

1,329,936.

G. SPIESS.
 DEVICE FOR FEEDING AND ADJUSTING PAPER SHEETS.
 APPLICATION FILED DEC. 28, 1915.

Patented Feb. 3, 1920.
 6 SHEETS—SHEET 1.

Fig. 1.

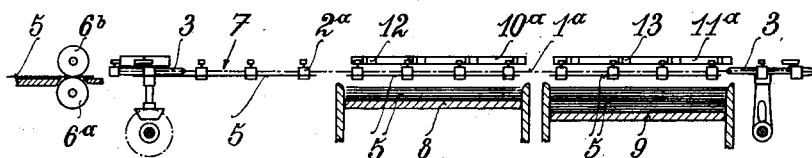
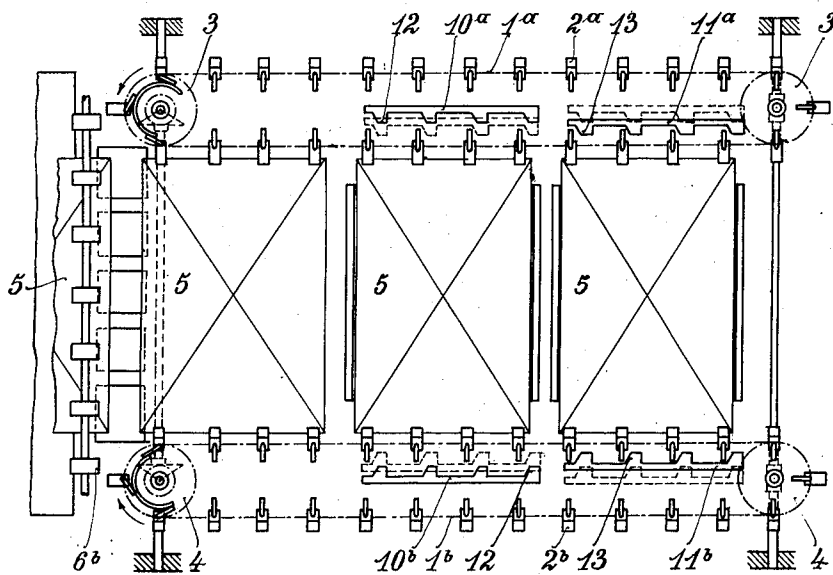


Fig. 2.



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Fig. 3

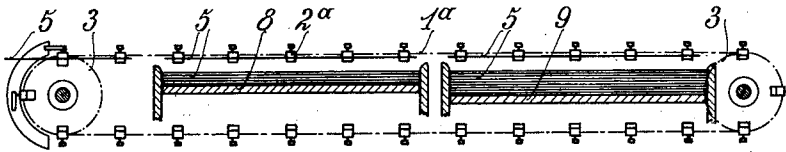


Fig. 4.

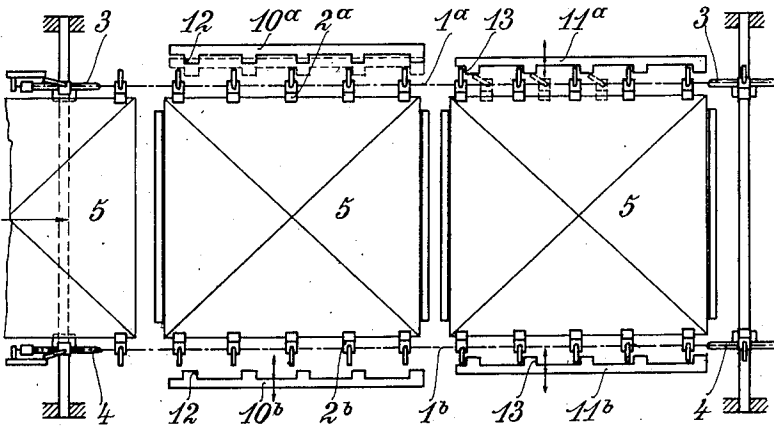


Fig. 6.

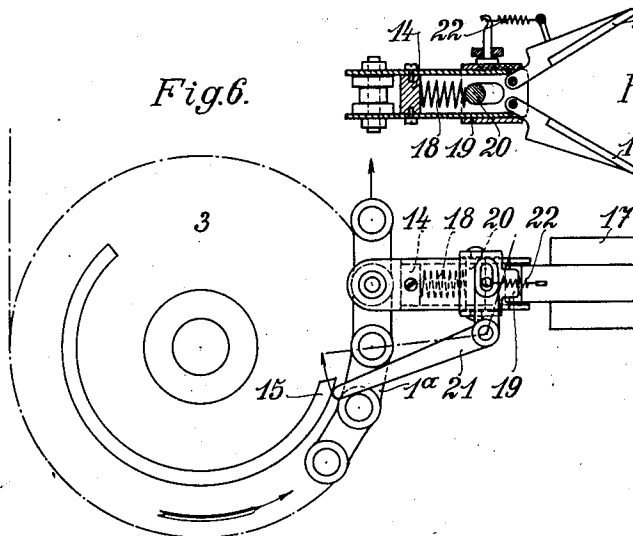
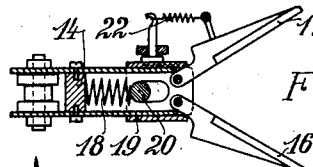


Fig. 5.



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Fig. 7.

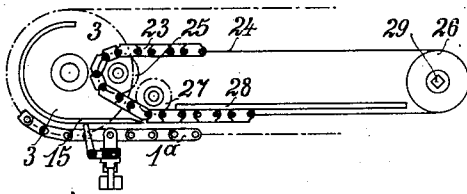


Fig. 8.

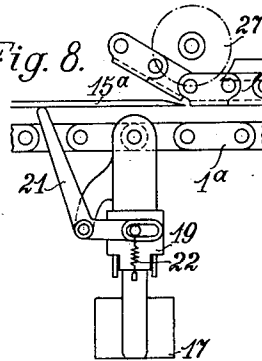


Fig. 9.

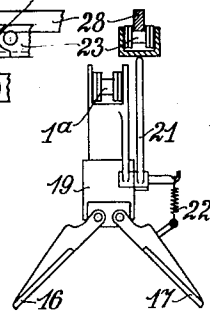


Fig. 19.

