Nov. 12, 1968 H. A. RUGGERI 3,410,162

APPARATUS FOR MANUFACTURING FILM RECORD CARDS

Filed June 15, 1966 2 Sheets-Sheet 1

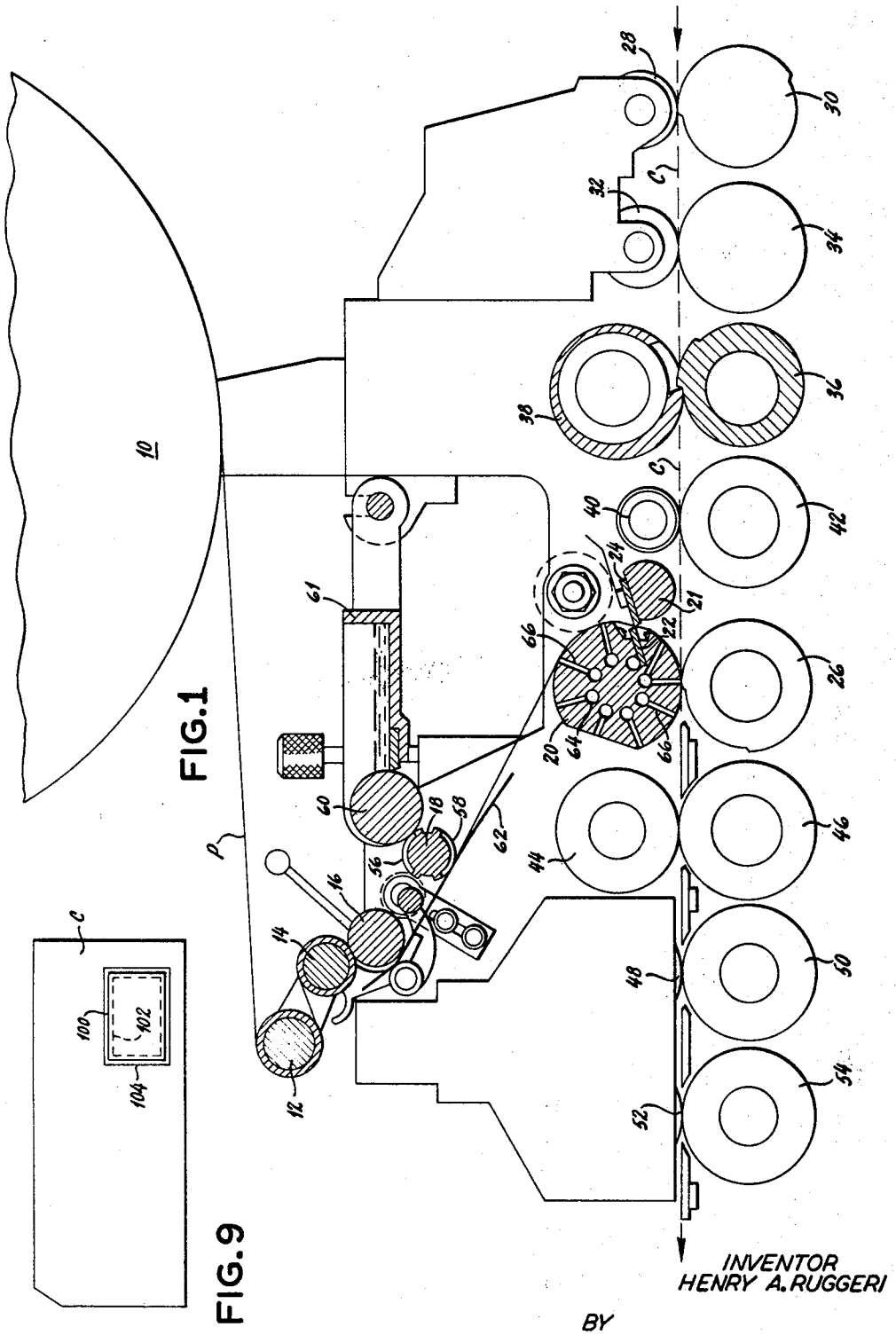


FIG. 1

FIG. 9

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APPARATUS FOR MANUFACTURING FILM RECORD CARDS

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FIG. 2

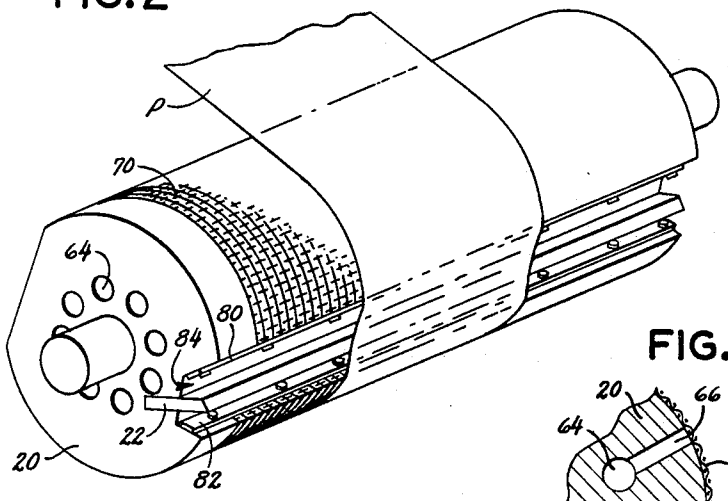


FIG. 3

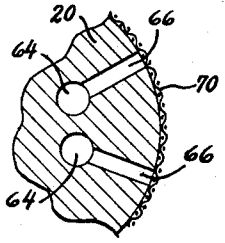


FIG. 4

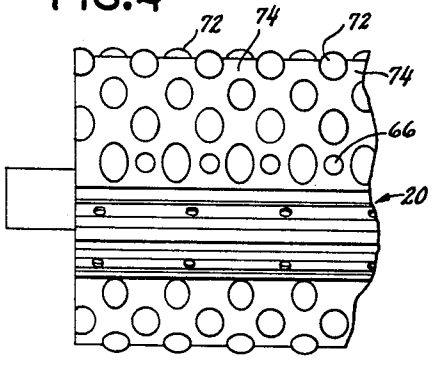


FIG. 5

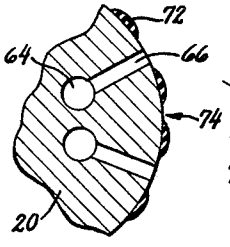


FIG. 8

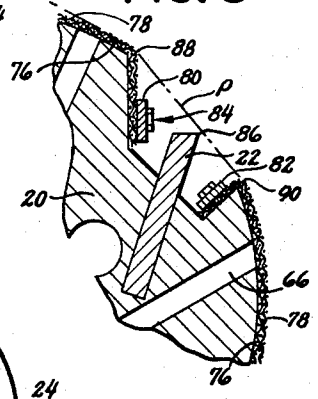


FIG. 6

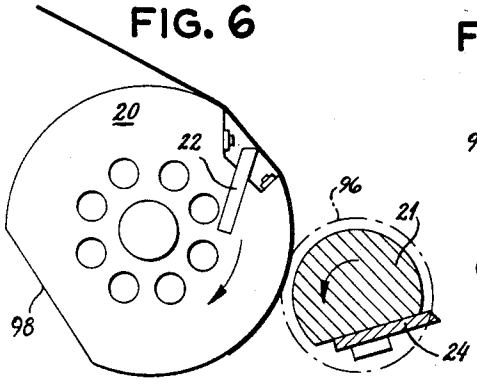
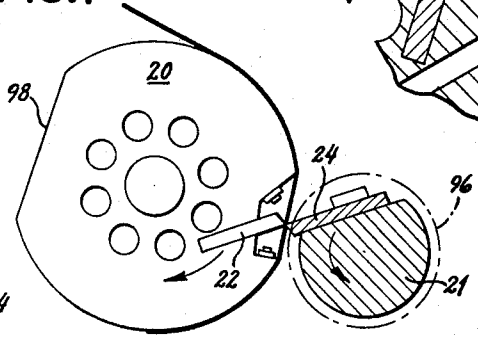


FIG. 7



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APPARATUS FOR MANUFACTURING FILM RECORD CARDS

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Filed June 15, 1966, Ser. No. 557,777
9 Claims. (Cl. 83—100)

ABSTRACT OF THE DISCLOSURE

In a film record card making machine a patch of film material is applied to a card passing between two rolls, one of which is a vacuum roll. The patch is cut from a web feed to the vacuum roll at a speed slower than that of the roll and means are provided on the roll to prevent scratching of the web due to slippage between the roll and web. A cut off blade carried by the vacuum roll is also so arranged as to prevent scratching of the web.

