Feb. 15, 1944. E. G. STAUDE 2,341,956

PATCH APPLYING MECHANISM

Filed July 22, 1943

Fig. 1.

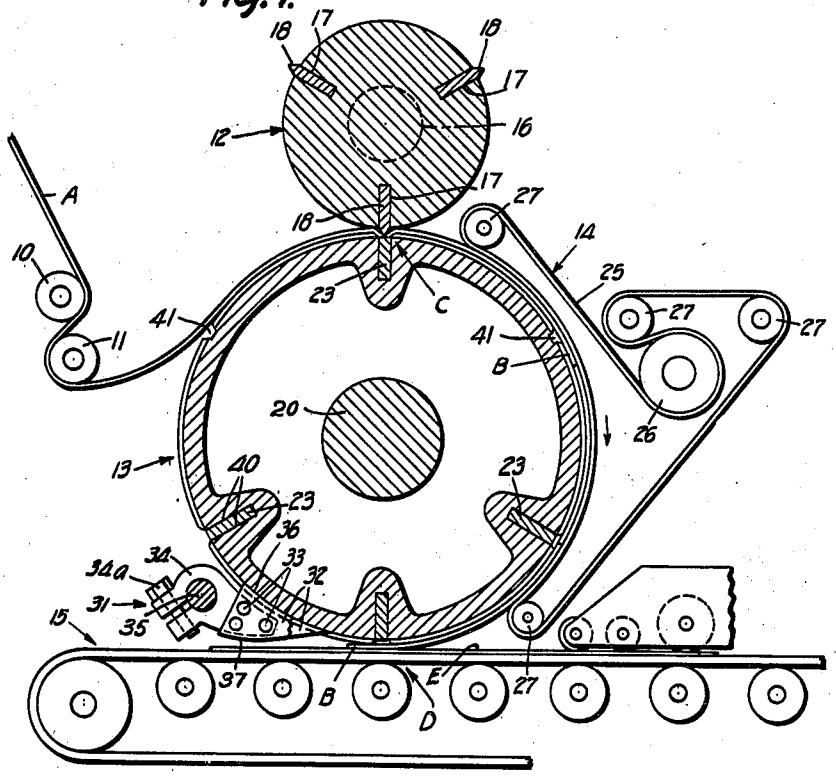


Fig. 2.

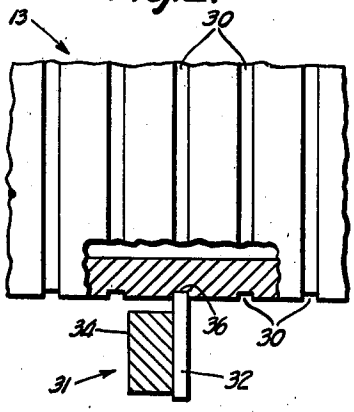
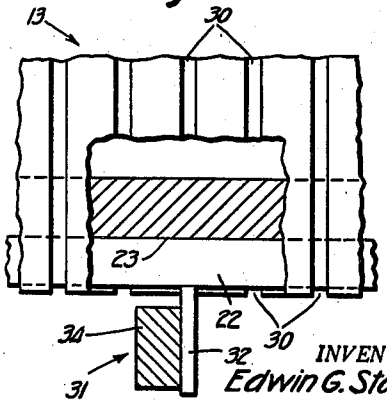


Fig. 3.



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2,341,956

PATCH APPLYING MECHANISM

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2 Claims. (Cl. 164—68)

The present invention relates to improvements in machines of the general type shown in my Patent No. 2,291,841 for cutting a thin flexible web into sections and successively applying these sections to predetermined areas of sheet material. Such a machine, for example, may be employed for cutting a roll of glassine, "Cellophane" or other lining or patching material into sheets or sections, and for adhesively applying these severed sections to box blank units, to form windows or linings, or patches for said units.

In a machine of the general type referred to, there is provided means for advancing the box blanks or other sheet units employed towards an assembly or sheet applying station, means for cutting the advancing flexible web into sheets or sections of predetermined length, and means for successively feeding the section from said cutting means towards said assembly station in timed relationship with the advancing blanks to effect registering adhesive application of said sections to said blanks at said station. In machines of this general type, there is provided a cutter for severing the flexible web into sections, and a cylindrical feed drum cooperating with said cutter to cut said web into sections, and adapted to advance the severed sections successively to the assembly station where they are applied to the box blank or other sheet units employed. It is important with this type of machine that the severed web sections are retained on said drum in predetermined spaced relationship against slippage as they are advanced to the assembly station.