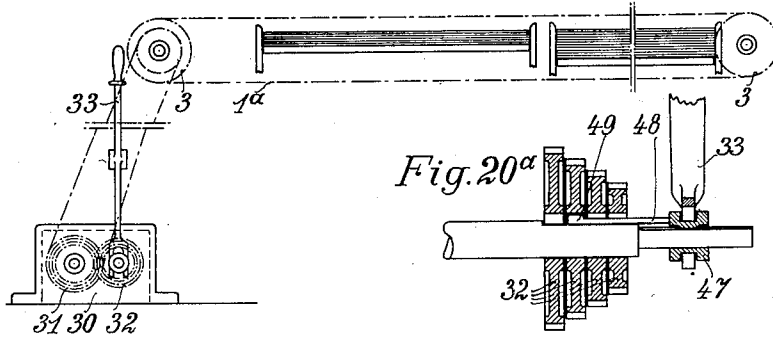


Fig. 20a.

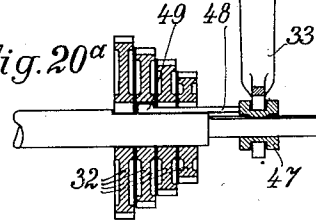


Fig. 20.

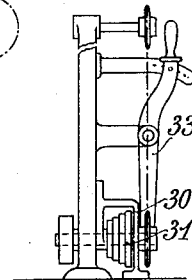


Fig. 21.

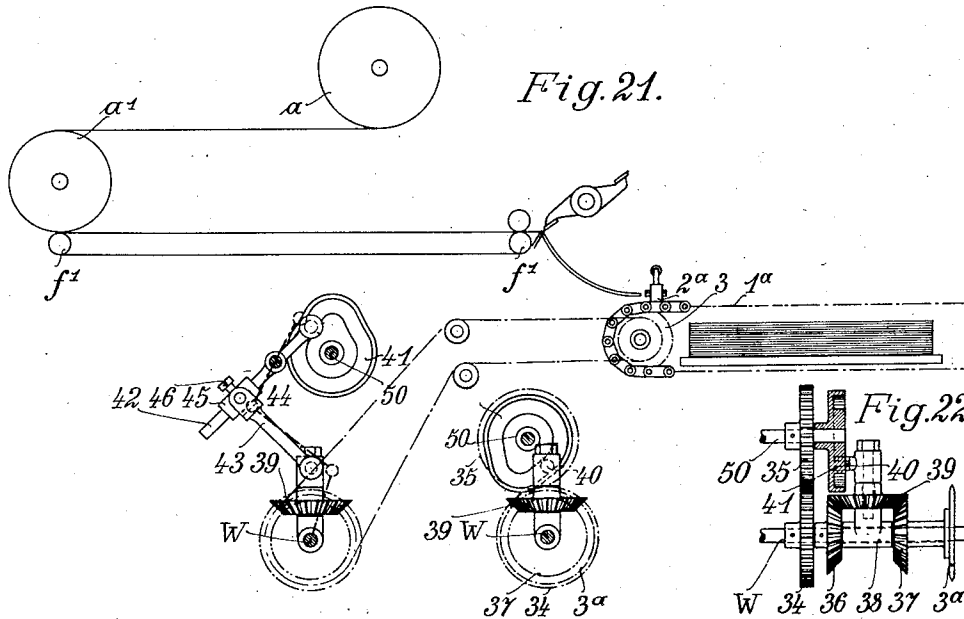
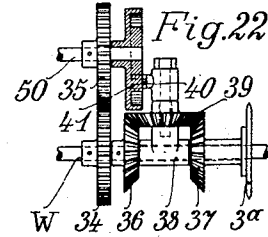


Fig. 23.



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6 SHEETS—SHEET 4.

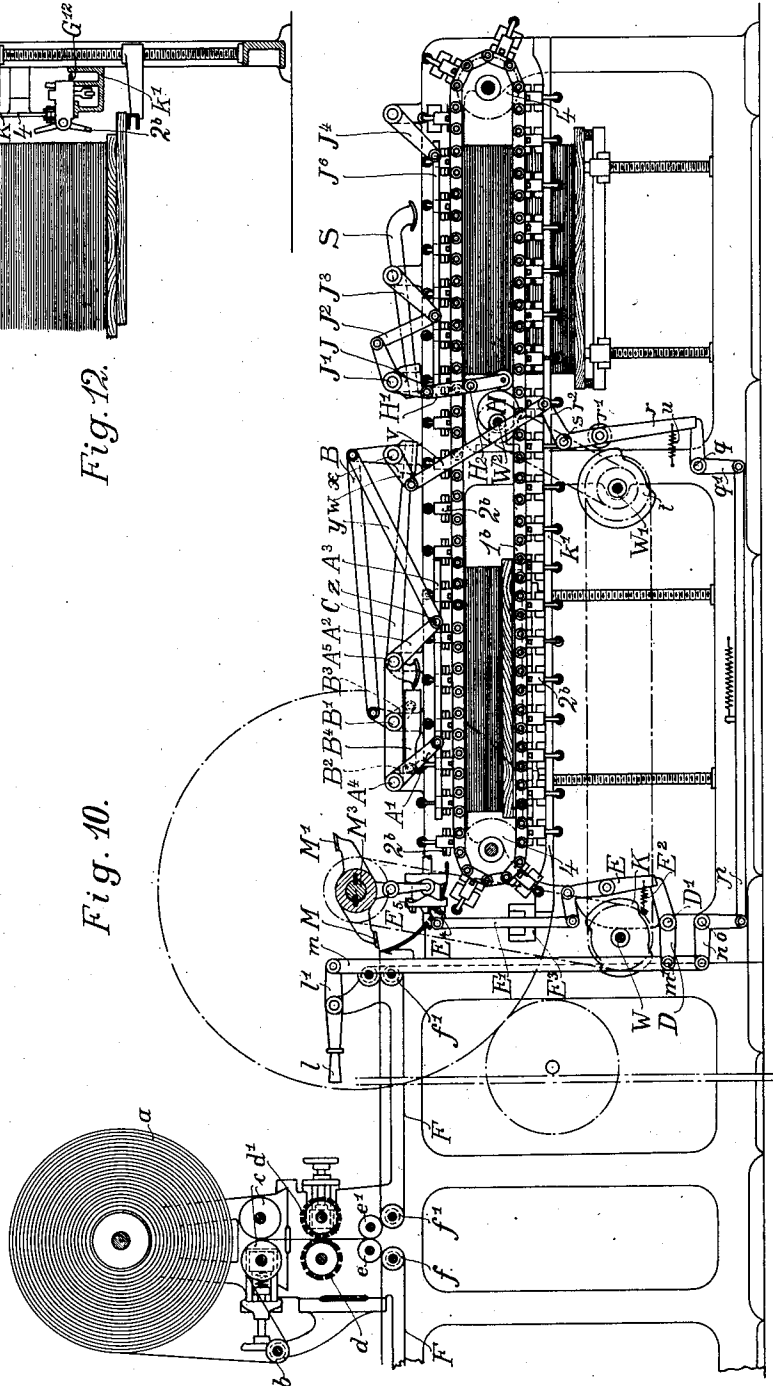


Fig. 12.