This invention relates generally to apparatus for manufacturing film record cards, and more specifically, this invention relates to apparatus for permanently associating, at high speed, patches of film with individual record cards adapted to receive the film.

Record cards are commonly in use in connection with electrical card handling machines for the filing and storage of certain information, data, etc. Such record cards are sometimes used for the storage of microfilm, both undeveloped and developed. The microfilm is normally affixed to a record card over an opening therein. Cards having the undeveloped microfilm may be used for making copies of the developed cards stored in a master file.

The present invention is principally concerned with taking the microfilm material in roll form, cutting patches of predetermined size from the roll strip, and permanently affixing the so-cut patches to record cards which are advanced in continuous motion through the machine.

The basic process of affixing the patches of film to record cards is, in some ways, analogous to affixing patches of transparent material to the windows or openings of envelope blanks. Various types of apparatus have been developed in the past for applying a patch of transparent material over openings in envelope blanks. For example, in the manufacture of so-called window envelopes, it is common practice to advance unfolded envelope blanks successively along a horizontal path, first cutting the opening in the blank, and then affixing the patch of transparent material over the opening. An example of such a method and mechanism is the patent of V. E. Heywood, No. 2,953,071, entitled "Manufacture of Window Envelopes," issued Sept. 20, 1960.

Basically, the method and mechanism described in the Heywood patent should be satisfactory for affixing film patches to record cards. However, the film material, which is commonly of a material such as acetate, tricite, triacetate, or the like, having a coating of photosensitive material, is so delicate, and is so easily scratched, that extreme care is required during handling. If the film, or coating, is scratched even microscopically, the usefulness of the film becomes seriously impaired.

The advantages of the method and mechanism of the Heywood patent are many, and will not be repeated herein in detail. Suffice it to say that basically it provides an extremely efficient, speedy, and accurate method and apparatus for affixing patches of material cut from a web over the openings of the blanks. Delicate material, however, has been found to receive serious scratches from parts of this mechanism. On the tougher envelope window

material, however, no scratching problem is encountered.

It is, therefore, an object of the present invention to provide mechanism, of the general type disclosed in the Heywood patent, for handling delicate material, thereby overcoming the problem encountered with common types of mechanism for affixing patches of material to a carrier.

It is another object of the present invention to provide mechanism for handling such material in an efficient, speedy, and accurate manner.

Other and further objects and advantages of the invention will become apparent from the following detailed description thereof, taken in connection with the accompanying illustrative drawings in which

FIGURE 1 is a side elevation view, partly in section, of mechanism embodying this invention.

FIGURE 2 is a perspective view, on a larger scale, of the vacuum roll which applies patches of film material to the record cards.

FIGURE 3 is a partial cross-sectional view of the vacuum roll illustrated in FIGURE 2.

FIGURE 4 is a partial elevation view of a vacuum roll similar to that shown in FIGURE 2, but illustrating a different embodiment of this invention.

FIGURE 5 is a partial cross-sectional view of the vacuum roll illustrated in FIGURE 4.

FIGURE 6 is a schematic view in elevation illustrating another feature of this invention, and showing the approximate position of the film web, vacuum roll, and knife previous to cutting the patch from the web for affixation to the film record card.

FIGURE 7 is a schematic similar to FIGURE 6, showing the patch at cut-off position.

FIGURE 8 is an enlarged partial cross-sectional view of the vacuum applicator roll in the vicinity of its blade.

FIGURE 9 is a plan view of a record card having a patch of film affixed thereto.

Referring to the drawings in detail, in FIGURE 1, a continuously moving high-speed succession of record cards C (shown in broken lines) passes from the right to the left between the various opposed rolls which are illustrated in the lower portion of this figure. At the same time, a web P of film material is drawn at constant speed from a large supply roll **10**, around a guide roll **12**, by its passage between a pair of contacting feed rolls **14** and **16**. The web P passes thence from left to right, first beneath a rotating gum applicator **18**, and then onto and embracingly around a constantly rotating vacuum applicator roll **20**, to be described in detail hereinafter. The surface speed of this roll **20** is substantially the same as the card speed, and the card patch is tangent to said roll's surface at a point which is almost 180° distant from the web material's initial contact with said surface. As the subtended length of slower speed web P moves along this right-hand half of the vacuum roll's surface (in the "slip-draft" manner later to be described), knives **22** and **24** will cut successive patches from the web. Immediately after each patch is cut, roll **20** will apply this pregummed patch at high speed to that record card which is then passing at high speed between the bite of vacuum roll **20** and its associated underlying platen roll **26**.

