

Dec. 3, 1929.

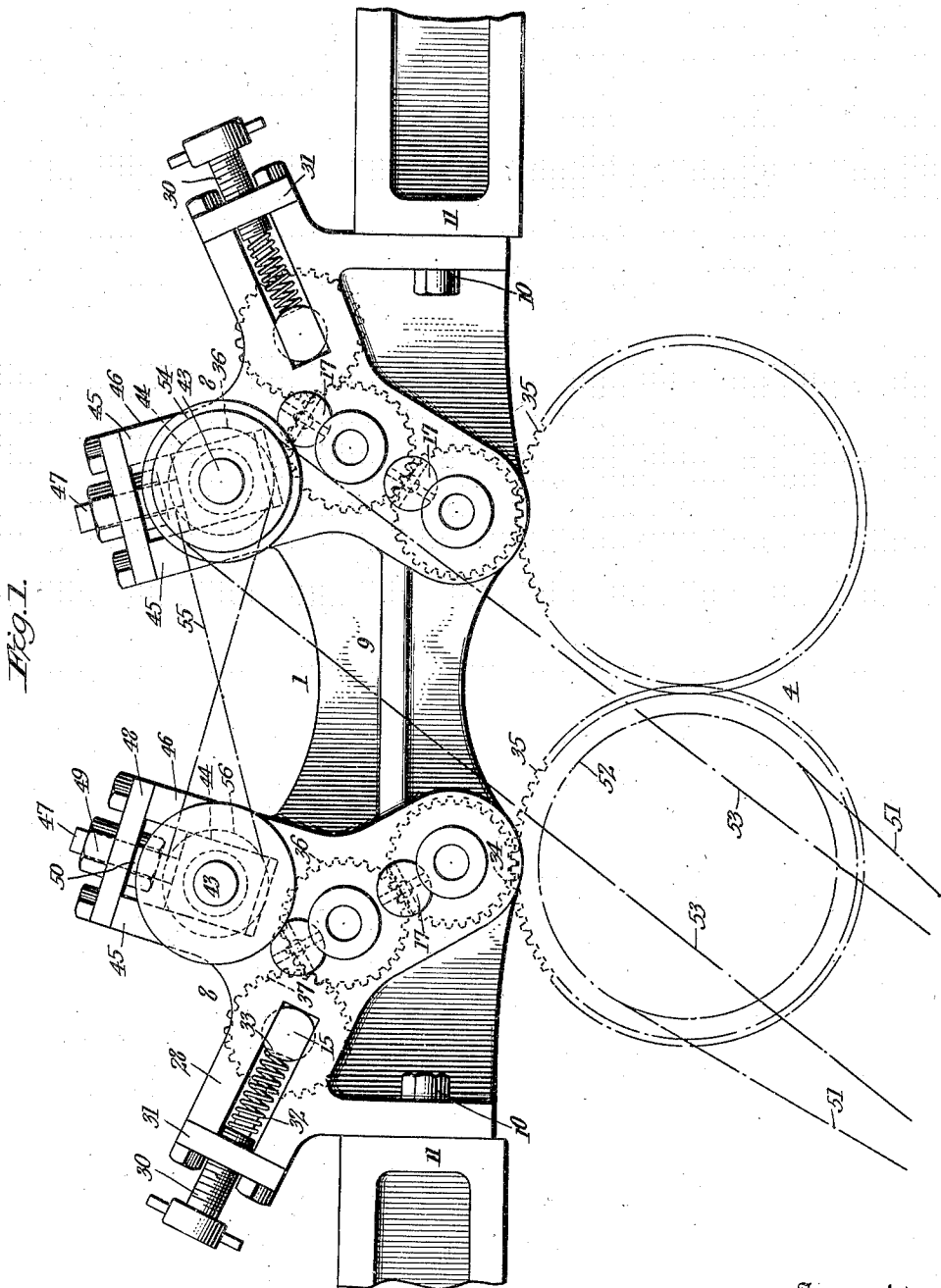
W. H. CANNARD

1,738,354

WEB CUTTING AND FEEDING MECHANISM

Filed March 31, 1926

3 Sheets-Sheet 1



Inventor

William H. Cannard,

Amos H. Lacey  
Attorney

Dec. 3, 1929.

