Nov. 18, 1924.

D. W. HUDSON

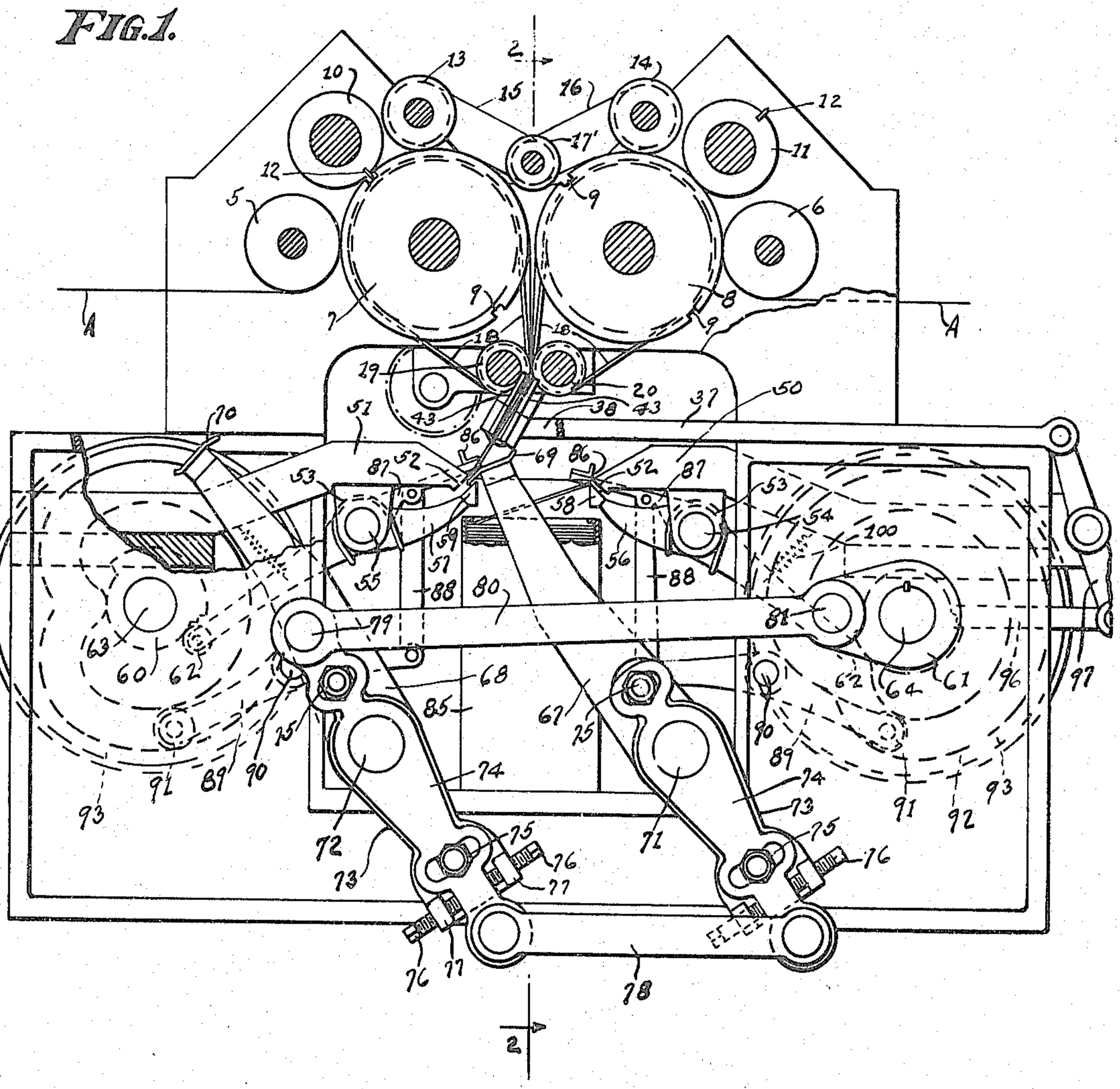
1,515,861

INTERFOLDING MACHINE

Filed July 10, 1922

2 Sheets-Sheet 1

FIG. 1.



INVENTOR.

David William Hudson

BY

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2 Sheets-Sheet 2

FIG. 2.

