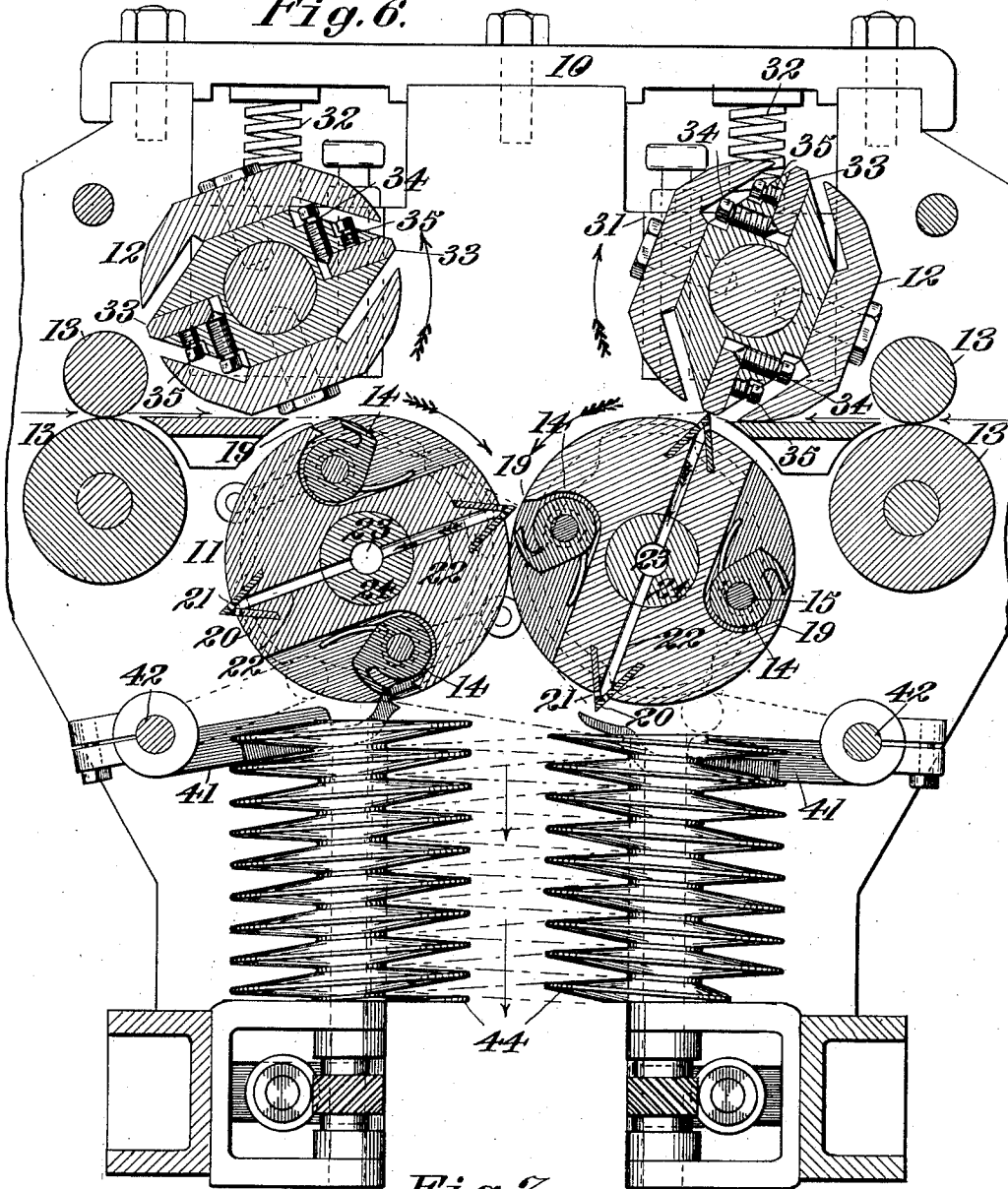
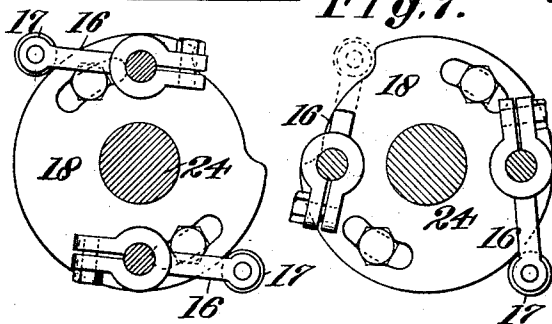


Fig. 7.



