

L. A. STRAUBEL.

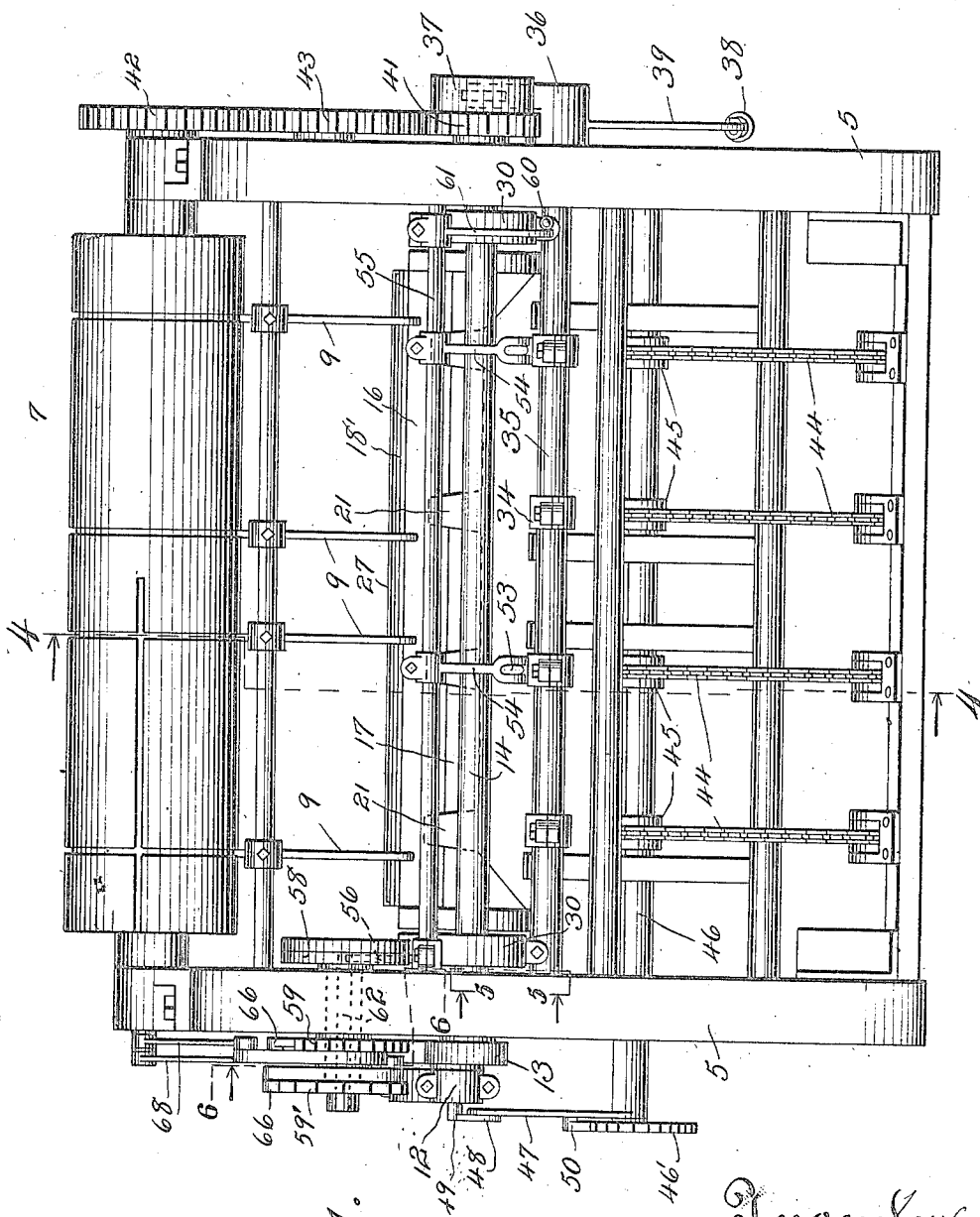
MACHINE FOR INTERFOLDING AND COUNTING PAPER TOWELING AND THE LIKE.

APPLICATION FILED JULY 9, 1917.

1,253,644.

Patented Jan. 15, 1918.

5 SHEETS—SHEET 1.



Witness:
T. P. Britt

Fig. 1.

Inventor:
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Attorney.