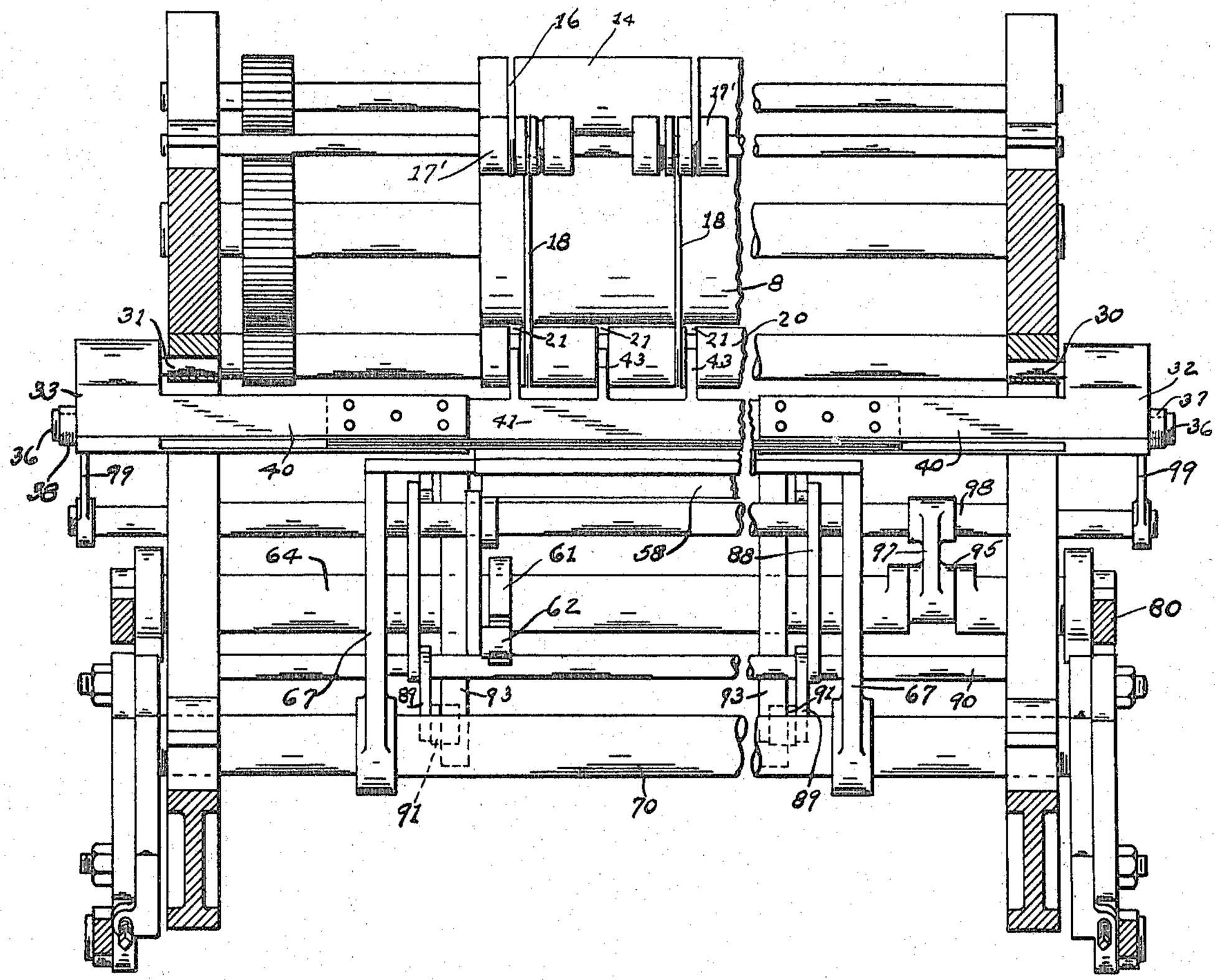


FIG. 3.