Cards C are advanced from right to left as viewed in FIGURE 1, being fed in timed, spaced succession into the first set of feed rolls **28** and **30** from hopper feeding means (not shown) or some other suitable feeding means. The cards C are then fed and held in alignment by the upper and lower feed rolls **32** and **34**. Openings are cut in the interior of the cards by the punch and die rolls **36** and **38** respectively. Cards C are thence fed through the feed rolls **40** and **42**, into the patch-applying rolls **20** and **26**. Cards C continue in their spaced progression

through the feed rolls **44**, **46**, **48**, **50**, **52** and **54**, and are finally discharged from the left-hand end of the machine onto a take-away conveyor (not shown), or the like, for packing. It should be understood that means for feeding the cards in spaced, timed relationship may be carried out by other means, e.g., a lug-chain appartus, and is not limited to the feed-roll arrangement illustrated in the drawings. The feed-rolls are illustrated only for the purpose of simplicity, and do not form a part of this invention.

The film web is fed out continuously from the supply roll **10** in predetermined amounts sufficient to provide a certain size patch for each card being "processed," or passed through the machine for patching. The feed rolls **14** and **16** control the amount of film web fed or metered out. The film web P passes a gum applicator roll **18** which is provided with land areas **56** and **58** which pick up adhesive from reservoir roll **60** rotating in communication with the interior of gum tub **61**. Patterns of adhesive are printed on the film web P at predetermined positions so that each piece subsequently cut from the end thereof has a pattern of adhesive for causing the piece to be adhered to its mating record card. It should be understood that, if desired, the machine may be designed such that the cards C, rather than the film patches, receive the adhesive pattern. For purposes of illustration, however, applicant has chosen to show the adhesive being applied to the film web P. In this case, the adhesive applicator roll **18** applies the adhesive to the web P against the backing plate **62**, which is adjustable to and away from the applicator roll **18**.

From the adhesive applicator roll **18**, the web P of film material is directed to the upper surface of vacuum applicator roll **20**, which is rotating at the full-line speed of the record cards C passing through the mechanism. As best shown in FIGURES 1 and 2, this roll has a plurality of inner, longitudinal channels **64** which are closed at one end of the roll **20**, but which open at the roll's other end against the inner face of a stationary vacuum distributor (not shown), concentric with the roll. The distributor's inner face provides, in the path of the several channels' open ends, an opening which is connected with the vacuum source. This distributor's opening is substantially co-extensive with the web-contacted right-hand half of the roll **20**, thereby to establish the access of suction to all the channels which at any given instant are occupying a position to the right of the vertical centerline of roll **20**. Channels **64** communicate with the outer surface of the roll by means of a plurality of spaced holes or ports **66** extending substantially radially outward from each of the channels **64**, along the lengths thereof. Under this arrangement, the right-hand portion of the surface of the vacuum applicator roll **20**, or, in other words, substantially the portion in contact with the film web P, will always be under light vacuum.

Since the peripheral speed of vacuum roll **20** is considerably greater than the linear speed of the web P of film material, as metered out by the slower speed feed rolls **14** and **16**, the length of web material on the right-hand half of roll **20**, though held closely by suction in the roll's surface, will be in constant slip-draft relationship to said rapidly rotating surface; the vacuum pull will hold the web against the right-hand surface of the roll while this relative slipping, or dragging effect occurs. Then, the web P will travel in a clockwise direction over the surface of the vacuum applicator roll **20** in a close fitting and slipping relationship until the foremost portion is severed from the web by the blade **24** of the rotating cutter roll **21**. This severed portion, released from restraint imposed by the film web's slower feed rolls **14** and **16**, will immediately assume full line speed of the vacuum applicator roll **20** against which it is held by the force of the vacuum, and as it does so, begins to contact and stick to the card C which, because of its timed progression relative to rotation of roll **20**, is directly thereunder, with the portion adapted to receive the patch in position.