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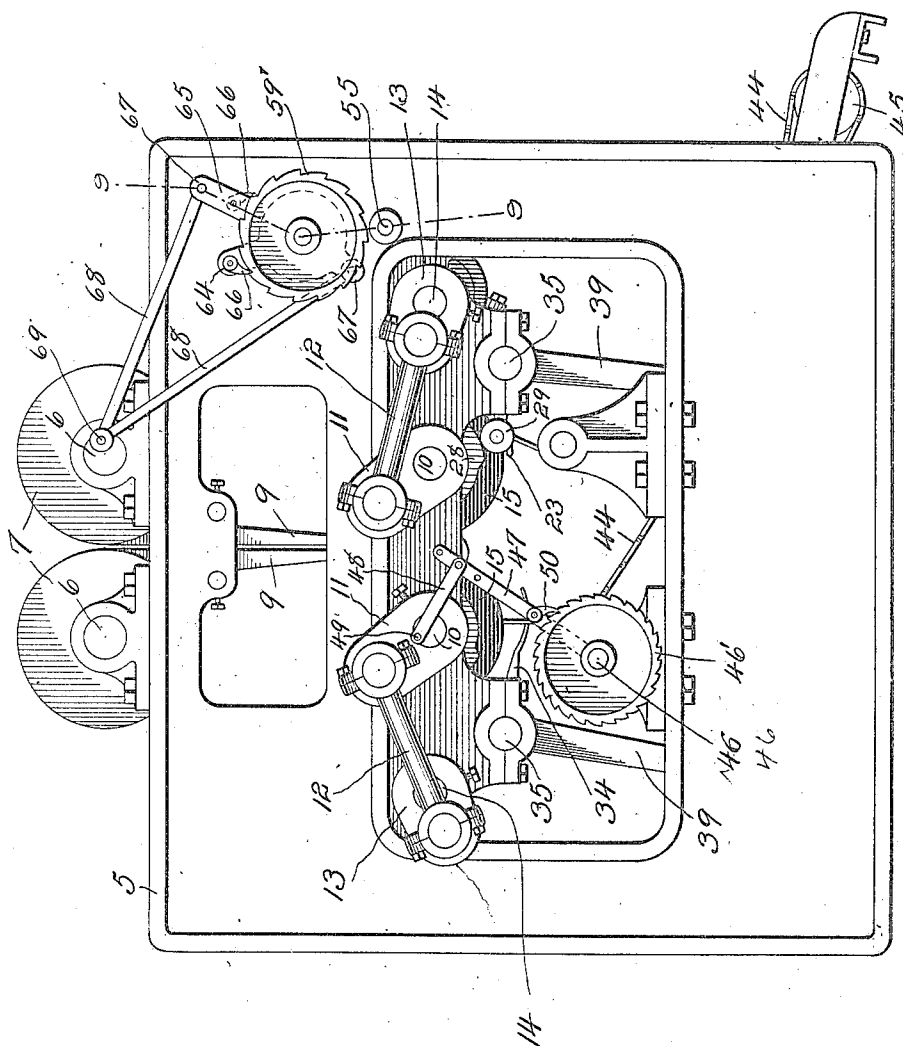


Fig. 2.