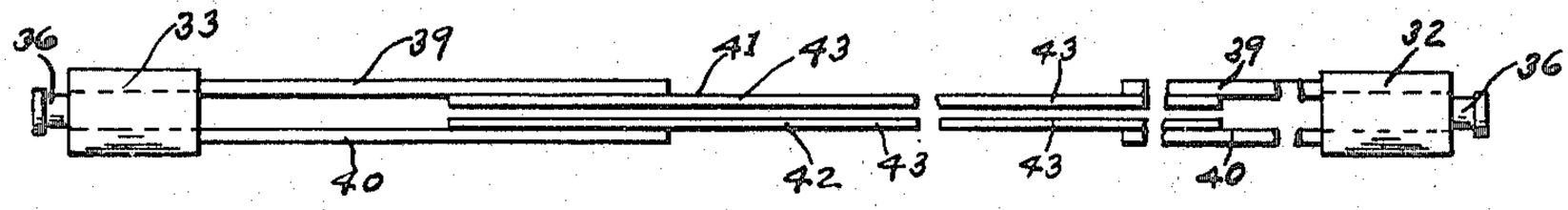
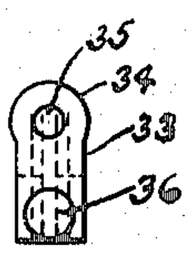


FIG. 4



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Patented Nov. 18, 1924. 1,515,861

UNITED STATES PATENT OFFICE.

DAVID WILLIAM HUDSON, OF GREEN BAY, WISCONSIN.

INTERFOLDING MACHINE.

Application filed July 10, 1922. Serial No. 573,802.

To all whom it may concern:

Be it known that I, DAVID WILLIAM HUDSON, a citizen of the United States, residing at Green Bay, county of Brown, and State of Wisconsin, have invented new and useful Improvements in Interfolding Machines, of which the following is a specification.

This invention relates to improvements in interfolding machines of the type disclosed in my co-pending application, Number 416,201, filed October 11, 1920.

As in the application above referred to, it is the broad object of this invention to provide effective means for handling duplex series of overlapped sheets, whereby the ends of contiguous sheets of each series are alternately interfolded in a crease of an adjacent sheet in the other series.

It is likewise an object of this invention to provide, in combination with means for supplying a duplex series of overlapped sheets, opposed sets of creasing jaws, and means for guiding the duplex series alternately from side to side for the engagement between said jaws of successive portions of said series of sheets.

More specifically it is a particular object of this invention to provide improved guiding means adapted to cooperate to an extent hitherto impossible with the tucking blades to deliver overlapped sheets to the creasing jaws. The guiding mechanism heretofore used for this purpose has been unwieldy and otherwise unsatisfactory, due to its bulk and the excessive number of parts required. In the present invention this mechanism has been greatly simplified and reduced in bulk, whereby it has been rendered possible to provide adequate guidance and support for the overlapped sheets in very close proximity to the creasing jaws without interfering in any degree with the operation of the tucking blades.

In the drawings:—

Figure 1 is a side elevation in partial section illustrating mechanism embodying this invention.

Figure 2 is a sectional view taken on line 2—2 of Fig. 1.

Figure 3 is a detail view in plan of the improved guiding mechanism which is shown for the first time in this application.

Figure 4 is an end elevation of the same.

Like parts are identified by the same reference characters throughout the several views.

The incoming strips of material are shown at A. They are passed, respectively, about the guide rollers 5 and 6, whereby they are brought into contact with the die rolls 7 and 8. It will be noted that each of the die rolls is provided at diametrically opposite points upon its periphery with the longitudinally disposed grooves 9. The rollers 10 and 11 are each provided with a cutting blade 12, and their motion is so synchronized with respect to the rotation of the die rolls 7 and 8 that the cutting blades 12 will register successively with each of the grooves 9 of the die rolls. As is clearly illustrated in the drawings, the die rolls 7 and 8 are further synchronized with each other so that the strips of paper carried by them will be alternately acted upon by the blades 12 of rollers 10 and 11.

The rollers 13 and 14 are peripherally grooved to receive the tapes 15 and 16 which are passed, respectively, about the peripherally grooved rollers 17 and 17′, disposed intermediate of the die rolls 7 and 8 upon a common axis shaft. The lower sides of tapes 15 and 16 contact with the upper surfaces of the die rolls and are adapted to maintain the material fed over such rolls in close contact therewith. The alternately perforated or cut sheets are thereby directed inwardly and, by the continued rotation of the die rolls, are brought together at the center of the machine.

It will be understood from the foregoing that the mechanism above described is adapted to cut sheets of paper alternately from each of the in-fed strips A. When said sheets are brought together at the center of the machine they are symmetrically overlapped, the abutting margins of any two contiguous sheets in either series being substantially centered intermediate of the ends of the adjacent sheet of the other series.