The use of suction on the feed drum has been suggested for the purpose of retaining the severed web sections against slippage as said sections are advanced between the cutting station and the assembly station. However, the use of suction for this purpose entails certain disadvantages. For example, a vacuum system is expensive to install and operate, since it requires a vacuum pump, vacuum conduit connections and sealing devices to prevent leakage. The use of a vacuum for the purpose indicated also involves the drilling of a large number of small suction holes in the feed drum, thereby adding materially to the cost of manufacture. Furthermore, these suction holes become clogged with lint and dirt, and require frequent cleaning. This cleaning operation is tedious and time-consuming, and cuts down materially on the production of the machine. In addition, it is necessary periodically to take the feed drum apart and remove the lint and wax coating of the paper from the inner walls of the vacuum conduits.

Also, in a suction feed drum, it is necessary to provide means whereby the air current is reversed at intervals to blow the web sections off the surface of the feed drum as they join their respective blanks or sheet units. To provide for such alternate reversal of air current through the suction holes of the feed drum, additional expensive equipment is required. Furthermore, such alternate pressure operations materially slow down the speed of production of the machine. Moreover, upon reversal of the air current from a vacuum condition to a pressure condition, oil from the vacuum system may find its way to the surface of the feed drum, and thereby soil the web sections thereon.

One object of the present invention is to provide new and improved patch applying cylinder constructed to permit the effective use of stripping fingers for positively removing the severed thin flexible sheets from said cylinder after said sheets have contacted the respective articles to which they are applied.

Another object is to provide a new and improved sheet feeding and stripping mechanism which is comparatively simple and inexpensive to manufacture, which requires a minimum of care and attention, which lends itself to high speed operation and which is highly effective for the intended purpose.

A further object is to provide a new and improved sheet feeding drum, constructed to effectively retain sheets thereon for advancement between a rotary cutter and an assembly station without the use of suction, and having means whereby the sheets are positively stripped off said drum after their application to respective sheet units without interfering with the cutting function of said drum in cooperation with said rotary cutter.

In carrying out the features of the present invention, the use of vacuum for retaining the sheets or severed web sections on the feed drum is dispensed with, and the severed web sections are made to travel circumferentially with the feed drum by means of a device yieldably pressing said sections against the drum periphery and driven in unison with the peripheral surface of said drum, so that the advancing severed web sections are frictionally retained against slippage in their proper positions on said surface. After the leading ends of the web sections have been applied to the box blanks or other sheet units employed in this device, suctorial attraction or attraction due to static electricity may tend to continue the travel of these sections with the feed drum as

they are advanced away from the assembly station. To prevent this adverse operation, the feed drum is provided with a series of shallow circumferential grooves for the purpose of allowing air to enter therein behind the web sections and thereby facilitate the pulling of said sections from the drum surface.

The tenacity of the adhesive between the severed web sections and the box blanks or other sheet units at the point of application is ordinarily sufficient to pull said sections away from the periphery of the circumferentially grooved drum. However, there may be web sections which will not attach themselves to the sheet units but will be carried with the feed drum beyond the point of assembly or application as the result of static electrical attraction. This is especially true in cases where the severed web section employed has an unglued "leader" at its forward end.

A device is provided for positively stripping the web sections from the feed drum periphery after the leading ends thereof have been applied and adhesively attached to the box blanks or other sheet units employed. This device comprises one or more fingers extending into the respective circumferential drum grooves beyond the assembly station, and serving to strip or peel off the web sections from the drum periphery as they move beyond said station.

The feed drum is provided with one or more anvil or platen bars which are adapted to cooperate with the knife or knives of the rotary cutter to sever the flexible web into sections, and which are radially set into longitudinal grooves inwardly of the outer cylindrical drum surface a sufficient distance to prevent their interference with the stripping fingers.

Various other objects, features and advantages of the invention will be apparent from the following particular description, and from an inspection of the accompanying drawing, in which

Fig. 1 shows diagrammatically a machine embodying the features of the present invention, parts of this machine being shown in vertical section and parts in side elevation;

Fig. 2 is a detailed section of the machine taken approximately across a stripping finger radially of the feed drum in one rotative position of said drum; and

Fig. 3 is a detailed section of the machine similar to that shown in Fig. 2, but with the feed drum in a different relative position.

Only those parts of the complete machine involving the novel features of the present invention are shown in the drawing, the other parts not shown being similar to those disclosed in my Patent No. 2,291,841. In this machine, the thin flexible web A of "Cellophane," glassine or other sheet material is continuously advanced from a reel (not shown) at a predetermined speed over an idler roll **10** and under a loop forming roll **11** to the cutting field C of two coacting rotary cutting heads **12** and **13**, where said web is cut into sections or sheets B of predetermined lengths. These web sections B are then engaged by a friction belt device **14** which yieldably presses said sections against the periphery of the lower rotary cutting head **13**, and which is positively driven at a linear speed corresponding to the peripheral speed of said rotary head **13** to advance the severed web sections B without slippage toward an assembly station D.