Fig. 10.

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6 SHEETS—SHEET 5.

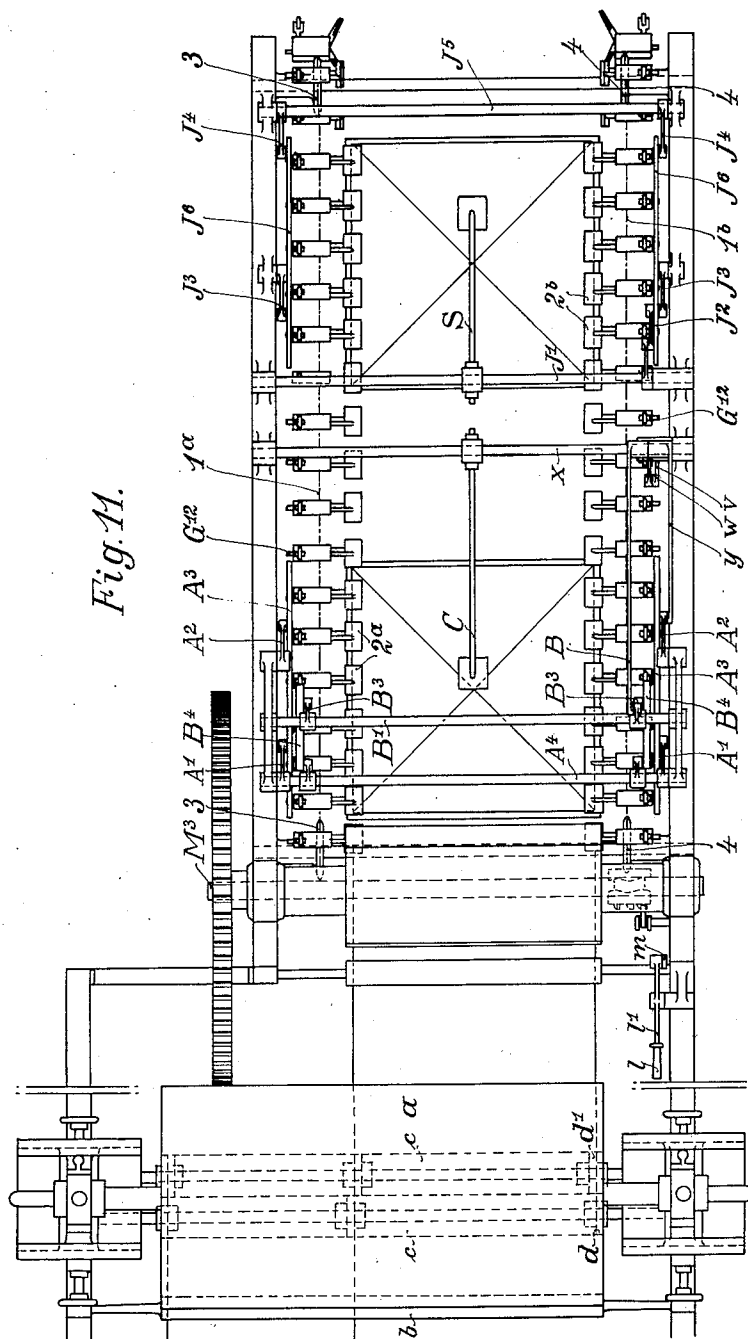


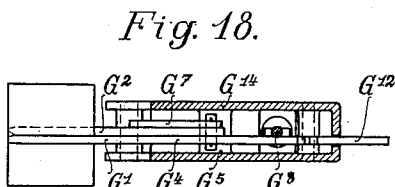
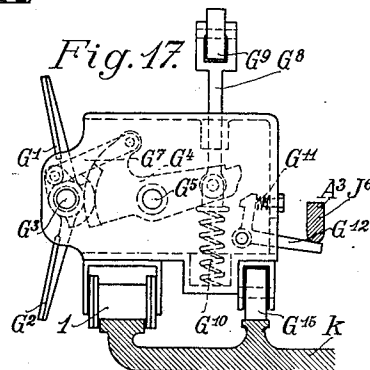
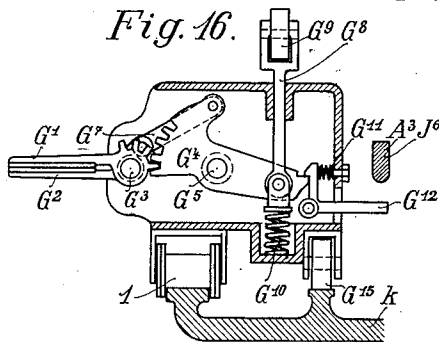
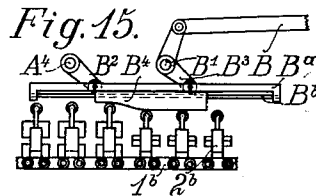
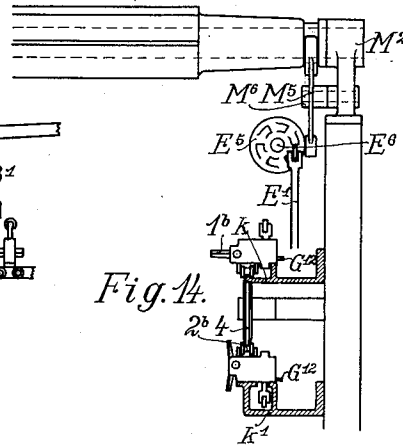
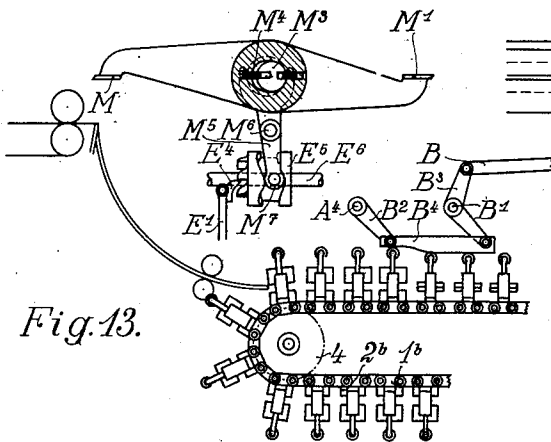
Fig. 11.