Both the structure and operation of the mechanism described above are basically similar to that described in full detail in the above-mentioned Heywood Patent No. 2,953,071, and will not be again described in detail here, except for the part pertaining to the present invention, i.e., the vacuum applicator roll **20**.

In the Heywood mechanism, there are two conditions which cause serious scratching of the delicate film web, i.e., the blade of the vacuum roll is in sliding contact with one side of the film web from the point of initial contact to the cutoff point (point where the knife blades meet), and is about 90°. Minute irregularities in the edge of the blade which must slide under the web (drawn tightly over the blade because of the vacuum in roll) is a primary source of the scratching. Another primary source of scratching is the plurality of vacuum holes in the applicator roll. The vacuum has a tendency to pull the film partially into the holes, and as the applicator roll is moving at a faster peripheral speed than the advancement of the web, the film must slide continuously in and out of the vacuum holes. Minute irregularities naturally occur in the junction between the outer surface of the roll and the radially extending vacuum holes. It will be noted that vacuum is not evenly distributed to the underside of web because the vacuum acts only at the holes, and a relatively large amount of land area is subjected to no vacuum at all.

The present invention provides means for overcoming the conditions mentioned above which cause the serious problems in scratching the usable surface of the film.

According to this invention, the applicator roll **20** is made of a configuration such that the film web P is firmly supported radially beyond the cutting blade **22** on each side thereof during the time the roll **20** is in sliding contact with the web P, and by providing the web-supporting surface of applicator roll **20** with a multiplicity of smoothly rounded and spaced apart land areas having vacuum communicating channels between the land areas.

Referring especially to FIGURES 2–5 inclusive and FIGURE 8, the web supporting surface area of applicator roll **20** is covered with a porous screen or fabric **70** (FIGURES 2, 3 and 8), or the surface has been finished, as illustrated in FIGURES 4 and 5, to provide a multiplicity of smoothly rounded and finished land areas **72**. The land areas **72** act to support the film web P, and interconnecting vacuum communicating channels **74** serve to distribute the vacuum from holes or ports **66** over a relatively large portion of the surface area of the applicator roll **20**. In this manner, there is no concentration of vacuum acting on a relatively small area of the web P. The vacuum is evenly distributed over a substantial area of the film web P. The film web will gently conform to the smoothly rounded land areas **72** of the vacuum applicator roll **20**. It is not subjected to the action of sliding past sharp edges of the bare vacuum ports **66**. The smoothly rounded and finished land portions may either be integral with the roll, or, if not integral with the roll, firmly affixed thereto.

FIGURES 2 and 3, illustrate a preferred form of the invention where a piece **70** of porous screen, fabric, or the like, penetrable by vacuum, has been placed over the surface of the roll **20**. Screen of fabric is found to have a multiplicity of minute land areas which serve to support the film web, and interconnecting vacuum communicating channels which serve to distribute the vacuum from the holes **66** over a relatively large portion of the surface area of the applicator roll by the porous nature thereof. Examples of suitable screen material include Fiberglas and plastic material. Examples of porous fabrics which have been found suitable include nylon, silk, and velvet. Undoubtedly, there are other suitable materials, and these materials are only mentioned as examples. What is important, however, is that there be a smooth surface of

closely spaced land areas and vacuum communicating channels between the land areas, such as that found in a screen or vacuum-penetrating fabric.

FIGURE 8 illustrates the manner in which the screen or fabric may be fixed to the vacuum applicator roll **20**. Also, FIGURE 8 illustrates a slightly different form of the invention, wherein two layers of material are affixed to the surface of roll **20**, the layer **76** next to the roll's surface being a coarse-mesh screen, and the outer layer **78** being a relatively fine-mesh fabric. In this instance, the underlying layer **76** of coarse-mesh screen provides means for effectively distributing vacuum from the holes **66** over almost the entire underside of the vacuum-penetrating fabric **78**. The fabric, however, provides an almost solid support for the film web P, but still porous enough for vacuum to penetrate. The soft fabric also provides a very smooth surface over which the film web may slide. It should be understood, however, that it is not necessary that both the screen **76** and fabric **78** be used in combination, as shown in FIGURE 8. FIGURE 8 only illustrates that it is within the scope of this invention to use both in combination. The screen fabric, or the combination of both may conveniently be affixed to the roll **20** by means of the clamping bars **80** and **82** fitted in the longitudinal slot **84** on both sides of blade **22**.