The sheets have a tendency to cling to the rollers over which they pass, and particularly to the die rolls 7 and 8. Accordingly said rolls are preferably grooved peripherally and are provided with tapes 18 which run in the peripheral grooves and are passed, respectively, about similarly grooved rolls 19 and 20. These last mentioned rolls are provided with grooves 21 in addition to those grooves which accommodate the tapes 18. The function of grooves 21 will hereinafter be specified.

At either side of the machine project the pins 30 and 31 which are substantially coaxial, and have their common axis substantially midway between the axes of rolls 19 and 20. Upon pins 30 and 31 are pivotally mounted the link members 32 and 33, respectively, each of which is preferably constructed in the manner illustrated in Fig. 4 with a sleeve portion 34 provided with an opening 35 adapted to receive pins 30 and 31. At the lower extremity of each of the link members there is a stud 36 or other suitable means for pivotally securing the operating rods 37 and 38 thereto.

Each of the link members 32 and 33 is provided with a pair of spaced and parallel, inwardly extending arms 39 and 40. The guide plates 41 and 42 are secured to the arms 39 and 40 carried by each link member and serve to connect together said link members to form a rigid assembly which is pivotally operable upon pins 30 and 31. The fingers 43 which project upwardly from guide plate 41 are received in the grooves 21 of roll 20. In like manner the creasing fingers 43 of guide plate 42 are received into the grooves of roll 19.

It will be obvious that when the sheets are brought together in a mutually overlapped relation between tapes 17 and 18 at the center of the machine they are fed downwardly and brought into close contact betweeen rolls 19 and 20. Thereupon the fingers 43 carried by guide plates 41 and 42 strip the material from rolls 19 and 20 and provide guidance and ample support for each sheet of material during the pendular oscillation of the guide by the rods 37 and 38 which are connected to the pivotally mounted link members 32 and 33. Irrespective of the position of said link members the free ends of fingers 43 will remain in the grooves 21 of rolls 19 and 20, and will, thereby, be adapted to pluck from said rolls the sheets of material fed therethrough. The guide made up of plates 41 and 42 smoothly directs between said plates the downwardly fed and mutually overlapped dual series of sheets.

It is particularly to be noted that by doing away with the set of oscillatory rollers and tapes shown in my co-pending application and found in such devices of this nature as have previously been constructed, I have succeeded in greatly reducing the thickness of the lower end of the swinging guide, thereby making it possible for the swinging guide to operate in much closer proximity to the path of the tucking blades than has hitherto been practicable. In fact the tucking blades may be so constructed that they will be shorter than the space between the arms 39 and 40 which project inwardly from either side of the machine to support the guide plates 41 and 42. Thus the width or thickness of the oscillatory guiding device adjacent the path of the tucking blades is no greater than the width of the guiding plates themselves, as shown in the center of Fig. 3. The size of the oscillatory guiding device is so materialy reduced that it is possible to support the duplex series of sheets fed therethrough at a point less than one-fourth of the length of a sheet from the creasing jaws. (See Fig. 1.)

Opposed sets of clamping jaws are provided for the purpose of creasing each sheet of paper, the contiguous ends of two adjacent sheets being interfolded therewith. One of the jaws of each sheet is preferably made relatively stationary. Accordingly the jaws 50 and 51 are supported in a relatively fixed position from the ends of the machine. Each of said jaws is provided with a clamping face 52 disposed obliquely to the perpendicular as shown.

Downwardly depending arms 53 carried by each of the relatively fixed jaws 50 and 51 are provided with trunnions or bearings adapted to support the shafts 54 and 55 upon which levers 56 and 57 are, respectively, mounted. The movable jaws 58 and 59 are carried by levers 56 and 57, and are arranged for cooperation, respectively, with fixed jaws 50 and 51.

Any suitable members may be utilized to actuate levers 56 and 57 to bring the movable jaw members 58 and 59 into operative clamping relation to the fixed jaw faces 52 with which each movable jaw member is associated. As one means of operating these levers, I have illustrated cams 60 and 61 which act upon rollers 62 carried at the end of each of the levers 56 and 57. The cam 60 is arranged for clock-wise rotation and the cam 61 for counter-clockwise rotation upon shaft 63 and 64, respectively. It will be noted that in each instance the cam face is so constructed that the roller mounts upon the nose of the cam in two successive steps, whereby each movable clamping jaw will be caused to move initially only a portion of the total normal distance between it and the fixed jaw.