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UNITED STATES PATENT OFFICE.

GEORG SPIESS, OF LEIPZIG-REUDNITZ, GERMANY.

DEVICE FOR FEEDING AND ADJUSTING PAPER SHEETS.

1,329,936.

Specification of Letters Patent.

Patented Feb. 3, 1920.

Application filed December 28, 1915. Serial No. 69,047.

To all whom it may concern:

Be it known that I, GEORG SPIESS, a subject of the German Emperor, and a resident of Leipzig-Reudnitz, Saxony, have invented certain new and useful Improvements in Devices for Feeding and Adjusting Paper Sheets, of which the following is a specification.

My invention relates to devices for feeding and adjusting paper sheets and the particular object of my invention is a paper feeding and adjusting device of superior efficiency.

Paper feeders such as used for instance in paper assorting machines are generally provided with gripping devices consisting of two endless parallel chains carrying between them bars serving as gripper carriers, such bars being distributed over the length of the chains at a certain distance from each other. Now the space between the two chains must be free of all obstacles in order to allow the gripper bars a free passage. Moreover the gripper bars themselves are a very disturbing element in paper assorting machines and the like, especially so at the point where the operator controls the passage of the sheets, as this control is continuously disturbed by the bars passing across. Besides this, the distance between the gripper bars must of necessity correspond to the largest size of sheets to be fed by the machine, and in consequence thereof, in feeding smaller sheets, if the distance between the grippers remains unchanged, the space between the single sheets will continually increase. Consequently the useful work done by the machine will be the less, the smaller the size of the sheets to be fed. Further the observation of the sheets is impaired by larger intermediate spaces between the single sheets, the eye of the observer being disturbed by the quick succession of the white sheets and the dark spaces of great dimensions.

In feeders heretofore employed these disadvantages were adjusted by altering the distance of the grippers in accordance with the size of the sheets; by doing this however the capacity of the machine is severely handicapped, all alterations of this kind requiring much time.

In the machine forming the subject matter according to the present invention all these defects are overcome by arranging on both sides of the path of feeding endless

transporting chains running in the same direction, such chains serving at the same time as carriers of the grippers. With this machine sheets of any size can be fed through the machine without necessitating any change in the arrangement of the chains or grippers and without altering the distance between two sheets in accordance with their size.

The invention is illustrated in the accompanying drawing embodying in desirable form the present improvements.

Figure 1 is an elevation showing the device as a whole, the side parts being represented diagrammatically.

Fig. 2 is a plan corresponding with Fig. 1.

Fig. 3 is a diagrammatical elevation, and Fig. 4 is a plan of a modification.

Fig. 5 is a vertical longitudinal section of a gripper to be employed with the devices shown in Figs. 1 to 4.

Fig. 6 is a plan showing said gripper and the means for opening it.

Fig. 7 is a plan view,

Fig. 8 a partial elevation on an enlarged scale and

Fig. 9 a detail of another device for opening and closing the grippers employed in the machine shown in Figs. 3 and 4.

Fig. 10 is a vertical longitudinal section through a paper assorting machine provided with a feeding device of the kind shown in the preceding figures.

Fig. 11 is a plan corresponding to Fig. 10.

Fig. 12 is a front view of the machine shown in Fig. 10.

Fig. 13 is a vertical section,

Fig. 14 a vertical elevation of the cross-cutting device arranged on said machine.

Fig. 15 is a modified closing device for closing the grippers.

Fig. 16 is a vertical longitudinal section,

Fig. 17 an elevation and partly in section.

Fig. 18 a plan view of a gripping device drawn to a larger scale.

Fig. 19 is a front view and

Fig. 20 an elevation of a device for changing the speed of the gripper chain.

Fig. 20^a is a vertical section centrally of the lever 33, as shown in Fig. 19.

Fig. 21 is a partial diagrammatical elevation of a device for controlling both sides of the sheets,

Fig. 22 is an elevation of a smaller modi-

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fied device adapted for adjustment to different speeds.

Fig. 23 is an end view of the device shown in Fig. 22.

5 Similar characters of reference denote like parts in the various figures.

In Figs. 1 and 2 of the drawings the chains carrying the grippers are all disposed in a horizontal plane. The endless chain 1^a 10 carrying grippers 2^a runs over wheels or disks 3 rotating in a horizontal plane. Parallel to this chain another chain 1^b carrying grippers 2^b is running over wheels or disks 4 in the same plane. Between the 15 grippers 2^a and 2^b directed inward and disposed opposite each other the sheets 5 are held and fed. Therefore the grippers must be mechanically opened and closed again, after a sheet has been introduced, whenever 20 they are passing the place where a fresh sheet is fed into the machine. It does not matter whether the sheet is long or short; according to its length the sheet is gripped and held by a smaller or greater number 25 of grippers on each side. The distance between the two rows of grippers is absolutely free of all obstacles, and the eye of the operator who has charge of the supervision and assorting of defective sheets can rest 30 undisturbed upon the sheets.

In the form of device shown in Figs. 1 and 2 each sheet 5 is fed into the machine by the feeding rollers 6^a and 6^b and then enters immediately into the first two grippers 2^a and 35 2^b. After these grippers are closed automatically and carry the sheet along, the following grippers in approaching this point are opened by a mechanical device of well-known construction in order to grip the 40 same sheet in another place and so on, until the sheet has been gripped by a number of grippers all over its length and is freely carried away by them. In this manner the sheet is transported across the point of control 7 in order to be then deposited on the 45 pile 8, if it had proved to be inferior in quality, or on pile 9, if it had been found to be free of all deficiencies.

The laying down of the sheets can be 50 effected by hand or mechanically, all the grippers carrying the sheet being opened simultaneously. To this end cam bars 10^a, 10^b and 11^a, 11^b are movably located on both sides of the grippers, said bars being provided with cams 12 and 13. Whenever the 55 shanks of the grippers meet these cams, the grippers are opened simultaneously and the sheet is free to fall down by its own weight. In order to pick out defective sheets the cam bars 10^a, 10^b can be displaced by the 60 operator by means of a hand lever in such a way as to effect the opening of the grippers only in case that defective sheets are to be deposited on pile 8^a, while in all other cases 65 the grippers are only opened by the bars 11^a,

11^b in their position of rest, the sheet being then deposited on pile 9.