The sheet material E is advanced towards the assembly station D desirably in the form of separate sheet units, and may specifically consist of blanks having respective openings with bordering streaks of adhesive over which the severed sheet or web sections B are successively attached as said web sections and said blanks come into respective registry to form windows for said openings or linings for the blanks in case no openings are provided in said blanks. These sheet units or blanks E are fed successively along a conveyor system **15** in predetermined spaced relationship to meet the advancing web sections B respectively at the assembly station D.

The web A is normally delivered to the cutting station C at a linear speed which is less than the peripheral speed of the rotary cutting heads **12** and **13** and therefore said web before being severed slips on the surface of the cutting head **13**. At the cutting station C at the instant when the knives **18** cut against the anvils **23**, the web A must travel at the peripheral speed of the rotary cutting heads **12** and **13**. To allow for this periodic increase in the speed of web feed, the loop forming roll **11** is caused to rise in synchronism with the cutting action, after which said roll slowly returns downwardly to establish the loop in the web A in preparation for the next cut-off period, as shown and described in my prior patent.

The upper rotary cutting head **12** is in the form of a cylinder fixed to a shaft **16** and having one or more longitudinal grooves **17**, three being shown spaced 120° apart. Knife blades **18** are adjustably secured in respective grooves **17** with their outer bevel cutting edges projecting radially outwardly beyond the periphery of the rotary head **12**, in a manner shown in my prior patent.

The lower rotary cutting head **13** is in the form of a cylindrical drum which is shown substantially larger in diameter than the upper cylindrical head **12** it being understood, however, that both cutting heads may be of the same diameter. Drum **13** is fixed to a shaft **20** driven in synchronism with the shaft **16** to cause the two rotary heads **12** and **13** to rotate at the same peripheral speed. This cylindrical drum **13** carries one or more anvil or platen bars **22**, three being shown, which are inserted in respective longitudinal grooves **23** in said drum, and which move into contact with the cutting edges of the blades **17** on the cutting head **12** at intervals, adjustably to cut the web A at the desired transverse sections. These platen bars **22** are removably retained in their respective grooves **23** by any suitable means, as for example by set screws (not shown).

The cylindrical drum **13** serves not only as a rotary cutting head, but also as a feed drum for advancing the severed web sections B successively between the two operating stations C and D. The friction belt drive **14** cooperating with the feed drum **13** to advance the severed web sections B between the two stations C and D, is similar to that shown in my prior patent, and comprises generally an endless tape belt **25** extending around a drive pulley **26** and over a series of idler pulleys **27** in yieldable contact with a substantial portion of the periphery of the drum **13** between said stations. Two or more of these belt units may be provided individually adjustable laterally of the path of feed of the web sections B.

As the box blanks E or other sheet units employed are advanced along the conveyor **15** towards the assembly station D, the web sections B move towards said station into registry with respective sheet units E where they are applied to the adhesively coated faces of said sheet units.

Suction attraction due to the absence of air between the web sections B and the peripheral surface of the feed drum 13 may cause said sections to overcome the tenacity of the adhesive and follow the periphery of the feed drum 13 beyond the assembly station D. To prevent such action, the feed drum 13 is provided with a series of circumferential grooves 30 which allow the air to enter behind the severed web sections B on the feed drum 13, and thereby reduce or break up any suction tending to attract said sections to said feed drum.

In spite of the use of the circumferential grooves 30 for the purpose indicated, the static in the feed drum 13 may be sufficient to cause the web sections B to follow the periphery of said feed drum beyond the assembly station D. To prevent this adverse condition, there is provided beyond the assembly station D a stripping device 31 comprising a plurality of stripping fingers 32 extending into respective circumferential drum grooves 30 with a fit loose enough to permit rotation of the drum 13 without frictional interference or resistance from said fingers. These stripping fingers 32 are desirably in the form of plates secured by studs or bolts or rivets 33 to respective holders or brackets 34 which are clamped to a rod 35, by screws 34*a*, along which said holders may be adjusted according to the desired position of the stripping fingers. Each of these fingers 32 has an inner edge 36 conforming substantially in curvature with the contour of the base of the circumferential drum grooves 30, and an outer cam edge 37 which converges towards said inner edge to a stripping extremity near the assembly station D, and which serves to move and guide the stripped web sections away from the periphery of the drum 13 as these are advanced beyond the assembly station D. The outer cam edge 37 is also of such a contour that when a holder 34 for some reason becomes loose on the rod 35 and drops down on the conveyor 15, the point of the corresponding stripper finger 32 will not dig into the moving conveyor 15, since the cam edge 37 will strike the conveyor first and thus hold this point out of contact with said conveyor.