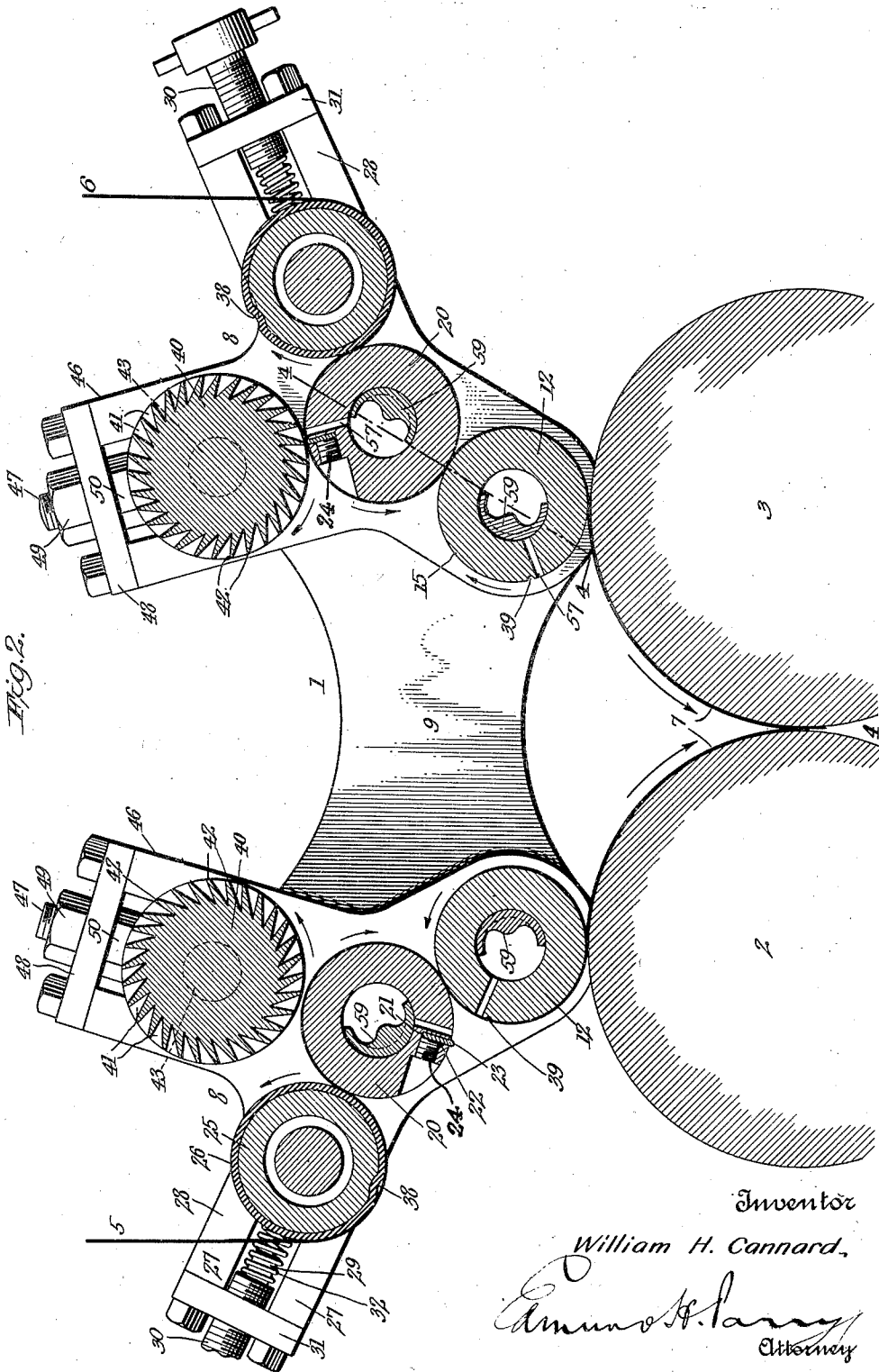
W. H. CANNARD

1,738,354

WEB CUTTING AND FEEDING MECHANISM

Filed March 31, 1926

3 Sheets-Sheet 2



Inventor

William H. Cannard,

*Edmund H. Larry*  
Attorney

Dec. 3, 1929.