Of course, the chains carrying the grippers can be replaced by ropes or bands, and in each case the wheels, pulleys or disks 70 carrying these chains, ropes or bands should be made displaceable so as to render the whole device applicable to sheets of any width. This can be effected for instance by displacing the axial bearings of the pulleys 75 3 and 4 on a common screw spindle; by rotating said spindle the distance between the two pulleys can then easily be varied. The screw spindle arrangement may of course be replaced by any other suitable arrangement. 80

The position of the pulleys 4, 4 of the other chain can be such that they are disposed in a horizontal plane. However they may also be inclined or the planes of the pulleys 3, 3 may be disposed vertically but 85 parallel to the pulleys 4, 4.

In the modification represented in Figs. 3 and 4, the pulleys and chains are disposed in vertical planes and the pulleys of one side are parallel to the pulleys of the other 90 side. This arrangement is preferable for the reason that it requires less room, the returning chains or ropes running below the effective chains or ropes.

In the device for opening and closing the 95 grippers at the point of introduction of the sheet, as shown in Figs. 5 and 6, the chain 1^a carrying the grippers runs over a pulley 3 and carries the gripper 14. The pulley 3 is provided with a curved guiding rail 15. 100 The gripper itself consists of two plates or shanks 16 and 17 pivotally connected with the body 14 and normally held in closed position by a spring 18 located within the gripper body. The closing is effected by a 105 sleeve 19 displaceably disposed on the gripper body 14 and adapted to be carried along by a pin 20, against which the spring 18 is resting, said sleeve 19 effecting the closing of the gripper plates 16 and 17. The 110 sleeve 19 is displaced against the action of spring 18 by means of a bell crank lever 21, one arm of said lever embracing the pin 20 with a slot, while the other arm is running against the curved rail 15 on the pulley 3 115 whenever the gripper is in the initial position. The running of the lever arm against the curved rail causes the toggle lever 21 to be oscillated and the sleeve 19 to be pulled back against the action of the spring 18 and 120 the plates 16 and 17 are opened, one of them by its own weight, the other one under the action of spring 22. As soon as the chain 1^a leaves the pulley 3, the bell crank lever 21 gets free of the rail and the gripper is 125 closed by spring 18 (Fig. 3).

The moment of opening and closing the grippers can be determined by simply displacing the pulleys 3 on their axles or by employing displaceable curved rails 15 on 130

said pulleys. Another and more effective device for varying the moment of opening and closing the grippers within wider limits is shown in Figs. 7 to 9, said device being especially applicable to the gripping device represented in Figs. 3 and 4. The means for closing the grippers are a short piece of a chain 23 running over pulleys 25 and 27 and having fastened to one end a steel band 24 running over a pulley 26. The outer links of the chain are U-shaped (Fig. 9), and in those places where the chain runs in a straight line, the outer edges of the links are all in one plane. The curved guiding rail 15 is not rigidly fixed to pulley 3, but is disposed sidewise of it and the end of said rail which is directed toward the chain 23, runs in a plane with the outer parts of the links of this chain. The free arms of the bell crank levers 21 fastened to the gripper bodies are connected with the guiding rail 15 and then with the outer parts of the links of chain 23 until they arrive at the end of this chain. At this moment they are left free and the grippers are closed under the action of springs as described above. A stationary flat rail 28 is arranged in a suitable way behind the chain links 23 so as to take up the counterpressure of the arms of lever 21. If it is desired to have the grippers closed sooner or later, a mere turning of the axle 29 carrying the steel band pulley 26 will vary the position of the last link of chain 23. To this end the axle 29 is preferably provided with a prismatic end allowing a crank handle to be affixed to it. By employing a displaceable guiding chain as described the moment of closing the grippers can be varied within wide limits without requiring much space. In those cases where much free space is available, a variability within wide limits may be obtained by affixing to the free arm 15^a of rail 15 prolongations of different length or by composing said arm of two parts and arranging the prolongation rail immediately on arm 15^a.

As herein mentioned the feeding by means of grippers such as described allows the sheets to follow each other in immediate succession independently of their lengths, thus securing a uniform capacity of the machine for all sizes. Further the observation and control of the sheets passing through the machine is materially facilitated, no gripper bars being provided which could run over the sheets. The adjustable closing rail allows of increasing the distance between each two sheets if necessary, this being especially important with sheets of light paper and of large size, such sheets requiring a certain time for falling down at the end, before the way is clear for the next sheet to follow.

If the feeding device herein described is

used for sorting out defective sheets from a continuous strip of paper, this gripper-feeder allows of firmly guiding each strip, said strip being continuously controlled by the grippers and being gripped by them before the cross-cutter has cut the sheet off the paper strip. This arrangement is especially effective in case the cross-cutting knife is arranged immediately in front of the gripping device and one sheet follows the other.

In machines heretofore provided with gripper bars, the sheet cut off by the cross-cutter falls upon a transporting device carrying it to the gripper bars following each other at a certain distance and carrying the sheet across the point of observation down to the piles of good or defective sheets. The transporting device mentioned is usually a band transporter serving as a connecting member between the cross-cutter and the grippers in order to make it possible to feed all sizes and thus to avoid the necessity of constructing a special machine for each size.

Of course the sheets carried off by such transporting device will get out of order and have to be adjusted before leaving the transporting device in order to be gripped by the grippers. In former machines such adjustment has been effected by catches suddenly emerging at certain intervals between the transporting bands of said device. The sudden stopping of the sheets caused by the said catches is apt to damage the front edges of the sheets, especially so in the case of light weight paper. The primary cause of this damaging of the sheets is the high speed imparted to the sheets and also the draft created by the sheets moving at high speed, the sheets being thereby frequently prevented from resting against said catches in a correct position. All this is a cause of frequent failures in the adjusting of the sheet. Any sheet, however, which is gripped by the gripper bars without having been well adjusted will be torn to pieces during its further transportation. The number of defective sheets is still higher with smaller sized sheets because the smaller weight of these sheets will cause them still more frequently to be displaced on the transporting bands. Said band transporter must further have a size sufficient for the greatest length of sheets, and in consequence thereof the length of said transporting device is from 5 to 7 feet. All this can be avoided if such a transporting device can be dispensed with. This can be effected by employing a device such as shown in Figs. 10 to 12, said device preventing the sheet from leaving the grippers after it has been cut off.

The endless paper leaving the roll *a* is carried across the cylinders *b* to the trans-

porting cylinders *c* which are feeding it to the lengthwise cutter *d d'*. After the paper has been cut lengthwise, the halves are transported to the right and left across a
 5 controlling station on to the cross-cutters. Each controlling station consists of an endless felt band *F* running around the cylinders *f f'*. Each sheet to be cut off is gripped at both sides by grippers 2^a, 2^b at the moment
 10 of cutting and is then transported on to the defective sheet pile or to the pile where the good sheets are deposited. The grippers 2^a, 2^b are carried by endless chains 1^a, 1^b running around pulleys 3, 3'. The grippers are
 15 further supported by guide rails *k*, *k'*, on which the grippers roll.