The number of stripping fingers 32 which may be employed may vary according to the width of the web sections B to be stripped. In an ordinary case, three stripping fingers 32 are sufficient.

To prevent the interference of the stripping fingers 32 with the platen bars 23 as these travel past these stripping fingers, the platen bars 22 are set inwardly from the outer periphery of the feed drum 13 with their outer longitudinal cutting edges extending substantially flush with the bases of their corresponding retaining grooves 30.

The outer edge of each cutting anvil 23 must be on the pitch line of the driving gears. This is accomplished by increasing the diameter of the drum 13 beyond the pitch diameter of its corresponding drive gear by twice the depth of the groove 30. In practice, the depth of this groove 30 would only be about $\frac{1}{32}$ of an inch, and the full depth of this groove would extend radially outwardly beyond the outer edge of the anvil 23. In this manner, the cutting elements 18 and 23 will travel with the web A at the instant of cutting without slippage between these elements.

The side walls 40 of the longitudinal or axial grooves 23 extending outwardly beyond the platen bars 22 are desirably flared outwardly to afford the necessary space for the progressive movement of the knife blades 18 into cutting contact with the outer longitudinal cutting edges of the platen bars 22, and to prevent sharp bending of the web A during cutting action. The outer longitudinal corners of the side groove walls 40 are desirably rounded off to prevent the web A from being cut, bent sharply or otherwise injured along these corners during cutting action.

The platen cutting bars 22 are shown arranged in a manner similar to that indicated in my prior patent, and these may be increased or decreased in number, and/or the cutting blades 18 may be rearranged, increased or decreased according to the desired length of the web sections B to be cut. The number of platen cutting bars depends upon whether only one sheet or two or three sheets are required to be severed per revolution of the drum 13. Obviously, where no severing is required, at any particular platen bar, such platen bar is either removed from the drum or lowered out of cutting contact. A similar situation obtains with respect to the cutting knives in cylinder 12. Those sections of the feed drum 13 which normally come opposite the knives 18, but which do no cutting are provided with longitudinal grooves 41 to permit said knives to pass without marring the web A or the knives.

I have described what I believe to be the best embodiments of my invention. I do not wish, however, to be confined to the embodiments shown but what I desire to cover by Letters Patent is set forth in the appended claims.

I claim:

1. A machine for combining thin flexible sheets severed from a web to flat articles, comprising means for feeding a web, a web severing cylinder having cutting knives arranged axially on the periphery of said cylinder, a co-acting sheet applying cylinder having annular grooves in its periphery, cutting anvils co-acting with said cutting knives in said web severing cylinder, and arranged axially on said sheet applying cylinder, the outer surface of said anvils being so mounted that they do not extend outwardly beyond the bottom of said annular grooves, the thin flexible severed sheets being retained on the periphery of said sheet applying cylinder without substantial slippage for a part of the revolution of the sheet applying cylinder and being advanced thereby towards an assembly station where said sheets are applied by said latter cylinder to respective flat articles and stripper fingers operating in the annular grooves of said sheet applying cylinder over the cutting surface of said cutting anvils to prevent winding of said flexible sheets around said sheet applying cylinder.

2. A machine for cutting a web of thin flexible material into sheets and applying these sheets to respective flat articles comprising a web severing cylinder having a cutting knife arranged on the periphery of said cylinder lengthwise thereof with its cutting edge extending radially outwardly beyond the periphery of said cylnder, a sheet advancing and applying cylinder having a plurality of circumferential axially spaced grooves, said sheet advancing and applying cylinder also having a longitudinal peripheral groove and a cutting anvil retained in said longitudinal groove with its outer longitudinal cutting edge set radially inwardly from the outer periphery of said sheet applying cylinder, said cutting anvil being adapted to come periodically into cutting contact with said knife as said cylinders are rotated and to move with said knife and said web at the in-

stant of cutting, means for feeding a web of thin flexible material between said cylinders into the cutting field of said knife and said anvil, whereby said web is cut into sheets, means for advancing the cut web sheets in unison with the periphery of said sheet applying cylinder away from the web cutting field of action and towards an assembly station where said sheets are applied by said latter cylinder to respective flat articles, and stripper fingers extending into said annular grooves respectively beyond said assembly station to prevent winding of said sheets around said sheet applying cylinder as they are advanced beyond said assembly station, said cutting anvil extending in said longitudinal groove with its cutting surface radially inwardly beyond said fingers to prevent interference of said fingers with said anvil.

EDWIN G. STAUDE.