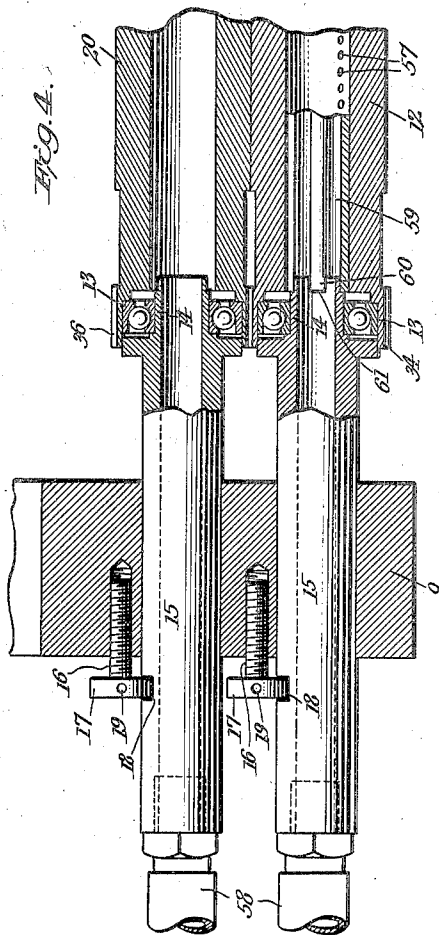
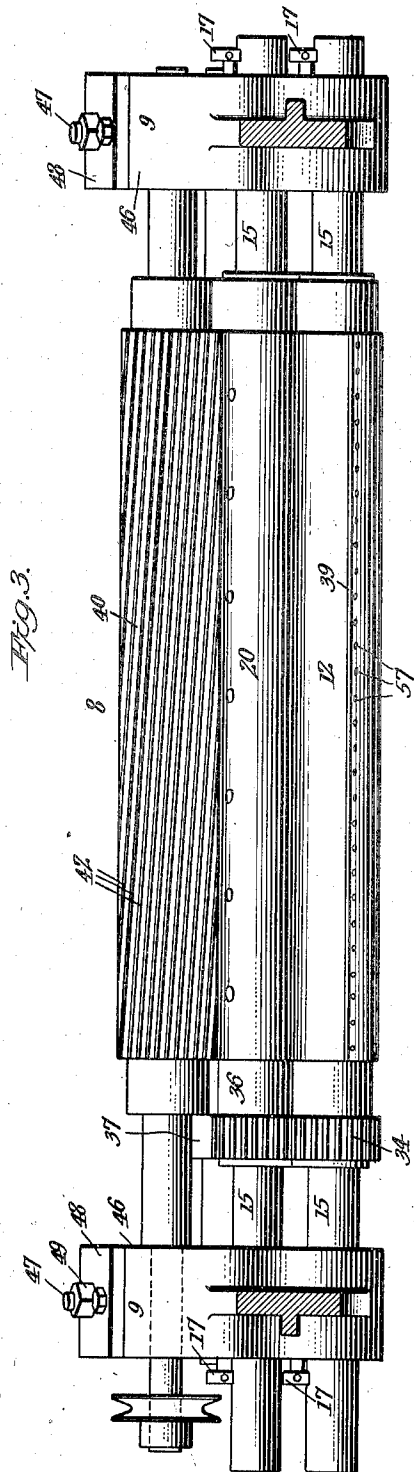
W. H. CANNARD

1,738,354

WEB CUTTING AND FEEDING MECHANISM

Filed March 31, 1926

3 Sheets-Sheet 3



Inventor  
William H. Cannard.

Ernest H. Barry  
Attorney

# UNITED STATES PATENT OFFICE

WILLIAM H. CANNARD, OF GREEN BAY, WISCONSIN

## WEB CUTTING AND FEEDING MECHANISM

Application filed March 31, 1926. Serial No. 98,786.