Witness:
T. P. Bortt

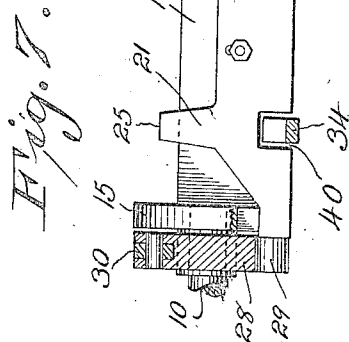
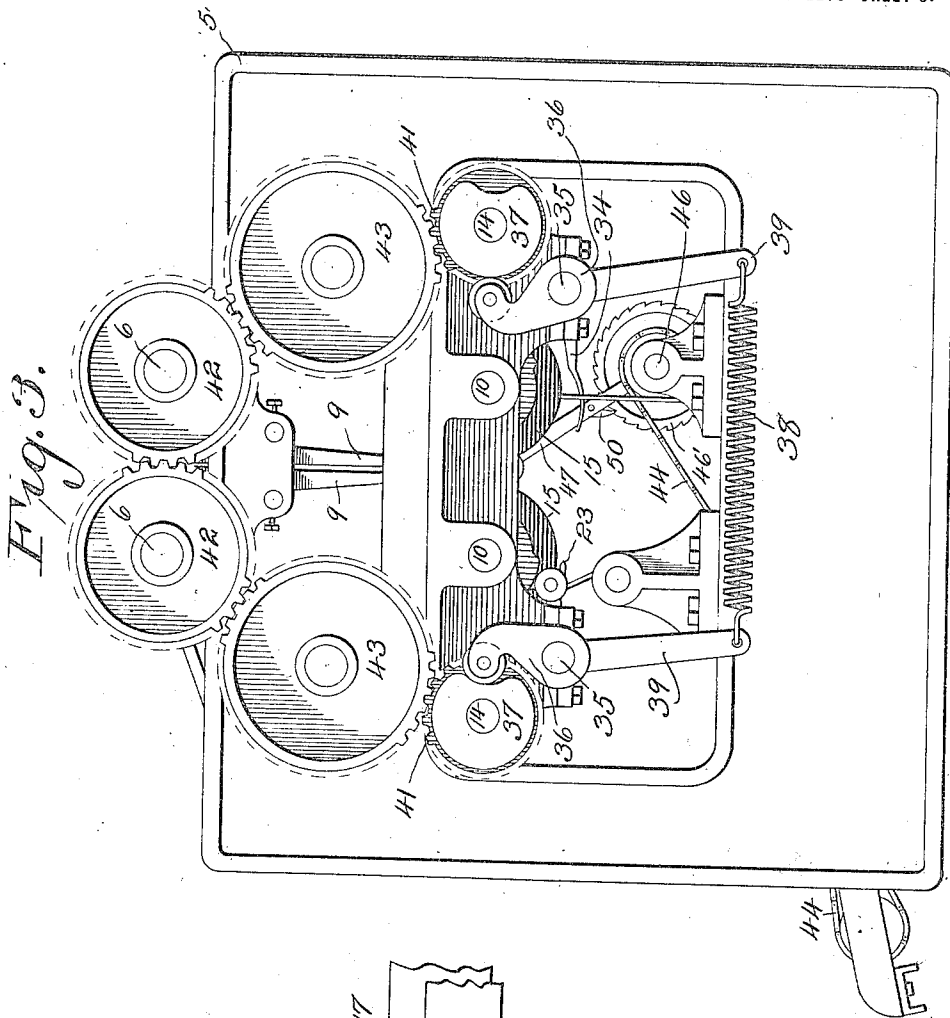
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5 SHEETS—SHEET 3.



Witness:
 J. P. Burt

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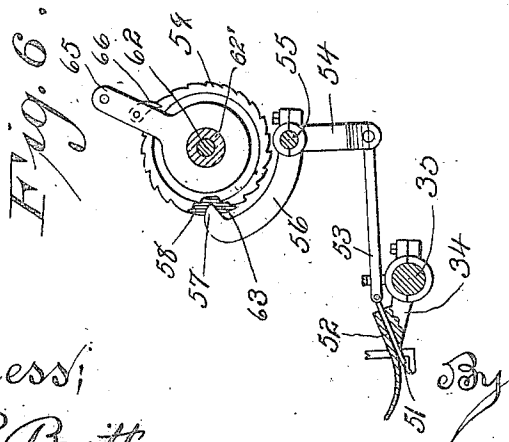
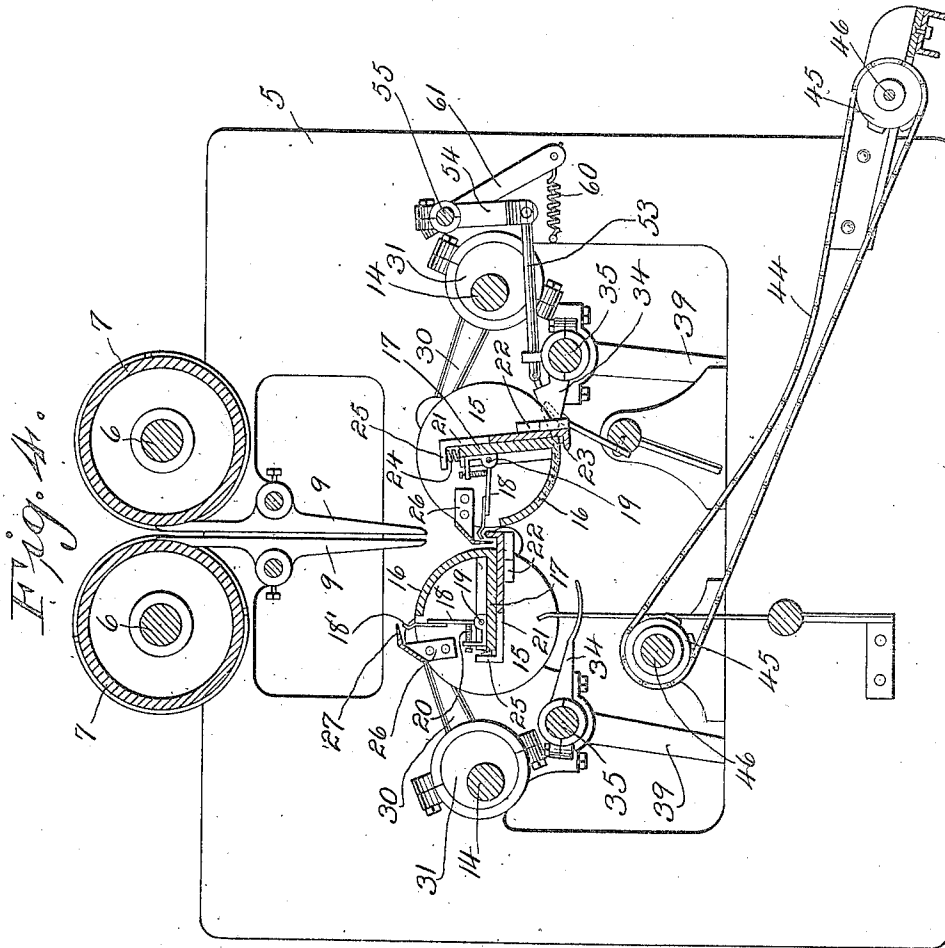
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5 SHEETS—SHEET 4.