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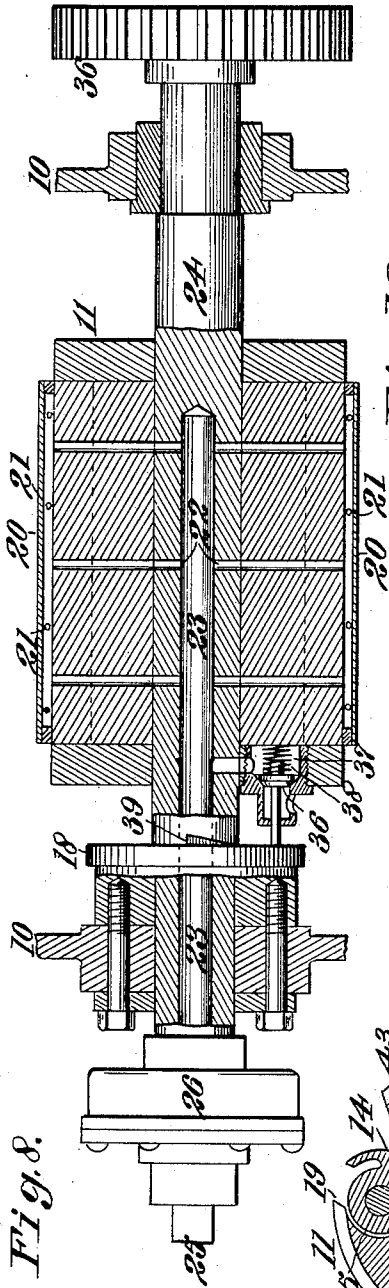


Fig. 8.

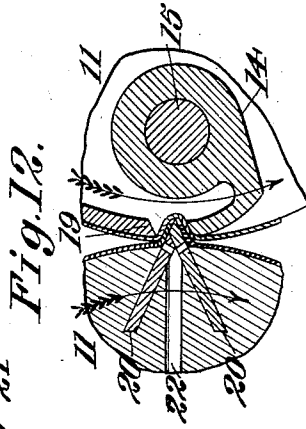


Fig. 12.

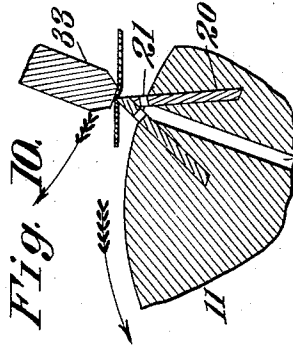


Fig. 10.

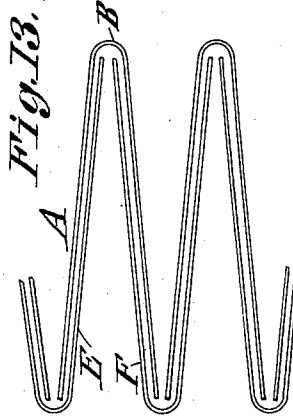


Fig. 13.

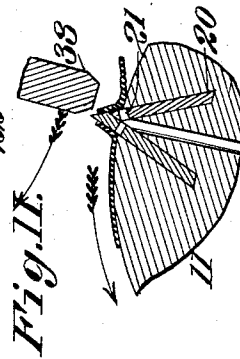


Fig. 11.

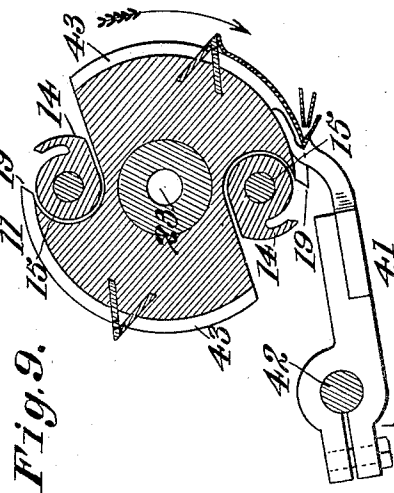


Fig. 9.