This invention relates generally to web cutting and feeding mechanism and, more particularly, to a machine for drawing a web of paper, metal, fabric, or the like material from a source of supply, either partially or completely severing the web into sheets; and subsequently feeding the sheets from the machine. The invention, while unrestricted in its scope or application, is especially adapted for use in conjunction with sheet-folding or interfolding devices, as disclosed, for instance, in my United States Patents Nos. 1,561,907 and 1,561,908, issued November 17, 1925, to William H. Cannard and Glenn A. Shaffer, wherein it is essential that either partially or completely severed sheets, uniform as to size, be fed to the interfolding rolls in a regular, predetermined sequence.

The primary object of this invention is to provide a machine of this character which is extremely simple of construction, and is capable of severing a web into sheets and feeding the sheets from the machine at practically unlimited speed.

A further object of the invention is the provision of a web-cutting and feeding mechanism wherein the cutting instrumentalities are so arranged and cooperate in such a manner as to render them self-sharpening.

A still further object of the invention is the provision of a device of this character which may be quickly and easily associated with an interfolding machine so that certain of its parts are driven thereby to insure feeding of the sheets to the interfolding machine in the required sequence and at the proper speed.

My inventive-concept further contemplates the provision of novel means for intermittently subjecting a web or sheets of material to the effect of a partial vacuum within a plurality of rolls to insure accurate feeding of the web or sheets between and about the rolls.

With these and other objects in view, as will become apparent as the description proceeds, the invention consists of the novel features of construction, combinations of elements, and arrangements of parts hereinafter to be fully described and claimed.

A full and complete understanding of the invention may be obtained from a consideration of the following detailed description, taken in conjunction with the accompanying drawings forming a part of the disclosure; it being understood, however, that the drawing is, and is intended to be, merely illustrative of a single practical form of the invention and that the latter may be changed or modified so long as such changes and modifications mark no material departure from the salient features of the invention as pointed out in the claims.

In these drawings:

Figure 1 is a view in end elevation illustrating a cutting and feeding mechanism embodying certain features of my invention operatively associated with a sheet-interfolding machine;

Figure 2 is a view, slightly enlarged and in vertical section, of a portion of the structure shown in Fig. 1;

Figure 3 is a view in side elevation of one of the sheet feeding and cutting units shown in Fig. 1 as viewed when looking to the left from between the two units there shown, the connecting webs being shown in section; and

Figure 4 is an enlarged, fragmentary detail view in section, taken on the line 4—4 of Fig. 2, and illustrating the mounting of the feeding rolls and the instrumentalities for creating a partial vacuum therein.

In the accompanying drawings, I have illustrated my invention in the form of a duplex web feeding and cutting instrumentality, designated generally as 1, operatively associated with a pair of coacting folding or interfolding drums 2 and 3 of a web-folding mechanism 4 so as to be driven thereby to draw a pair of webs 5 and 6 from supply rolls (not shown) to cut these webs into partially or wholly cut sheets 7 and to feed these sheets to the associated folding drums in predetermined sequence as required by the latter. It is to be understood, however, that one only of the cutting and feeding units 8 may be employed either with the type of folding mechanism shown or with any other form of sheet converting or handling mech-

anism, and in case the cut sheets themselves, without further folding or converting, constitute the required product, any desired sheet stacking or receiving mechanism may be directly associated with the unit 8 or with the complete duplex cutting and feeding instrumentality 1.

As shown, a pair of frame members 9, made fast as at 10 to opposite ends of the frame 11 of the converting machine 4, serve to support all of the cutting and feeding instrumentalities of both units 8 in operative position both with respect to each other and to the rolls 2 and 3.