The levers 67 and 68 which carry, respectively, tucking blade 69 and tucking

blade 70 are keyed to shafts 71 and 72 upon the axes of which said levers are, respectively, fulcrumed. Adjacent the outer end of each of said shafts is keyed an arm 73. Outside of each of said arms is a similar arm 74 which, however, is not keyed to said shaft, but is secured thereon by bolts 75 which are threaded into the levers 73. It will be noted that bolts 75 pass through slots in the superimposed or outer levers 74, whereby the adjustment of said outer levers relative to the levers 73 is possible.

For the purpose of effecting the adjustment of levers 74 with respect to the arms 73 which are fixed to shafts 71 and 72, the set screws 76 threaded through ears 77 are provided. The bolts 75 having first been loosened, it is possible to adjust the levers 74 relative to arms 73 by loosening one of the set screws 76 and tightening the other in an easily understood manner. A link 78 connects levers 74, whereby they are caused to move in unison. Obviously when said levers are moved the arms 73 secured to shafts 71 and 72 will be moved therewith in any desired position of adjustment and the shafts 71 and 72 will be caused to oscillate accordingly.

Motion may be transmitted to the levers 74 in any desired manner. For example, one of said levers may be projected upwardly beyond the adjusting bolt 75 as shown in the left hand of Fig. 1, and may be provided adjacent its end with a projecting pin or stud 79 to which the connecting rod A may be secured. The connecting rod in turn is oscillated from a crank pin 81 which may be mounted upon shaft 64, as shaft 64 rotates the connecting rod A will transmit oscillatory movement through levers 74 and arms 73 to shafts 71 and 72, thereby effecting the oscillation of the arms 67 and 68 which support the tucking blades 69 and 70, respectively. The extent of the movement of either tucker blade in any given direction may be governed independently by adjusting the set screws 76 in the manner aforesaid.

Beneath the opposed sets of clamping members, whereby the sheets are successively creased, is a magazine 85 opened at its top and arranged to receive the interfolded sheets. For the purpose of packing the sheets securely and positively in the magazine I provide suitable packing members 86 which are normally positioned immediately above the opposed sets of clamping jaws. The packing members 86 are carried by levers 87 which may conveniently be fulcrumed upon shafts 54 and 55, respectively. Said levers may be actuated through links 88 by levers 89 which are fulcrumed at 90 and provided at their ends with rollers 91 arranged to travel in heart shaped cam grooves 92 in disks 93. Said disks may conveniently be mounted upon the shafts 63 and 64.

An eccentric or a crank pin 95 upon shaft 64 actuates link 96 which is connected to an arm 97 secured to the rock shaft 98. Arms 99 at the ends of said shaft communicate the oscillation thereof through links 37 and 38 to the oscillatory guiding device hitherto described which leads the duplex series of sheets alternately to the opposed clamping jaws to be creased therein.

It will be understood that the shafts 63 and 64 are the main power shafts of the machine and may be suitably driven in synchronization by any desired mechanism. It is likewise necessary that the die rolls 7 and 8, and the associated mechanism be synchronized by suitable gearing with the main drive shafts 63 and 64, since it is essential to the operation of this machine that the tucking blades 69 and 70 which encounter the duplex series of overlapped sheets substantially at the juncture of two contiguous sheets of that series which is closest to the contacting tucking blade.

The strips of paper are fed in as shown at A about the idling rollers 5 and 6 which bring the material into contact with the die rolls 7 and 8. The die rolls are so synchronized with respect to each other and with respect to the cutting blades 12 carried by rollers 10 and 11 that said blades become operative alternately to cut the paper upon the die rolls into lengths equivalent to half the circumference of said rolls. Since the blades 12 upon rollers 10 and 11 operate alternately and at equally spaced intervals the material fed down between the die rolls 7 and 8 upon tapes 17 and 18 will comprise a duplex series of symmetrically overlapped sheets. The tapes 17 and 18 strip each sheet from its respective die roll and bring the opposing sheets together between rollers 19 and 20.

The oscillatory guiding device disclosed herein is designed to operate in a minimum of space, thereby to enable its length to be increased to such an extent that adequate support will be given the duplex series of overlapped sheets down to a point very close to the jaws of the creasing devices. The fingers 43 integral with the guide plates 41 and 42 are disposed in the peripheral grooves 21 of rollers 19 and 20. They are thereby afforded the opportunity of stripping from said rollers and from the tapes engaged about said rollers, the duplex series of sheets which is downwardly fed therebetween. Regardless of the degree of oscillation of the guiding device (within the limit of its movement) it is adapted to receive the sheets and to guide them in the direction of one or the other of the sets of clamping jaws. The sheets pass alternately

and easily down between the guide plates and consequently the mass of moving tapes and pulleys with their driving connections that have hitherto been used upon an oscillatory frame for this purpose is unnecessary.