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UNITED STATES PATENT OFFICE.

EINAR G. WENNERBLAD, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-HALF
TO MAX M. COHN, OF PIEDMONT, CALIFORNIA.

INTERFOLDING-MACHINE.

1,358,665.

Specification of Letters Patent.

Patented Nov. 9, 1920.

Application filed October 7, 1919. Serial No. 329,046.

To all whom it may concern:

Be it known that I, EINAR G. WENNERBLAD, a citizen of the United States, residing at the city and county of San Francisco and State of California, have invented new and useful Improvements in Interfolding-Machines, of which the following is a specification.

This invention relates to mechanism for cutting and interfolding paper sheets for toilet use, wherein packages are formed of sheets folded in zig-zag arrangement and interleaved with the severed ends of two sheets lying within the middle fold of another sheet.

The object of the invention is to improve and simplify the cutting mechanism and the means for controlling the cut sheets as they pass from the cutting to the folding position. The particular form of mechanism herein shown comprises preferably a pair of folding cylinders arranged side by side and overlying each of which is a cutting roller. Each of the folding cylinders carries a plurality of knives or blades and a plurality of gripping devices, a knife on one of the cylinders cooperating with a gripping device on the other cylinder. A continuous web of paper is fed into each side of the machine passing first between one of the folding cylinders and the overlying cutting roller, and thereafter both sheets coming in from opposite directions pass between the two folding cylinders and are interleaved and folded in the manner above indicated. I may use a V-shaped knife or blade carried on each of the folding cylinders and projecting from the surface thereof. This element cooperates in an improved way with the cutting roller to first sever the paper, and has in its sides, near the apex, a series of openings through which suction is applied to hold the loose ends of the paper in place on the cylinder until such time as the V-shaped element meets a gripper member on the other cylinder. Thereupon both incoming sheets are folded, one at the middle and two others at the line of severance. The folded and interleaved sheets are carried by the gripping member until released at a point near the bottom of the folding cylinder where they are taken off by stripper fingers.

The preferred form of my invention is

illustrated in the accompanying drawings, 55 wherein—

Figure 1 shows a side elevation of the machine.

Fig. 2 shows a plan view of the same.

Fig. 3 shows a detail of the suction controlling means. 60

Fig. 4 shows a cross section of the same.

Fig. 5 shows a side elevation of said suction controlling means.

Fig. 6 shows a cross sectional view in elevation of the assembled mechanism. 65

Fig. 7 shows a detail view of the cam mechanism for controlling the gripping members on the folding cylinder.

Fig. 8 shows a longitudinal sectional view of one of the folding cylinders illustrating the manner in which suction is applied to the perforations in the V-shaped blades or knives. 70

Fig. 9 shows a sectional view of one of the folding cylinders and a stripper finger cooperating therewith. 75

Figs. 10 and 11 show detail sectional views illustrating different positions of the V-shaped knives in cooperation with a cutting roller. 80

Fig. 12 shows a detail sectional view illustrating the manner of folding the incoming sheets.

Fig. 13 shows a diagram illustrating the manner in which the sheets are folded and interleaved when they leave the machine. 85

Referring more in detail to the mechanism shown on the accompanying drawings, the interfolding machine comprises a frame 10 on which is journaled a pair of interfolding cylinders 11 arranged side by side and cooperating with each other in a manner hereinafter made clear. Overlying each folding cylinder is a cutting or severing roller 12. At each side of the cutting rollers and folding cylinders are feeding or guiding rollers 13 between which a web of paper passes on its way to be cut and folded. 95

Each folding cylinder carries a plurality of gripping devices 14, two being shown in the present instance at diametrically opposite points on the cylinder. Each of these gripping devices is carried on a shaft 15 extending through the cylinder and having a projecting end on which is a rock arm 16 carrying a roller 17 at its outer end. This roller rises upon a stationary cam 18 100

which is so shaped as to cause the gripping member to be oscillated at the proper time. It will be seen that each gripping device is carried in a recess formed in the cylinder and coöperates with a stationary jaw 19 formed on the cylinder. Also carried on each of the cylinders 11 is a plurality of V-shaped knives or blades 20 embedded in the cylinder and each having its apex projecting some distance from the surface of the cylinder. There are two such knives or blades on each cylinder spaced equally apart from the gripping members, the knife on one cylinder being adapted to coöperate with the gripping member on the adjacent cylinder. At each side of the projecting portion of the V-shaped member is a series of apertures or perforations 21 and extending radially of the cylinder and communicating with said apertures 21 is a plurality of ducts 22.