Each unit 8 preferably includes a web-feeding roll 12 rotatably mounted on anti-friction bearings 13 intermediate the frame members 9 in longitudinal alinement with and in coacting relation to one of the rolls of the web-converting machine. As shown, the ball-bearing units 13 upon which roll 12 revolves are disposed within the ends of the roll and are mounted upon the reduced ends 14 of short shafts 15 which extend through the respective frame members 9 and are longitudinally adjustable therein. Machine screws 16, threaded into the frame members 9 and having enlarged cylindrical heads 17 which engage in transverse concave recesses 18 in the respective shafts 15, are provided to permit the shafts to be easily moved to and retained in different positions with respect to the frame members. For instance, to remove the roll 12 from the machine, it is only necessary to rotate one or both of the screws 16—either by hand or by means of a pin or the like inserted in turn in the holes 19 and employed as a lever—until the distance between the adjacent ends of the alined shafts 15 is greater than the length of the roll.

Obliquely above roll 12, in coactive relation thereto and in longitudinal alinement therewith, is mounted, in a like manner, a web feeding and cutter carrying roll 20. As shown, this roll is longitudinally slotted, as at 21, to receive an elongated cutter blade 22 which is adjustably maintained in fixed position therein with its edge 23 extending radially past the periphery of the roll, by means of a plurality of set screws 24 countersunk in the roll with their inner ends bearing upon the side of the blade.

A third web-feeding roll 25, which is preferably provided with an outer covering 26 of rubber, felt, or the like material in order that it may better function as a pull roll, is mounted at the side of but somewhat above and in coacting relation to roll 20 in a manner similar to the mounting of the rolls 12 and 20 (best shown in Fig. 4) except that the adjusting screws 16 are dispensed with and the ends of its supporting shafts 15 are non-rotatably but movably mounted between the spaced arms 27 of the bifurcated portions 28 of the respective frame members 9. As shown, the

inner end 29 of an adjusting bolt 30 having threaded connection with and passing through a crosspiece 31 fast to and joining the arms 27, fits within and bears upon one end of an expansion spring 32, the other end of which bears upon a flattened surface 33 on the shaft 15.

In order that the rolls 12, 22 and 25 may be rotated at a peripheral speed equal to that of the folding rolls 2 and 3, a pinion 34 of the desired size and having the required number of teeth is made fast to the roll 12 in such position as to mesh with and be driven by a driving gear 35 for the associated converting-machine roll. Similar pinions 36 and 37 are provided on the respective rolls 22 and 25, and the pinion 36 meshes with both pinions 34 and 37 so that upon rotation of the intergeared rolls 2 and 3, the several web-feeding rolls are driven each in a direction opposite to the adjacent roll and a web threaded therebetween will be fed to the converting machine as desired. It is to be observed that recesses 38 and 39 are provided on the respective rolls 25 and 12 to accommodate the blade edge 23, which projects from roll 20, as the several rolls coact in the web-feeding operation.

A knife or cutter roll 40, which is preferably milled out spirally and longitudinally, as at 41, and then hardened and ground to produce a series of parallel cutting edges, knives or cutters 42, is fast centrally to a shaft 43 having bearing in a pair of bearing-blocks 44 adjustably mounted between spaced arms 45 of the bifurcated portions 46 of the respective frame members 9. As shown, each bearing-block 44 has an integral upwardly extending threaded bolt 47 which passes centrally through a crosspiece 48 fast to and connecting the ends of the spaced arms 45 of one of the pedestals or bifurcated portions 46. A pair of nuts 49 and 50 disposed, respectively, above and below the cross-piece 48 on the bolt 47 serve to lock the bearing blocks and, consequently, the roll 40 in adjusted positions with respect to the roll 20 over which it is disposed and with which it coacts in the cutting operation.

As shown, the converting-machine 4 is driven from any desired source of power (not shown) by means of a belt 51, which passes over a pulley 52 which is fixed with respect to the roll 2 and gear 35 thereon. This gear 35 drives gear 35 on roll 3 and the two gears 35 mesh with and drive the pinions 34 of the respective units 8. The cutting rolls 40, which are required to rotate at comparatively high speed, are driven from a source of power (not shown) by means of a belt 53 passing over a pulley 54 fast to the shaft 43 of one of the rolls 40, the roll 40 of the other unit being driven by a crossed belt 55 passing over pulleys 56 fast on the shafts 43 of the

respective rolls 40 intermediate the frame members 9.