Whenever the operator has observed a deficiency in the paper, he presses the hand lever *l* down, the end *l'* of said lever being
 20 connected with a connecting rod *m* transferring said movement to a bell crank lever *n* pivoted to a bolt *o* and in being turned oscillating the bell crank lever *q* arranged on the bolt *q* by means of the connecting
 25 rod *p*. This causes the lever *r*, provided with a roller and turning around bolt *s*, to be released and to apply its roller *r'* under the action of the spring *u* against the cam disk *t*. When the sheet arrives at the point where
 30 the defective sheets are deposited on their pile the roller *r'* is pressed by the spring *u* into an indenture of the cam disk *t* and the arm *r'* of the lever *r* is moved downward. The connecting rod *v* transfers this move-
 35 ment to a lever *w* turning on a bolt *x* and connected with a rod *y* pivoted to bolt *z* of the lever *A*², thus causing the opening bar *A*³ to be lowered, said bar hanging on the oscillating arms *A*¹ and *A*² arranged on
 40 pins *A*⁴ and *A*⁵. When the opening bar *A*³ is lowered, the levers *G*¹² of the grippers 2^a, 2^b to be described hereinafter are pressed outward so as to cause all the grippers 2^a, 2^b which are still below the opening bar *A*³, to
 45 be opened and to release the respective sheet.

By means of another connecting rod *B* the lever *w* also displaces the gripper closing cam *B*⁴ carried by the oscillating arm *B*²
 50 loosely mounted on the shaft *A*⁴ and by a bell crank lever *B*³ loosely mounted on shaft *B*¹. Thus the turning movement, mentioned, of cam disk *t* causes the opening bar *A*³ to be lowered and the gripper closing
 55 cam *B*⁴ to be lifted simultaneously so that during the moment when the grippers are opened, the gripper closing cam is put out of action.

A push-arm *C* fixed on a shaft *x* is oscillated by said shaft in a vertical direction and causes the sheet to fall quickly down upon the pile.

The good sheets are laid off by means of a cam disk *H* fixed on the rotating shaft *W*²
 65 and acting upon a roller lever *H*¹ pivoted

to a bolt *H*². A connecting rod *J*² and an opening bar *J*⁵ hanging on the oscillating arms *J*³, *J*⁴ are displaced by means of a bell crank lever *J* fixed to the shaft *J*¹, said shaft also carrying a push-arm *J*⁶ lowered simultaneously with the opening of the grippers.

The grippers 2^a, 2^b consist of two movable gripping plates *G*¹, *G*² (Figs. 16 to 18). The upper plate *G*¹ is pivoted to a bolt *G*³ and its hub forms a toothed segment which
 75 gears with the teeth of a toothed-segment *G*⁴ pivoted to a bolt *G*⁵. The lower gripping plate *G*² which is pivoted to the bolt *G*³ as well, is linked by means of a link *G*⁷ to the toothed segment *G*⁴ in such a way that when
 80 this segment is oscillated, the two gripping plates are moved in opposite directions. The segment is displaced and the gripper is closed by a roller bolt *G*⁸ pressed downward when its roller *G*⁹ is rolling on the
 85 closing cam *B*⁴. On the roller bolt *G*⁸ being lowered the spring *G*¹⁰ is compressed until the catch-lever *G*¹², acted upon by spring *G*¹¹, catches the toothed segment *G*⁴. The grippers are opened by the opening bars *A*³
 90 and *J*⁵ being lowered upon the free end of the catch-lever *G*¹², thus causing its pawl to release the segment lever *G*⁴. Thereupon the compressed spring *G*¹⁰ will press the upper gripping plate *G*¹ upward, while the
 95 lower gripping plate *G*² is pressed downward by means of the link *G*⁷.

The casing of each gripper is affixed to the links of the chain 1^a, 1^b and carries guiding
 100 rollers *G*¹⁵ serving to roll on guides *k*.

In order to render the work done by the machine as economical as possible, a rotating cross-cutter is combined with it. Whenever a defect has been observed in the paper
 105 band close to the front edge of the sheet to be cut off, the cross-cutter will cut off only the defective front portion of the moving web or strip and will cause it to be laid upon the defective sheet pile. The said cross-cutter is represented on a larger scale
 110 in Figs. 13 and 14. With this cutter defective sheets are cut off the moving paper web or strip after the cutter has made a half revolution, so that only short portions are deposited on the defective sheet pile.

The cross-cutting knife thus actuated before a full length of a sheet has passed and in half the time hitherto required for it by the hand lever *l* may be arranged to work
 115 simultaneously with the push-arm *C* and the opener *A*³. If for instance a lever *D* pivoted to a bolt *D*¹ is arranged on the bolt *m*¹ of the connecting rod *m*, by lifting said connecting rod the other end of the lever is pressed downward and the roller lever *E*
 120 is applied under the influence of the spring *E*² to the cam disk *K* fixed on the shaft *W*. The shafts *W*, *W*¹ and the shafts *W*² herein mentioned make the same number of
 125 revolutions. At the other end of the roller

lever E a connecting rod E¹ is pivoted, said rod being guided in the bearing E³ and carrying a pawl E⁴ engaging with the ratchet-teeth of a cam disk E⁵ arranged on the shaft E⁶.

The cross-cutter proper consists of two knives M M¹ (Fig. 13) fixed in opposite directions to the opposite arms of a double-armed lever which embraces the shaft M³. The cross-cutter carrying lever arms have a longitudinal slot allowing the lever arms to be shifted laterally on the shaft M³ by means of the keys M⁴. A forked lever M⁵ is pivoted to a bolt M⁶ fixed to a bearing M², the forked end of said lever embracing the rotating knife lever and being provided at its other end with a roller M⁷ running in the curved slot of the cam disk E⁵. Whenever the connecting rod E¹ is moved upward, the curve of the cam disk moves through a certain angle on the shaft E⁶, the cam slot causing the forked lever M⁵ to be displaced and the lever carrying the knives to be displaced sideways on the shaft M³ so as to cause the second knife M¹ to cut the paper when the shaft M³ has made a half revolution. In this way only half a sheet is cut off and carried to the defective sheet pile. After this has been effected, the knife M will cut the paper only after each full revolution of the knife carrying shaft until the whole device is again caused to act in the manner herein described whenever the paper web or strip has been found to be defective in some place, the knife M cutting off the defective half sheet. whereupon knife M will take its place, first cutting off a half sheet after which the normal operation is resumed. This cross-cutting arrangement offers the advantage of furnishing a larger number of good sheets.