These ducts 22 open into an axial bore 23 extending partially through the shaft 24 on which the folding cylinder is carried. This bore 23, as will be seen by reference to Figs. 3 and 4, has communication with a suction pipe 25. The application of suction thereto is controlled by a rotating valve casing 26 carried on each cylinder shaft 24 and in closing a stationery valve disk 29 on the intake pipe 25. The disk 29 has a cut away segment 30 opening into the intake pipe 25 through perforations 28. Diametrically opposite ports 27 are formed in a partition plate 27^a on the valve casing when the ports 27 register with the cut-away segment 30, communication is established between the suction pipe 25 and the axial bore 23, and thereby suction is applied to the apertures or perforations 21 in the V-shaped members 20. The valve mechanism just described is so timed that suction will be applied to the V-shaped members when the incoming web of paper has been cut so that the severed ends of the sheets shall be drawn into intimate contact with the sides of the V-shaped member and held until such time as the V-shaped member meets a gripping device on the other cylinder and the gripping device grips the incoming sheets and folds them.

Each cutting roller 12 is preferably mounted in bearings 31 which are slidable in the main frame and are held depressed by means of springs 32. At diametrically opposite points on each of the cutting rollers is a steel or other hard surface plate 33 embedded in the roller and adjustable radially thereof by means of a screw 34 having a beveled end coöperating with a beveled surface on the inner end of the plate. A set screw 35 is also provided for holding said plate in adjusted position. Each of the cutting rollers is driven by means of a spur gear 36 meshing with a spur gear 37 on the

adjacent folding roller, and the timing of this gearing is such that a V-shaped member on the folding roller will meet with one of the plates 33 on the cutting roller at each revolution. In so meeting the incoming web of paper is caught between the V-shaped member and plate 33 and severed. The pressure with which these coöperating members engage can be regulated by adjusting the members 33 radially of the cutting roller and the spring-pressed bearings for the cutting rollers will obviously permit a sufficient extension of the members 33 to insure a complete severing of the web of paper.

With the incoming web severed at this point the valve mechanism shown in Figs. 3 and 4 will be in position to permit suction to be applied to the perforations 21 whereupon the loose ends of the severed web will be drawn into contact with the V-shaped member, as shown in Fig. 11. Suction will continue to act until such time as the V-shaped member comes into coöperation with the gripping member. I have provided means operative at this time to insure a clear release of the suction so that the gripping member may act to remove the sheets carried by the V-shaped member and press them into the fold formed in the middle of the sheet entering from the opposite direction. This suction release comprises a valve 36 formed in one end of each folding roller and having a chamber 37 which communicates at one end with the axial bore 23, and at the other end with the atmosphere. The valve is held normally closed by means of a spring 38. This spring has its stem projecting through the casing and coöperating with a projection 39 on the face of the cam 18. At the desired time the projection 39 on the cam strikes the valve stem and forces the valve inwardly unseating it and allowing the vacuum to be destroyed by opening communication with the atmosphere. The projection 39 preferably is made short so that the valve stem passes immediately away from the same allowing the valve to close and once more restoring the action of the suction to the perforations in the V-shaped members.

The action of the gripping members is such that when the incoming sheets of paper are forced between the gripping member and the stationary jaw, said gripping member will be rocked by reason of the cam mechanism previously described and shown in detail in Fig. 7, said rocking movement being in a direction toward the stationary jaw 19. The gripping member thus comes in contact with the sheets of paper and presses them tightly against the stationary jaw insuring that a fold is made in one of the sheets, within which fold will lie the severed ends of two other sheets. The grip-

ping member continues to press the sheets against the stationary jaw, while the travel of the folding cylinders will cause the V-shaped knife to be withdrawn from the gripping member. Thereafter, as the gripping member approaches the bottom of its run the cam mechanism will cause it to rock in the opposite direction, thereby releasing the device. At this time other mechanism about to be described comes into operation to insure that the folded sheets shall be removed from the cylinder.