Means are provided for insuring the proper feeding of the partially or completely severed sheets, as the case may be, from roll 20 to the interfolding rolls 2 and 3. Preferably and as shown, these means comprise instrumentalities for continuously maintaining a partial vacuum within the rolls 20 and 12 and for rendering this partial vacuum intermittently effective upon the sheets to hold them in contact with their carrier roll. As shown, the rolls 20 and 12 are hollow, are open at one end only, and are each provided with a longitudinally extending line of perforations 57 extending from the interior to the exterior surface of the rolls. The shafts 15 communicating with the open ends of the rolls 20 and 12 are also hollow and have connected to their outer free ends hose or pipe lines 58 which connect to a vacuum pump or the like suction-producing device (not shown). A segment 59 is disposed within each of the rolls 20 and 12 and is maintained in fixed position, in this instance, by means of projecting lugs 60 which extend and fit into corresponding cut-out 61 in the ends of the shafts 15. These segments conform in contour to the inner surface of the rolls against which they are disposed, and each one serves as a valve to maintain all of the holes 57 of one of the rolls closed for a little over half of each revolution thereof, the partial vacuum in the roll being effective throughout the remainder of the revolution to draw and hold the cut sheet to the surface of the roll.

From an observation of the right-hand unit 8 of Fig. 2, it will be perceived that the ports 57 of roll 20 are disposed adjacent the cutter-blade 22, and the valve 59 is so disposed within the roll that the partial vacuum therein becomes effective upon the web just before the cutting thereof and directly in rear of the line of severance in the web produced by the coaction of the knives 42 of the rapidly revolving cutter roll 40 with the relatively stationary blade 22. The rotation of the rolls 20 and 12 is so correlated that the lines of ports 57 of the respective rolls arrive at the bight therebetween coincidentally. At this point in the cycle, the ports 57 of roll 20 are moving under the valve 59 in the latter and by reason of the location of the valve 59 in roll 12, the ports 57 in this roll are moving off of the valve 59 therein. The leading end of the severed sheet 7 is thus held against roll 12 until it reaches the bight between rolls 12 and 3, at which point the ports 57 in roll 12 again move under the valve 59 therein and the sheet is carried forward by the roll 3.

In the operation of the structure, as shown, the webs 5 and 6 are drawn from supply rolls (not shown) by the felt or rubber covered pull rolls 25 of the respective units 8 and are

fed thereby to the feeding and cutter carrying rolls 20. By reason of the partial vacuum within the rolls 20, the webs are forced tightly against the surface thereof adjacent the projecting cutter-blades 22 and a clean, shear cut of the web, by the interaction of a plurality of the rapidly moving spiral knives 42 with each of the blades 22, is insured. The several leading ends of the cut sheets are still held to these rolls during their continued travel until they come into contact with the transfer rolls 12 on a center line, whereupon the ports of the cutter-carrying rolls are closed, those of the transfer rolls are opened, and the sheets are thus carried by the latter to the respective rolls 2 and 3. The cutter-carrying rolls of the two units are so arranged that when the blade of one of them is coacting with the associated cutter roll, the blade of the other is disposed away from its cutter roll and diametrically opposite thereto in order that the sheets of the two webs 5 and 6 may be fed to the converting-machine alternately, that is, with the leading end of each sheet of one web midway between the ends of a sheet of the other web.

The knife or cutter rolls 40 are preferably of very hard material, while the blades 22 carried by the rolls 20 are of softer material. The contact of several of the hardened knives 42 of the swiftly moving rolls 40 with the cutter-blades 22 upon each revolution of the rolls 20 maintains the blades 22 and, to a lesser degree, the knives 42, in a sharpened condition, and they may therefore be said to be self-sharpening in the sense that no sharpening operation need be performed upon them other than that resulting from the normal operation of the apparatus.

What I claim is:

1. A web feeding and cutting machine comprising a supporting frame; a plurality of web-feeding rolls mounted thereon in coacting relation; a cutter-blade carried by and extending past the periphery of one of the web-feeding rolls; a cutter roll, having a plurality of longitudinally and spirally extending knives, mounted for coaction with said cutter-blade; and means for driving the feeding rolls and the cutter roll.