In order to provide that the cutting-off operation and the operation of closing the grippers are effected substantially at the same moment, a number of different arrangements may be made. Instead of using the device shown in Figs. 6 to 8, an adjustable gripper closing cam may be employed, such as shown for instance in Fig. 15. In this device the gripper closing cam B⁴ is suspended on the oscillating arms B² and B³ only indirectly, a rail B^a being pivoted to said arms. The gripper closing cam B⁴ is adapted to be displaced in a horizontal direction on a bar B^b carried by said rail B^a, a clamping screw or the like being provided for securing it in its position. According to whether the cam B⁴ is displaced to the right or to the left, the grippers 2^a, 2^b are closed earlier or later and it is possible, with this arrangement, to regulate the closing of the grippers so as to bring it in accordance with the size of the sheets.

A full effect of an adjustable gripper closing cam as described, however, only is

obtained in case the velocity of the grippers is rendered variable also. If the distance between two succeeding sheets must be made greater or smaller, the velocity of the grippers must be varied as well in order to cause each sheet, which has been cut off to be carried away so quickly that the predetermined distance is obtained. If the velocity of the grippers is varied, it is also necessary to vary the closing movement of the grippers which are the first to act upon the sheet. This is effected first by making the gripper closing cam adjustable. The variability of the velocity of the grippers can be obtained by different devices, one of said devices being shown in Figs. 19 and 20.

In this device the chain wheels 3 carrying the gripper chains 1 are driven by a change gear arranged within a casing 30. The change wheels 31 and 32 are coned toothed wheels. A hand lever 33 serves to throw in either one or the other gear, the special construction of the change gear and the means for throwing it in being of no avail as far as this invention is concerned. A variable friction gear of some well-known type may be employed as well. By adjusting the gripper closing cam in such a manner that the first grippers are closed simultaneously with the cutting off of the sheet by means of the cross-cutter, the sheets are carried off without any spaces being left between them, in case the velocity of the grippers is at the same time adjusted corresponding to the velocity of the paper. On the other hand, if the closing of the grippers only takes place at approximately the same moment as the paper is being cut off, and if the velocity of the grippers is a little greater than that of the paper, then the desired spaces between the single sheets are obtained.

The capacity of a device for assorting defective sheets as herein described is dependent, apart from the normal velocity of observation, merely from the velocity of the paper. The highest capacity is obtained, if the place of observation is arranged in front of the cross-cutter as herein described, because the velocity of the paper can be increased as far as the observing capacity of the operator goes.

If on account of economy of space or for other reasons the place of observation is located behind the cross-cutter and the observing shall be done across the grippers, the arrangement described can be used, if the paper allows of transporting one sheet after the other without leaving any spaces between the single sheets. On the other hand, if light weight paper webs shall be cut in the machine or the sheets are of large size and require a certain time for being deposited on the pile, then intermediate

spaces of a certain size have to be arranged between the successive sheets.

In consequence thereof the capacity of a device having the place of observation arranged above the path of the grippers would be less in accordance with the size of the spaces between the sheets, provided that the velocity of observation is the normal one. This defect can however be avoided by using the device shown in Figs. 21 and 22 and designed for observing the sheets from both sides. In this case two places of observation are provided, one in front of and the other one at the rear of the cross-cutter. The paper strip or web runs from a cylinder *a* across a reversing cylinder *a'* and between these two cylinders the first place of observation is arranged. The path of the paper is then identical with the one described before. If the gripping device shall be given the same velocity as the paper in view of another place of observation being arranged above said device, and if spaces shall be provided between the successive sheets in order to have sufficient time for depositing the sheets, then the velocity of the gripper device must be increased after the sheet has been cut off by the cross-cutter; this can be effected for instance by means of the following device for driving the chain wheels 3.

On the driving shaft W two cone wheels 36 and 37 are arranged, the wheel 36 being fast and the wheel 37 being loose. On the hub of wheel 37 the driving wheel 3^a is mounted which causes the gripper chains to rotate and between the two cone wheels 36 and 37 an intermediate cone wheel 39 is arranged, said intermediate wheel being in gear with both cone wheels at a time, its hub 38 being loose on the shaft W. A roller arm 40 at the upper end of the shaft of the cone wheel 39 is in gear with the cam slot of a cam disk 41 fixed on a shaft 50, said shaft being driven from the main shaft W by means of toothed wheels 34, 35. By turning the cam disk the cone wheel 39 is kept in its normal position, as long as the roller 40 is running in the circular part of the slot. However as soon as the roller enters the curved part of the slot, the carrier of the cone wheel 39 is caused to effect a turning movement on the shaft W. If this movement is effected in the direction of rotation of the cone wheel 37, the movement of rotation of this wheel and the movement of the grippers is accelerated. When the cone wheel 39 returns to its initial position the ripping device receives its normal velocity which may correspond to the velocity of the paper strip or web. By this means, whenever a fresh sheet is fed, its transporting speed is intermittently varied at the desired moment and this variation of speed is stopped immediately thereafter

as soon as the sheet to be observed is passing the second place of observation.

In order to allow the spaces between the sheets to be varied, the driving device may be constructed as shown in Fig. 23. In this modification the cam disk 41 does not act upon the cone wheel 39 directly, but by the medium of a double-armed lever 42 having a link 43 displaceably arranged at its free end. The said link is linked to the carrier of the cone wheel 39 and also to a sleeve 45 displaceable on the free end of the lever 42 and adapted to be fixed to it by means of a set-screw 46. If the movement of the cam disk is transferred by means of these links 42 and 43 upon the cone wheel 39, then the turning movement of the cone wheel 39 on the shaft W is varied according to whether the link 43 is fixed in a position nearer to or farther away from the pivot 44 of lever 42. By varying the turning movement of the cone wheel 39 the velocity of the sheet transport and the distance between the successive sheets also is varied.

The device described can of course be employed also in connection with a machine allowing only a one-sided observation of the sheets. The highest possible output of the paper sorting machine provided with all these improvements is obtained not only as far as the number of sheets is concerned, but also with regard to the weight of the sheets. The sheets can follow each other immediately without any spaces being left between them or else a space may be left between each two successive sheets such as is required for safely depositing each sheet. In every case the maximum capacity of the machine can be obtained in accordance with the different kinds of paper to be assorted without requiring any variation in the velocity of observation.