Witness:
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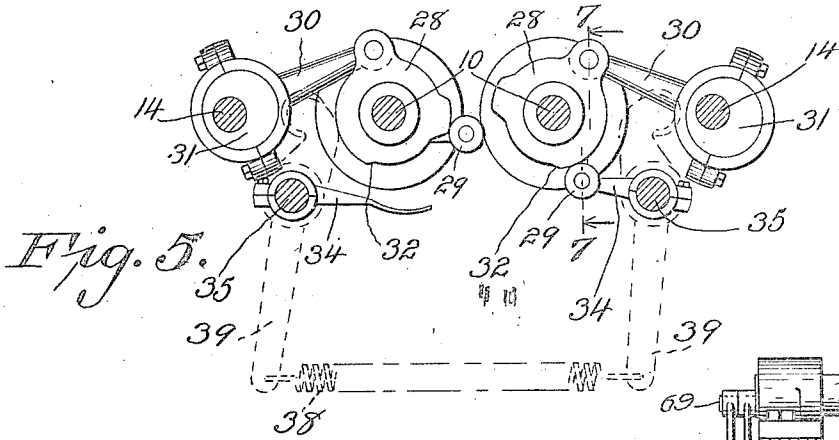


Fig. 5.

Fig. 9.

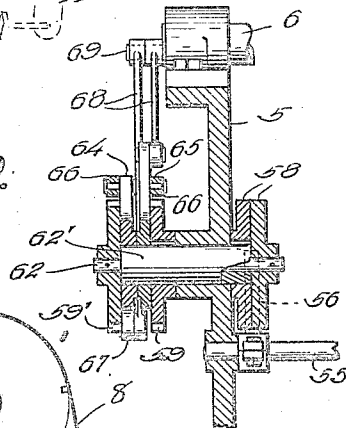
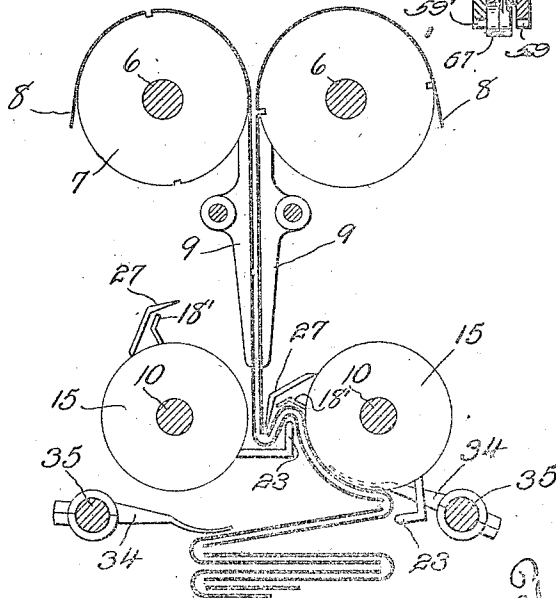


Fig. 8.