2. A web feeding and cutting machine including a frame; a plurality of intergeared coacting web-feeding rolls mounted thereon; a cutter-blade extending radially past the periphery of one of the rolls; a cutter roll, having a plurality of longitudinally and spirally extending knives, mounted in coacting relation to said cutter-blade; and means for driving the web-feeding rolls and said cutter rolls at relatively different speeds.

3. A web feeding and cutting machine including a frame; a web-feeding roll mounted thereon and having a cutter-blade extending radially therefrom; a cutter roll, having a spirally and longitudinally extending knife

thereon, mounted in coacting relation to said cutter-blade; and means for rotating said rolls at relatively different speeds.

4. A web feeding and cutting machine including a frame; a web-feeding roll mounted thereon and having a cutter-blade extending radially therefrom; a cutter roll, having a plurality of spirally and longitudinally extending knives thereon, mounted in coacting relation to said cutter-blade; and means for rotating said rolls at relatively different speeds.

5. A web feeding and cutting machine including a frame; a plurality of web-feeding rolls mounted in coacting relation thereon; a longitudinally and spirally milled cutter roll mounted in longitudinal alinement with the web-feeding rolls; means for driving all of said rolls; and means extending from one of the web-feeding rolls for coaction with the cutter roll to transversely sever a web being fed by the web-feeding rolls once upon each revolution of the web-feeding rolls.

6. A web feeding and cutting machine comprising a frame; a felted pull roll, a cutter-carrying roll, a transfer roll and a cutter roll carried thereby; means for rotating the pull roll, cutter-carrying roll and transfer roll to convey a web through the machine; means for rotating the cutter roll at a relatively higher speed; and coacting means on the cutter and cutter-carrying rolls for transversely severing the web into sheets in transit.

7. A web feeding and cutting machine comprising a supporting frame; a plurality of web-feeding rolls journaled in coacting relation therein; means for driving the rolls to feed a web through the machine; a cutter-blade extending radially from one of the web-feeding rolls; and means mounted adjacent the web-feeding rolls for coaction with the cutter-blade to transversely sever the web upon each revolution of the cutter-carrying roll.

8. A web feeding and cutting machine comprising a supporting frame; a plurality of web-feeding rolls mounted thereon in coacting relation; a cutter-blade carried by and extending past the periphery of one of the web-feeding rolls; a cutter roll, having a plurality of longitudinally and spirally extending knives, mounted for coaction with said cutter-blade; and means for driving the feeding rolls and the cutter roll; one of said web-feeding rolls having a longitudinal groove to receive the cutter-blade.

9. A web feeding and cutting machine comprising a supporting frame; a plurality of web-feeding rolls mounted in coacting relation thereon; a cutter roll operatively mounted adjacent one of the web-feeding rolls; means for rotating the web-feeding rolls and the cutter roll at relatively different speeds; and coacting means on the cutter roll and the web-feeding roll adjacent thereto for trans-

versely severing a web fed through the machine upon each revolution of the web-feeding rolls; certain of said rolls being provided with means for insuring the feeding of the resulting cut sheets through the machine as though the web had been uncut.

10. In a web feeding and cutting machine, a frame, a plurality of rolls mounted in coacting relation thereon, means for rotating the rolls to feed a web through the machine, a cutter bar carried by one of said rolls, and a cutting instrumentality operatively mounted adjacent said roll for coaction with the cutter blade to transversely sever the web periodically as it is advanced, certain of the rolls being provided with means whereby the resulting cut sheets are fed through the machine in sequence as though the web had not been severed.

11. A web feeding and cutting machine comprising a frame; a plurality of rolls mounted in coacting relation thereon; means for rotating the rolls to feed a web through the machine; a cutter-blade carried by one of the rolls; means mounted adjacent the blade-carrying roll for coaction with the cutter-blade to transversely sever the web; and means associated with the blade-carrying roll whereby the leading end of the severed web is held with pressure against the blade-carrying roll until it is carried by rotation of the rolls between the blade-carrying roll and an adjacent roll.