I claim:—

1. In a device for cutting sheets from a moving strip or web, feeding, adjusting and delivering the said sheets, two parallel rows of grippers arranged in one plane and adapted to grip each one side edge of a sheet, gripper opening means, a support for piling defective sheets, and a support for piling the perfect sheets, the said two rows of grippers passing both pile supports.

2. In a device for feeding and adjusting sheets of paper cut from a moving web, in combination, two rows of grippers arranged in one plane and adjustable toward each other, wheels for carrying said rows of grippers and means for adjusting said wheels on their shafts so as to vary the time of closing the grippers.

3. In a device for feeding and adjusting sheets of paper cut from a moving web, in combination, two rows of grippers arranged in one plane and adjustable toward each other, wheels carrying said rows of grippers,

curved guides adapted to open said grippers and means for adjusting said guides so as to vary the time of closing the grippers.

4. In a device for feeding and adjusting
5 sheets of paper cut from a moving web, in combination, two rows of grippers arranged in one plane and adjustable toward each other, wheels carrying said rows of grippers, curved guides arranged in close proximity
10 to said wheels and a prolongation on the free end of each of said guides for varying the time of closing the grippers.

5. In a device for feeding and adjusting sheets of paper cut from a moving web, in
15 combination, two rows of grippers arranged in one plane, wheels carrying said rows of grippers, curved guides arranged in close proximity to said wheels and a piece of chain adapted to form a prolongation of the
20 free end of each of said guides.

6. In a device for feeding and adjusting sheets of paper cut from a moving web, in combination, two rows of grippers arranged
25 in one plane, wheels carrying said rows of grippers, curved guides arranged in close proximity to said wheels, a piece of chain at the free end of each said guide and means for displacing said piece of chain with respect to said guide.

30 7. In a device for feeding and adjusting sheets of paper cut from a moving web, in combination, two rows of grippers arranged in one plane, wheels carrying said rows of grippers, curved guides arranged in close
35 proximity to each said wheels, a piece of chain at the free end of said guide and a steel band forming a prolongation of said piece of chain.

8. In a device for feeding and adjusting
40 sheets of paper cut from a moving web, in combination, two rows of grippers arranged in one plane, a driving shaft for driving said rows of grippers, a cone wheel gear and a driving wheel on said driving shaft,
45 the driven cone wheel and the driving wheel being adapted to be rotated together on said shaft, a roller lever connected with the intermediate cone wheel and a cam disk adapted to displace said roller lever and to be
50 driven by said shaft.

9. In a device for feeding and adjusting sheets of paper cut from a moving web, in combination, two rows of grippers arranged
55 in one plane, a driving shaft for driving said rows of grippers, a cone wheel gear and a driving wheel on said driving shaft, the driven cone wheel and the driving wheel being adapted to be rotated together on said shaft, a roller lever connected with the
60 intermediate cone wheel, a cam disk adapted to displace said roller lever and to be driven by said shaft, a double-armed lever adapted to transmit the oscillating movement from the cam disk to the intermediate cone wheel,
65 and a link adjustably arranged on the free

end of said lever, said link being pivoted to the intermediate cone wheel carrier.

10. In a sheet feeding apparatus for paper sorting machines having a longitudinal cutter and a transverse cutter, an inspection place located between the said cutters and close to the transverse cutter.

11. In a sheet feeding apparatus for paper sorting machines, a longitudinal cutter, a transverse cutter having knives, a
75 sheet deflecting mechanism, an operating lever therefor, and connections for communicating the motion of the levers to the knives of the transverse cutter.

12. In a sheet feeding apparatus for
80 paper sorting mechanism, a longitudinal cutter and a transverse cutter having rotating knives, and a knife holder, means for mounting the knife holder for adjustment transversely to bring in one of the knives
85 into operative position.

13. In a sheet feeding apparatus for paper sorting machines having a longitudinal cutter and a transverse cutter, gripper
90 carriers, grippers thereon having levers, guide disks for the gripper carriers, and arc shaped sections on the disks on which the said levers bear.

14. In a sheet feeding apparatus for
95 paper sorting machines having a longitudinal cutter and a transverse cutter, gripper carriers, grippers thereon having levers, guide disks for the gripper carriers, and arc shaped sections adjustably mounted on the
100 disks on which the said levers bear.

15. In a sheet feeding apparatus for
105 paper sorting machines having a longitudinal cutter and a transverse cutter, gripper carriers, grippers thereon having levers, guide disks for the gripper carriers, and arc shaped sections adjustably mounted by the side of the disks and having a free limb
110 adjustable in length for engaging the levers to vary the time of closing the grippers.

16. In a sheet feeding apparatus for
115 paper sorting machines having a longitudinal cutter and a transverse cutter, gripper carriers, grippers thereon having levers, guide disks for the gripper carriers, arc shaped sections adjustably mounted by the
120 side of the disks and having a free limb adjustable in length for engaging the levers to vary the time of closing the grippers, an endless chain in front of the free limb, and adapted to engage the gripping levers, chain
125 guide wheels, and means for adjusting the axes of the chain guide wheels.

17. In a sheet feeding apparatus for paper sorting machines having a longitudinal
130 cutter and a transverse cutter, gripper carriers, grippers thereon having levers, guide disks for the gripper carriers, arc shaped sections adjustably mounted by the side of the disks and having a free limb
135 adjustable in length for engaging the levers

to vary the time of closing the grippers, an endless chain in front of the free limb, a steel ribbon closing the endless chain and adapted to engage the gripping levers, chain
5 guide wheels, and means for adjusting the axes of the chain guide wheels.

18. In a sheet feeding apparatus for paper sorting machines having longitudinal cutters and transverse cutters, gripper carriers, grippers thereon having levers, guides
10 for the gripper carriers, a gripper closing device comprising a curved member at the side of the gripper carrier and movable relatively to the latter whereby it can be
15 brought into the path of the gripper levers.

19. In a sheet feeding apparatus for

paper sorting machines having longitudinal cutters and transverse cutters, gripper carriers, grippers thereon having levers, guides
for the gripper carriers, a gripper closing de- 20
vice comprising a curved member at the side of the gripper carrier and adjustable longitudinally whereby the action of the knives and closing of the grippers can be controlled
and operated simultaneously, when operat- 25
ing on different sizes of paper.

Signed at Leipzig, Germany, this 26th day of November, 1915.

GEORGE SPIESS.

Witnesses:

WM. P. KENT,
RUDOLPH FRICKE.