Witness:
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Inventor:
Louis A. Straubel

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Attorney

UNITED STATES PATENT OFFICE.

LOUIS A. STRAUBEL, OF GREEN BAY, WISCONSIN.

MACHINE FOR INTERFOLDING AND COUNTING PAPER TOWELING AND THE LIKE.

1,253,644.

Specification of Letters Patent.

Patented Jan. 15, 1918.

Application filed July 9, 1917. Serial No. 179,321.

To all whom it may concern:

Be it known that I, LOUIS A. STRAUBEL, a citizen of the United States, and resident of Green Bay, in the county of Brown, and State of Wisconsin, have invented certain new and useful Improvements in Machines for Interfolding and Counting Paper Toweling and the like; and I do hereby declare that the following is a full, clear, and exact description thereof.

The present invention relates to certain new and useful improvements in machines for interfolding sheets of material such as toilet paper and paper toweling, particularly of that type exemplified in an application filed by me August 19, 1916, Serial No. 115,773, allowed April 6, 1917.

In machines of this nature, the work material is usually fed to the machine from a pair of continuous rolls and the webs of these rolls are longitudinally cut or slit and transversely cut, but not entirely separated, to form the individual sheets, which are subsequently interfolded. There is a tendency of the paper to become slack as it passes over the body rolls and if this slack is allowed to accumulate wrinkles are soon formed in the paper which in time will clog the machine, but by using the ties connecting each individual sheet, the paper is stretched across the body rolls and through the guides when the ties are broken which prevents clogging of any kind.

It is therefor primarily an object of the invention to provide a folding mechanism which is of relatively simple structure, and positive in its operation, to promote its efficiency particularly with respect to permitting actuation at a relatively high speed.

The present folding mechanism comprises a pair of opposed members mounted for pivotal oppositely oscillatory movements and it is now more particularly an object of the present invention to provide means for successively clamping spaced folded portions of the sheets against the outer faces of the members to procure a positive creasing of the sheets whereby upon rotation of said members to dispose the bends of the sheets at their respective sides of the pile of folded sheets, the material at the sides of the bends will be disposed in a plane parallel to the face of the pile, to avoid any possibility of crimping the material as it is fed to the pile, and will be positively creased to avoid the

necessity of pressing the folded sheets after their removal from the machine.

It is further an important object of the present invention to provide a counting mechanism, for marking the folds of the work material at predetermined intervals, which is of extremely simple construction and accurate in its operation.

It is still further an object of my invention to provide an endless belt conveyer for removing the folded work material from the machine which will be continuously operated step by step at the proper speed to correspond with the operation of the machine.

With the above and other objects in view, my invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

In the accompanying drawings I have illustrated one complete example of the physical embodiment of my invention constructed according to the best mode I have so far devised for the practical application of the principles thereof, in which:

Figure 1 is a front elevational view of a sheet interfolding machine embodying the present invention.

Fig. 2 is an end elevational view thereof.

Fig. 3 is a view similar to Fig. 2 of the reversed end of the machine.

Fig. 4 is a transverse sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is a transverse sectional view taken on the line 5—5 of Fig. 1.

Fig. 6 is a view part in section and part in elevation, said view being taken on the line 6—6 of Fig. 1.

Fig. 7 is a detailed sectional view taken on the line 7—7 of Fig. 5.

Fig. 8 is a partly diagrammatic view illustrating the operation of the folding device, and

Fig. 9 is a view part in section and part in elevation of the counter controlling mechanism, said view being taken on the plane indicated by the line 9—9 of Fig. 2.

Referring now more particularly to the accompanying drawings, the improved machine comprises a body frame 5 on which is longitudinally mounted a pair of shafts

6 carrying the body rolls 7 of the feeding and cutting mechanism which are in engagement and between which the mutually overlapped sheets of material 8 pass downwardly to the folding mechanism.

As described in the aforementioned application, the work material, prior to its delivery to the folding mechanism, is cut or slit longitudinally and also cut transversely but not separated entirely, that is small ties which are broken in the folding operation connect the sheets. As aforementioned, the sheets of work material 8 are fed downwardly to the folding mechanism and guided in their passage by means of suitable guides 9.