The means for removing the sheets comprises a series of stripper fingers 41 lying beneath each folding cylinder and mounted upon a rock shaft 42. Each of these rock shafts is controlled by suitable cam mechanism not herein shown to cause the fingers to be moved upwardly into circumferential channels 43 formed on each of the cylinders, and, in this position, to engage the folding sheets, as shown in Fig. 9, and move downwardly carrying such sheets with them and depositing them on suitable delivery mechanism indicated generally by the reference character 44.

The manner in which the sheets are folded and interleaved is clearly illustrated in Fig. 13 where it will be seen that the sheet A has a central fold B, within which fold lies the severed ends of two adjacent sheets E and F.

It is believed that from the foregoing the operation of the machine will be readily understood. Any suitable means may be provided for supplying vacuum to the folding cylinders and the amount of vacuum should be sufficient so that, notwithstanding the fact that one of the V-shaped members as, for instance, the one at the lower portion of the cylinder, has its perforations uncovered, the other V-shaped member will receive enough suction to insure that the severed ends of the sheet will be retained thereon. The perforations are preferably made small but are few in number so that the loss of suction through the uncovered perforations will not interfere with the operation of the other V-shaped member.

Since there are two V-shaped knives or cutting members the apertures therein must exert a suction during the travel of each knife from cutting to folding position, and the valve plate 27^a must be provided with two ports 27 so positioned that suction will be exerted at the required times.

The spur gears 36 and 37 which connect the folding cylinder and cutting roller are of the same diameter and pitch, but the cutting roller is smaller in diameter than the folding cylinder. Hence, the latter has a slightly faster peripheral speed, as the result of which the knife will slide over the cutting block 33 and serve to separate the paper web which is already weakened by

pressure exerted between the knife and block. This operation is clearly illustrated in Figs 10 and 11.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a machine of the class described, a pair of rotary gripping cylinders, each provided with a blade and a gripping device, the blade on one of the cylinders being adapted to cooperate with the gripping device on the other cylinder, means to cooperate with the blade at one point in its travel whereby to sever webs of paper and means carried by the blade at each side thereof to retain the loose ends of the severed sheets in place until the blade reaches the gripping device.

2. In a machine of the class described, a pair of rotary gripping cylinders, each provided with a blade and a gripping device, a blade on one cylinder being arranged to cooperate with the gripping device on the other, means to cooperate with the blade at another point in its travel whereby to sever webs of paper and suction devices carried by the blade at each side thereof to retain the severed ends of the sheets in position on the cylinder until the blade reaches the folding device.

3. In a machine of the class described, a pair of rotary gripping cylinders, each provided with a blade and a gripping device, a blade on one cylinder being arranged to cooperate with the gripping device on the other, means to cooperate with the blade at another point in its travel whereby to sever webs of paper, suction devices carried by the blade at each side thereof to retain the severed ends of the sheets in position on the cylinder until the blade reaches the gripping device, and means to release the suction when the blade enters the gripping device.

4. In a machine of the class described, a pair of rotary folding cylinders, each provided with a V-shaped blade projecting from the periphery thereof, folding devices carried also by said cylinders, the blade on one cylinder being arranged to cooperate with the folding device on the adjacent cylinder, means to cooperate with the blade at another point in its travel whereby to sever webs of paper, each of said blades being provided with a series of apertures in its sides adjacent the apex and means for applying suction through said apertures whereby to retain the severed ends of the sheets in position until such time as the blade reaches the folding device.

5. In a machine of the class described, a pair of rotary folding cylinders, each having a projecting blade thereon extending longitudinally and folding devices also carried by each of said cylinders, a blade on one cyl-

inder being arranged to cooperate with the folding devices on the other, said folding devices comprising a stationary jaw and a movable jaw, means to cooperate with the blade to sever webs of paper, means carried
5 by the blade to retain the severed ends of the paper in position thereon and means to control the movable jaw to open the same and permit the sheets to be inserted by said
10 blade, said control means being operative to

close the jaw whereby to remove the sheets from the blade and fold the same.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EINAR G. WENNERBLAD.

Witnesses:

JOHN H. HERRING,
WM. H. BAUER.