As the guiding device swings to the left (as viewed in Fig. 1) the rotating shaft 64 will bring the crank pin 81 towards the position in which it appears in said figure, and thereby the lever 67 will be caused, through the medium of connections previously described, to move the tucking blade 69 to the left. The material encountered by the blade is forced between the stationary jaw 52 and the movable jaw member 59, and is there held pending the action of the jaw as will be noted from the drawing. The cam 60 is so disposed that the wheel 62 is about to mount the first step of the nose of the cam. As soon as the lever 57 receives its initial movement, due to the first shoulder of the cam striking the wheel 62, the movable jaw 59 will be actuated for a distance sufficient to enable it to clamp the folded material upon either side of the tucking blade which still remains in the fold. At this point, however, the continued rotation of shaft 64 and the consequent movement of crank pin 81 effects the withdrawal of tucking blade 69 from between jaws 52 and 59,—the latter of which is simultaneously actuated to its closed position by the second shoulder of the nose of cam 60 which has, in the meantime, reached the roller 62. The arrangement is such that as the tucking blade is withdrawn, the movable jaw simultaneously snaps to its clamping position with respect to the fixed jaw face 52, and thereby engages and creases the paper folded between said jaws. The location of the clamping jaws upon the line of travel of the duplex series of sheets is such that each tucking blade will encounter and fold between said jaws a single sheet of material, the severed and abutting ends of adjacent sheets being included in the fold.

It is particularly to be noted that the material which is clamped between the left hand creasing jaws always comprises a sheet received from die roll 7 to be folded intermediate its ends, within the fold of which is embraced the severed ends of contiguous sheets received from die roll 8. On the other hand, the clamping jaws at the right invariably act upon and crease a sheet of paper received from die roll 8, interfolding therein the severed ends of contiguous sheets delivered from die roll 7. It will be obvious, therefore, that as the material is fed between the guide plates which are inclined sharply to one side or the other, the single sheet to be creased is always uppermost, and the severed ends of the sheets to be interfolded lie beneath. As a consequence of this fact, the severed ends of the sheets to be interfolded tend to fall away from the line of travel of the sheets and would fall if it were not for the support afforded by the upper surface of the tucking blades.

The levers carrying the tucking blades are pivoted upon axes well below the clamping jaws,—to the end that the arcs described by the blades may be such that the blades can support the free ends of the sheets to be interfolded. It is obvious that in the mechanism illustrated herein the tucking blades move in an arc to which the ultimate position of the duplex series of sheets is approximately tangential. As the sheets are fed downwardly, the tucking blades are moving downwardly with them toward the position in which tucking blade 69 appears in Fig. 1. If the pivots of levers 67 were disposed above the clamping jaws, it must be clear that the ultimate position of the tucking blades with respect to the line of travel of the duplex series of sheet would be such that the sheets would lie upon a radius of the arc described by the blades instead of on the tangent thereof. With such a construction the tucking blades would necessarily have to move against the line of travel of the paper rather than with it.

It will be remembered that the duplex series of sheets is now grasped between stationary jaw 52 and movable jaw 59. Tucking blade 69 has already commenced its retractive movement. The oscillatory guiding device now begins to swing from its extreme left position actuated by the mechanism previously described. The sheets of material are fed from between the guide plates 41 and 42 with sufficient rapidity so that the material which is clamped in the left hand clamping device will not be torn by the movement away therefrom of the guiding device.

As the guiding device commences its movement, the crank pin 81 actuates lever 68 to bring the tucking blade 70 into play. Just before the guiding device reaches its ultimate position at the right of Fig. 1 the tucking blade 70 will become effective to stretch taut the material which has been hanging between the left hand clamping jaws and the guiding device. In so doing the tucking blade moves upon a path which closely parallels the ultimate line of travel of the duplex series of sheets delivered from the guiding device. In other words, at the moment of contact the tucking blade 70 is moving downwardly along said sheets and is adapted to support the end of a sheet delivered from die roll 7, which sheet might otherwise hang free and fail to be included in the fold.