Pairs of alined longitudinal stub shafts 10 are journaled in the ends of the body frame under the bed roll shafts 6 and the stub shafts at one end of the frame are projected outwardly thereof and carry crank arms 11 connected by pitmen 12 with relatively shorter crank arms 13 of a pair of longitudinal shafts 14 journaled in the frame outwardly of the stub shafts 10, whereby rotation of the shafts 14 will affect oscillatory movement of the pairs of stub shafts 10.

Carried on each pair of alined stub shafts 10 is a folding member comprising end plates 15 fixed on the stub shafts 10 and connected at adjacent peripheral portions by preferably transversely arcuate wall 16 at one side edge of which is formed an inwardly extending wall 17, the other edge of the arcuate wall 16 providing a limit of movement for finger 18 having its outer end shaped to form a bending ledge 18' and its inner end pivoted at 19 to the wall 17 and having an expansible spring 20 normally urging said finger against the outer edge of said arcuate wall. The end portions 15 and the wall 17 preferably form a single casting.

For clamping spaced portions of the continuous web of overlapped sheets alternately to the oscillatory folding members, a plate 21 is slidably mounted on the outer face of the wall 17 by extending the ends of the plate through slots 22 in the heads 15, and the outer end of this plate is laterally directed toward the wall 16 to form a clamping lip 23 adapted to coact therewith, this lip being normally urged for clamping engagement by series of expansible springs 24 disposed in sockets formed transversely in the wall 17 and bearing at their outer ends against lateral lugs 25 at the inner side of the clamping plate.

The ends of the clamping lips 23 are adapted to alternately each engage the bending ledge 18' of the opposite folding member to thus clamp the paper therebetween and to provide a positive tuck or fold in the paper thus clamped, which fold is disposed between the clamping lip 23 and its wall 16. A pair of arms 26 are rigidly mounted on the inner face of each head 15 and carry

at their outer ends a longitudinal tuck blade 27.

The movement of the clamping plates is also procured independently of the clamping members and through the medium of the shafts 14 by cam disks 28 loosely mounted on the stub shafts 10 at the ends of the folding members and have their cam portions engageable with rollers 29 carried on the ends of the clamping plates. The cam disks 28 have pivoted thereto links 30 which have their other ends of annular shape to embrace cams 31 on the shafts 14.

As is obvious, the bending ledge 18' comes in contact with the opposite clamping lip before the same reaches its upper limit and thereby stretches the paper before the opposite clamping lip releases the paper. Hence it will be seen that the bending ledge has two duties to perform, that of bending the paper or preparing it for the tucking blade and that of tensioning the paper to prevent the upper end of the sheet from dropping after the ties are broken.

The travel of the face of wall 16 is greater when midway between the limits of its travel, and at that point the fold is held in the clamp and as it travels faster than the paper passing over the roll 7, it breaks the ties connecting the individual sheets at a point about half way down the guides 9. The sheets are parted about one inch at that point and when the next fold is made the ends of the sheets almost meet again caused by the decrease in travel of the wall 16 at its lower limit which allows the ends of the sheets to register properly with the fold.

Taking up now the operation of the folding mechanism, the folding members simultaneously and continuously pivotally oscillate each through approximately a quarter revolution, and the upper and lower limits of oscillation of the coacting bending ledges and clamping lips respectively lie substantially in the horizontal plane passing through the axis of oscillation of the folding members, the lower limit of oscillation of the clamping lip being consequently at the vertical plane passing through the axis of oscillation of the folding members, whereby the folds held by the clamping lips are disposed horizontally when released.

As the inner side of a clamping member oscillates upwardly, its clamping lip 23 will move into the recess of the bending ledge 18', to provide a definite bend in the web for proper coaction with the tucking blade 27, it being noted that this clamping action occurs immediately below the meeting edges of a pair of sheets. The tucking blade 27 of other said operating member then moves downwardly between its correspondingly bending ledge and the wall 16 of the other drum to thus dispose the bend or fold of paper between the lip 23 and wall 16. The

tucking blade is then quickly moved upwardly and the clamping blade draws its lip 23 against the wall 16 to firmly clamp the fold.