12. A web feeding and cutting machine comprising a frame; a plurality of rolls mounted in coacting relation thereon; means for rotating the rolls to feed a web through the machine; a cutter-blade carried by one of the rolls; means mounted adjacent the blade-carrying roll for coaction with the cutter-blade to transversely sever the web; and means associated with certain of the rolls whereby the leading end of the severed web is in turn held by pressure to and carried forward by said rolls.

13. In combination with a web-converting machine including a supporting frame, a pair of intergearing carrier drums, and means for driving the drums; an auxiliary frame fast to the converting-machine frame, a plurality of web-feeding rolls mounted in coacting relation on the auxiliary frame, means whereby the feeding-rolls are driven from the converting-machine, a cutter-blade extending radially from one of the feeding-rolls, a spirally milled cutter roll mounted on the auxiliary frame in coacting relation to the cutter-blade, and means for rotating the cutter roll at a higher speed than that of the feeding rolls whereby a clean transverse shearing of the web results each time the cutter-blade comes into coactive relation to the cutter roll.

14. In combination with a web-converting machine including a supporting frame, a pair of intergearing carrier drums, and means for

driving the drums; an auxiliary frame fast to the converting-machine frame, a plurality of web-feeding rolls mounted in coacting relation on the auxiliary frame, means whereby the feeding-rolls are driven from the converting-machine, a cutter-blade extending radially from one of the feeding-rolls, a spirally milled cutter roll mounted on the auxiliary frame in coacting relation to the cutter-blade, means for rotating the cutter roll at a higher speed than that of the feeding rolls whereby a clean transverse shearing of the web results each time the cutter-blade comes into coactive relation to the cutter roll, and means associated with certain of the web-feeding rolls whereby the resulting cut sheets are positively fed about these rolls and to the web-converting machine.

15. In combination with a web-converting machine including a supporting frame, a pair of intergeared carrier drums and means for driving the drums; an auxiliary frame fast to the converting-machine frame; a plurality of web-feeding and cutting units carried by the auxiliary frame; each unit comprising a plurality of intergeared web-feeding rolls; means for driving them from the converting-machine; a spirally milled cutter roll rotatably mounted on the frame; means for rotating the cutter roll at greater speed than that of the feeding-rolls; means carried by one of the feeding-rolls for periodic coaction with the cutter roll to transversely sever a web being fed through the unit; and means associated with certain of the feeding-rolls whereby the resulting cut sheets are positively fed about said rolls and to the converting-machine.

16. In combination with a web-converting machine including a supporting frame, a pair of intergeared carrier drums and means for driving the drums; an auxiliary frame fast to the converting-machine frame; a plurality of web-feeding and cutting units carried by the auxiliary frame; each unit comprising a plurality of intergeared web-feeding rolls; means for driving them from the converting-machine; a spirally milled cutter roll rotatably mounted on the frame; means for rotating the cutter roll at greater speed than that of the feeding-rolls; means carried by one of the feeding-rolls for periodic coaction with the cutter roll to transversely sever a web being fed through the unit; and means associated with certain of the feeding-rolls whereby the resulting cut sheets are positively fed about said rolls and to the converting-machine; the action of said units being so correlated that the sheets are fed to the converting-machine in predetermined sequence.

17. In combination with a web-converting machine including a supporting frame, a pair of intergeared carrier drums and means for driving the drums; an auxiliary frame fast to the converting-machine frame; a plurality

of web-feeding and cutting units carried by the auxiliary frame; each unit comprising a plurality of intergeared web-feeding rolls; means for driving them from the converting-machine; a spirally milled cutter roll rotatably mounted on the frame; means for rotating the cutter roll at greater speed than that of the feeding-rolls; means carried by one of the feeding-rolls for periodic coaction with the cutter roll to transversely sever a web being fed through the unit; and means associated with certain of the feeding-rolls whereby the resulting cut sheets are positively fed about said rolls and to the converting-machine; the action of said units being so correlated that the sheets are fed to the converting-machine in sequence with the leading ends of sheets from one unit disposed centrally between the ends of the sheets from the other unit.

In testimony whereof I affix my signature.  
WILLIAM H. CANNARD.

70  
75  
80  
85  
90  
95  
100  
105  
110  
115  
120  
125  
130