The roller 62 at the end of lever 56 has

meanwhile been traversing the low part of cam 61, thereby allowing spring 100 to maintain the movable jaw 58 in its open position. The right hand clamping device is, therefore, in readiness to receive the tucking blade 70, and the material which is folded about said blade.

The movements of clamping jaw 58 correspond to those previously described as having occurred in clamping jaw 59. The clamping jaw 58 makes an initial movement towards its closed position, thereby grasping the paper upon each side of the tucking blade 70. Thereafter the tucking blade is withdrawn and clamping jaw 58 snaps to its closed position, thus creasing the sheet of paper delivered from die roll 8 and interfolding in the crease the two severed ends of two contiguous sheets received from die roll 7.

Substantially simultaneously with the clamping of the duplex series of sheets in the right hand creasing device, the clamping action of the left hand creasing device has been relieved and the packing blade 86, urged downwardly by mechanism previously described, has swept the interfolded sheets from their position within the clamping jaws and has packed them within the magazine.

By the actuation of the mechanism above described, therefore, strips of paper fed together toward the center of the machine are cut into symmetrically overlapped sheets, and in that condition are guided between the oscillatory plates 41 and 42 and fed therefrom alternately between two opposed sets of clamping jaws. In each clamping jaw a sheet of paper is creased approximately upon its median line, and the abutting ends of two sheets cut from another separate strip of paper are interfolded within the crease. Each clamping jaw retains its hold upon the creased sheet and the interfolded ends of adjacent sheets for a length of time sufficient to permit the guide and the co-operating tucking blade to bring the next whole sheet of material to be fed from the guide into position within the opposing set of clamping jaws. Thereupon the first clamping jaws release their hold and allow the creased paper to fall and to be packed into place within a suitable receiving magazine.

It must be apparent that the particular construction of the tucking blades and their supporting levers is important for the reasons specified in detail above. The arrangement must be such that the tucking blade, whether by the curve of its operating edge, or by the position of the axis above which it moves, is so arranged as to provide support for the free end of one sheet of paper which might otherwise fail to be included in the embrace of the clamping jaws. If this free end is not so included in either clamping jaw, the next tucking blade to act upon the material will, obviously, be unable to stretch it taut inasmuch as its end will be free to move.

I claim:

1. The combination with sets of opposed clamping jaws and means for supplying material to be creased therein, of an oscillatory guiding device provided with opposed confining surfaces restrained against unidirectional movement along the path of travel of said material, and arranged to receive and guide the material between them, and means for oscillating the discharge end of said device, whereby said material is fed alternately in the direction of said clamping jaws.

2. The combination with sets of opposed clamping jaws, and with means for supplying sheets of material to be creased therein, of an oscillatory guiding device provided with opposed guiding surfaces, restrained against movement along the path of travel of said material, means for pivotally supporting the guiding device upon an axis in substantial alinement with the margins of said surfaces at the receiving end of the device, and means for oscillating the free end of said guiding device whereby material fed therethrough is directed alternately toward said clamping jaws.

3. The combination with a set of peripherally grooved rollers, and means for feeding material therebetween, of an oscillatory guiding device provided with opposed guiding surfaces, fingers comprising extensions of said guiding surfaces projecting upwardly therefrom into registry with the grooves of said rollers, means for pivotally supporting the guiding device upon an axis in substantially the same plane as the axes of said rollers, and means for oscillating the delivery end of said guiding device.

4. In a paper interfolding machine the combination with means for supplying a duplex series of symmetrically overlapped sheets and opposed sets of clamping jaws arranged to act upon said sheets, of an oscillatory guiding device comprising a pair of spaced plates supported for pivotal movement about an axis substantially alined with the admission end of said plates and means for causing the free end of said plates to oscillate upon said axis.

5. The combination with means for supplying a duplex series of symmetrically overlapped sheets of material, of a set of peripherally grooved rollers between which the material is fed by said supplying means and a set of pivotally mounted and spaced plates, each of which is provided with fingers registering with the grooves of one of said rollers.

6. The combination with means for supplying a duplex series of symmetrically overlapped sheets, of a set of peripherally grooved rollers between which said supplying means is arranged to feed such sheets, a pair of spaced plates provided with fingers registering with the grooves of the rollers, means for supporting said plates for oscillation about an axis disposed substantially between the ends of said fingers, and means for oscillating said plates.