5 Oscillatory movement of the folding members then continues and as the fold carrying member reaches its limit of oscillation, the fold of work material is released by engagement of the clamping blade roller 29
10 with portions 32 of the cams, this movement to releasing position occurring immediately prior to the movement of the clamping lip 23 of said blade past a corresponding side edge of an endless delivering belt or chain
15 to be later described and which is disposed under the folding members for receiving the interfolded pile of sheets. The entire operation described is repeated alternately with respect to the folding members. By
20 reason of the pitman connection for procuring pivotal oscillation of the members, it is noted that speed of the folding members is reduced adjacent their limits of oscillatory movement, and thus the varying clamping
25 and tucking operations are facilitated.

An important feature of the present arrangement is that the successive folds of work material are clamped against the outer
30 faces of the members, and thus in their movements to releasing position the material at the sides of the folds is disposed substantially horizontally to lie in its proper position on the pile of folded material, to
35 thus eliminate the possibility of crimping the material adjacent its portions gripped by the folding members when said work material is disposed on the pile.

To successively pack the folds of work material on the delivery means, a series of
40 presser fingers 34 are disposed at each side of the folding mechanism, having their extremities extending slightly beyond the axis of shafts 10, and each series of fingers is carried on a shaft 35 to which is imparted oscillatory movement by means of a roller carrying
45 arm 36 carried by said shaft and engageable with a cam 37 carried on the corresponding shaft 14, the shaft being urged by a suitable spring 38, connect the outer
50 ends of levers 39 having their inner ends secured to shafts 35, to a position wherein the fingers 34 are held by the cam in pressing engagement with the folded work material and are raised only momentarily by
55 the cam incidental to the releasing movements of the clamping plates, in their raised positions said fingers engaging in transverse slots 40 formed in the walls of the folding members and in said plates whereby to engage the upper faces of the folds of work
60 material.

Returning now to the general construction of the machine, power is initially imparted thereto through one of the shafts 14, and
65 gear wheels 41 and 42 are mounted on the

shafts 14 and the bed roll shafts 6 respectively, each pair of gears 41 and 42 being connected by an idler gear 43. Thus a continuous drive is provided across the machine and the shafts 14 are rotated in different
70 directions to procure opposite oscillatory movements of the folding members.

The novel form of delivery means which I employ consists essentially in a series of chains or belts 44 passing over sprocket
75 wheels or pulleys 45 mounted on shafts 46 journaled in the body frame 5. One of the shafts 46 has mounted thereon a ratchet wheel 46' which is adapted to be advanced
80 step by step to procure the steady movement of the delivery belts or chains. The means for operating the ratchet wheel 46' consists in a lever 47 having its inner end loosely journaled to shaft 46 and its outer
85 end pivotally connected by means of a toggle link 48 having its outer end pivoted to a crank pin 49 on the outer end of one of the shafts 10, said lever 47 having a pivoted dog 50 carried thereby and engaging the teeth of the wheel 46' to advance the
90 same upon the rotation of shaft 10 as will be obvious.

A further important feature of this invention exists in the novel form of counting
95 means which I employ for marking the folds of the work material at predetermined intervals. This counting mechanism consists in marking fingers 51 which pass through openings 52 in certain of the
100 pressing fingers 34 and are adapted at the proper time, to rumple or mark a fold of the work material while the same is being held between clamping lip 23 and wall 16, as will be readily seen in Fig. 6.

The marking fingers 51 are each connected
105 by means of a link 53 with an arm 54 having its inner end fixed to a shaft 55 extending transversely across the body frame, and secured to this shaft is an arcuate lever 56 having its outer free end directed inwardly
110 as at 57 and engaging the cam faces 58 connected with a pair of ratchet wheels 59 and 59'. To normally urge the end 57 of the lever 56 against the cam faces 58, a spring 60 is employed drawing inwardly
115 on the arm 61 carried by shaft 55.

The ratchet wheel 59 is fixed upon a sleeve 62' journaled in one outer wall of the
120 body frame 5, near one corner thereof, and ratchet wheel 59' is mounted upon the outer end of a stub shaft 62 journaled in sleeve 62', the ends of shaft 62 projecting beyond sleeve 62'. As best shown in Fig. 9, one cam 58 is fixed upon the inner end of sleeve 62' and the other cam is fixed upon the inner
125 end of shaft 62 adjacent said other cam, and the cams 58 have their faces recessed as at 63, said recesses being adapted to aline as hereinafter described.

Loosely journaled upon the sleeve 62', in
130

intermediate gears 59 and 59', are members 64 and 65 juxtaposed ratchet wheels 59 and 59' respectively and having pivoted thereto suitable dogs 66 engaging the uppermost portion of the adjacent ratchet wheels. These members 64 and 65 have directed therefrom in opposite directions an arm 67 having pivoted thereto one end of levers 68 which have their other ends both pivoted to a common crank pin 69 carried by one of the bed roll shafts 6.

Thus it will be seen that by reason of the arms 67 extending in opposite directions, the ratchet wheels will be revolved in opposite directions, and the notches or recesses 63 are so arranged as to align at predetermined intervals, as for instance, after the completion of the folding of every seventy-five separate sheets.

When the recesses 63 are aligned, the spring 60 will draw the end 57 of the lever 56 into said recesses which will move the marking finger 51 outwardly and mark the fold of material which is at that time clamped between clamping lip 23 and wall 16, as herein before described. It will be further understood that the number of marking fingers 51 depend upon the number of sheets which are folded in one operation.

Thus it will be appreciated from the foregoing description taken in connection with the accompanying drawings, that I have provided a practical and simple machine for accomplishing the desired purposes.

I claim:

1. In a machine of the class described, the combination of a mechanism for folding work material, and means associated therewith and adapted to rumple the folds of the work material at predetermined intervals, whereby to count the folded work material substantially as described.

2. In a machine of the class described, the combination of a pair of folding members mounted for oscillatory movement downward and outward from juxtaposed initial positions, means for alternately clamping spaced portions of the web of work material against the outer faces of said members, and means associated with one of the folding members for counting the folded work material.

3. In a machine of the class described, the combination of a pair of folding members mounted for oscillatory movement downward and outward from juxtaposed initial positions, means for alternately clamping spaced portions of the web of work material against the outer faces of said members, and means associated with the folding members for marking the work material at predetermined intervals.

4. In a machine of the class described, the combination of a pair of folding members mounted for oscillatory movement down-

ward and outward from juxtaposed initial positions, means for alternately clamping spaced portions of the web of work material against the outer faces of said members, and means associated with the folding members for marking the work material in the folds thereof at predetermined intervals.

5. In a machine of the class described, the combination of a pair of folding members mounted for oscillatory movement downward and outward from juxtaposed initial positions, means for alternately clamping spaced portions of the web of work material against the outer faces of said members, presser fingers for properly disposing the folded work material on a delivery mechanism, and means operable with certain of the presser fingers for marking the work material at the folds thereof at certain predetermined intervals.

6. In a machine of the class described, the combination of a pair of folding members mounted for oscillatory movement downward and outward from juxtaposed initial positions, means for oscillating said members in opposite directions, clamping lips carried by said members and engageable against the faces thereof, said clamping lips and the opposed members being provided with aligned transverse grooves, presser fingers engageable in the grooves upon movement of the members to releasing position, and means operable at predetermined intervals for marking the work material prior to the releasing thereof of said clamping lips.

7. In a machine of the class described, the combination of a pair of folding members mounted for oscillatory movement downward and outward from juxtaposed initial positions, means for oscillating said members in opposite directions, clamping lips carried by said members and engageable against the faces thereof, said clamping lips and the opposed members being provided with aligned transverse grooves, presser fingers engageable in the grooves upon movement of the members to releasing position, and means carried by certain of the presser fingers and operable at predetermined intervals for marking the work material prior to the releasing thereof of said clamping lips.

8. In a machine of the class described, the combination of a mechanism for folding work material, and means associated therewith for marking the folds of the work material at predetermined intervals comprising a pair of ratchet wheels having opposed cam faces, recesses in said cam faces and adapted to align, an arm engageable in said recesses when aligned, and a marker finger operated by said arm.

9. In a machine of the class described, the combination of a pair of folding members mounted for oscillatory movement downward and outward from juxtaposed initial

positions, means for oscillating said members simultaneously in opposite directions, clamping lips carried by the members for relatively lateral sliding movement to clamp material against the members, a lever having its inner end pivoted centrally in each member and its outer end outward of each member and forming a bending ledge for coaction with the clamping lip of the other member, means for forming a fold of work material between a clamping lip and its cor-

responding member when said clamping lip is in juxtaposition with its corresponding clamping ledge, and a conveyer belt for carrying off the folded work material, and means for continuously operating said conveyer step by step.

In testimony that I claim the foregoing I have hereunto set my hand at Green Bay, in the county of Brown and State of Wisconsin.

LOUIS A. STRAUBEL