7. The combination with means for supplying a duplex series of symmetrically overlapped sheets, of a set of peripherally grooved rollers between which said supplying means is arranged to feed such sheets, a pair of spaced plates provided with fingers registering with the grooves of the rollers, means for supporting said plates for oscillation about an axis disposed substantially between the ends of said fingers, means for oscillating said plates, and sets of clamping jaws operatively disposed adjacent the ultimate position assumed by said plates.

8. An interfolding machine including a pair of longitudinally grooved die rolls, cooperating rolls provided with cutting blades synchronized for registry with the grooves of the die rolls, peripherally grooved feeding rolls, belts passing about each die roll and one of said feeding rolls, a pair of oscillatory guide plates provided with fingers registering with the grooves of the feeding rolls, and means for oscillating said guide plates.

9. An interfolding machine including a pair of longitudinally grooved die rolls, cooperating rolls provided with cutting blades synchronized for registry with the grooves of the die rolls, peripherally grooved feeding rolls, belts passing about each die roll and one of said feeding rolls, a pair of oscillatory guide plates provided with fingers registering with the grooves of the feeding rolls, means for oscillating said guide plates, opposed sets of clamping jaws adapted to crease material fed betweeen said guiding blades, and tucking blades adapted to cooperate with said guiding plates in delivering material to the clamping jaws.

10. An interfolding machine including means for supplying a duplex series of overlapped sheets of material, a set of spaced guiding plates pivotally mounted and arranged to receive said material, and means for delivering said material between the guiding plates substantially in line with the axis upon which said plates are pivotally movable, said plates being formed with sufficient rigidity at their marginal delivery portions to span longitudinally the space traversed by said material, whereby the transverse dimension of said set may be comparatively small.

11. The combination with sets of opposed clamping jaws, and means for supplying material to be creased therein, of an oscillatory guiding device for said material comprising a pair of pivotally mounted link members provided with inwardly extending, spaced arms and guide plates supported by said arms.

12. The combination with sets of opposed clamping jaws, and means for supplying material to be creased therein, of an oscillatory guiding device comprising a pair of pivotally mounted supporting members, spaced guiding plates carried by said members, and fingers projecting from said plate and terminating substantially in a common plane including the axis upon which said supporting members are pivoted.

13. The combination with sets of opposed clamping jaws and means for supplying material to be creased therein, of an oscillatory guiding device comprising spaced members provided with opposed confining surfaces, said members being pivotally mounted for oscillation upon an axis lying in substantially the same plane as the corresponding extremities of said surfaces and being secured against movement along the path of travel of said material.

14. A set of pivotally grooved rollers, means for feeding material therethrough, spaced guiding means supported for oscillation, and fingers carried by said guiding means and registering with the grooves of said rollers.

15. The combination with a pair of coacting peripherally grooved rollers, and means for feeding material therethrough, of a pair of spaced guiding plates supported for oscillation upon a pivot lying approximately in the plane of the axes of said roller, and fingers projecting upwardly from said plates to a position of registry with the grooves of said rollers, whereby material fed between said rollers may be received between said plates.

16. The combination with sets of opposed clamping jaws and means for supplying a duplex series of overlapped sheets to be creased therein, of an oscillatory guiding device including a pair of spaced plates, means for feeding said duplex series of sheets therethrough, and tucking blades movable in paths convexly arcuate with respect to said guiding device and adapted to co-operate therewith in the delivery of said sheets to said clamping jaws.

17. The combination with means for supplying a duplex series of overlapped sheets, of a set of oscillatory guiding plates spaced apart and adapted to receive said sheets, opposed sets of clamping jaws, tucking blades, and means for moving said tucking blades alternately across the path of sheets dis-

charged from the guiding plates, said blades being thereby adapted to co-operate with said guiding plates in delivering material alternately to different sets of clamping jaws.

18. The combination with means for supplying a duplex series of overlapped sheets, of a feeding roller adapted to act upon said sheets, sheet creasing means disposed at either side of the path of sheet travel past said roller, and an oscillatory sheet delivery mechanism including an oscillatory support pivoted exteriorly of the path of travel of said sheets and substantially in the plane of such travel; and spaced sheet guiding elements adapted to receive said series of sheets between them and connected with said support, said elements being arcuately oscillatory with said support to discharge sheets alternately to each of said means and being fixed against translative movement with said sheets.

DAVID WILLIAM HUDSON.