Referring now especially to FIGURES 6–8 inclusive, cutter blade **22** is mounted in vacuum applicator roll **20** by any suitable means. Cutter blade **22** is mounted, however, such that its cutting edge **86** is below the effective periphery of the roll, or, in other words, such that its cutting edge **86** will be inside a chord struck between the two adjacent edges **88** and **90** of the roll. As best seen in FIGURE 8, the film web P, when stretched between these two edges **88** and **90**, will be spaced from the edge **86** of blade **22**. The web P will actually form a chord extending from **88** to **90**. Cutter blade **24** projects beyond the imiginary circumference **96** which would be tangent to the circumference and concentric with the central axis of cutter roll **21**. Since the edge **86** of blade **22** is below the circumference of roll **20**, a small amount of open space is left on both sides of blade **22** to prevent the blade **24** from contacting the roll adjacent knife **22**. It is apparent that the amount of space left open in this area is dependent upon several variables, i.e., the relative speed, relative roll diameters, and relative pitch diameters of the cutter blades **22** and **24**. In the drawings, roll **21** is designed to rotate twice for every revolution of roll **20**; hence, the flattened spot **98** in the roll **20** prevents the blade **24** from contacting roll **20** at this location.

FIGURES 6 and 7 have omitted many of the details of the vacuum applicator roll **20** for the sake of simplicity. These figures illustrate, however, the manner of cutting successive pieces from the end of film web P. FIGURE 6 illustrates the relative position of the cutter blades **22** and **24**, as well as the web P held snugly to the surface of roll **20**, at a point less than 90° from cutoff. FIGURE 7 illustrates the relative position just at the point of cutoff. It will be seen that in the illustration the cutter blade **22** is in contact with the film web P for a very slight distance just prior to cutoff. The amount of contact is a function of relative blade pitch diameter and relative speed of rolls **20** and **21**. This is not seen to cause serious scratching of the film web because any scratching which occurs will be immediately adjacent to the cutoff, and, therefore, within the area of where the film and card overlap for connection, and not in the useful area of the film.

FIGURE 9 illustrates a film record card C which may conveniently be manufactured by apparatus in accordance with this invention. Patch **100** is firmly affixed to card C over opening **102**. If desired, the area around the opening **102** defined by line **104** may be depressed, or the card thickness in this area may be reduced, so that the film patch **100** may be flush with the surface of the card C.

It will be understood that various changes in the details, materials, steps, and arrangements of parts, which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the scope of the invention as expressed in the appended claims.

I claim:

1. In an apparatus in which web material is fed at a relatively slow speed in a slipping manner over a vacuum roll rotating at a relatively high speed to have its leading portion severed and transported at vacuum roll speed to another moving surface traveling substantially tangentially to said vacuum roll, said vacuum roll having vacuum means acting from within, the improvement which comprises providing the work supporting portion of said roll with a surface having a multiplicity of smoothly rounded and spaced apart land areas having vacuum communicating channels between the land areas.

2. Apparatus according to claim **1** in which said improvement comprises a layer of porous woven material attached to the periphery of said roll.

3. Apparatus according to claim **1** in which said improvement comprises a roll surface finished to provide a multiplicity of smoothly rounded and spaced apart land areas having vacuum communicating channels between said land areas.

4. In an apparatus in which web material is fed at a relatively slow speed in a slipping manner over a vacuum roll rotating at a relatively high speed to have its leading portion severed and transported at vacuum roll speed to another moving surface traveling substantially tangentially to said vacuum roll, said vacuum roll having vacuum means acting from within, the improvement which comprises providing the work supporting portion of said roll with a sleeve having a multiplicity of minute openings communicating with the vacuum source, the walls of said openings blending smoothly into the land areas.

5. Apparatus for successively cutting patches from the end of a web of material comprising:

(a) two opposed, axially parallel rolls, one being a vacuum roll having suction communicated to its surface,

(b) cooperating cutter blades carried by said rolls,

(c) means for feeding and metering out said web over part of the periphery of said vacuum roll at a rate slower than the peripheral speed thereof, said suction holding said web in a taut, slipping relationship,

(d) said vacuum roll having recessed portions adjacent said blade, and web-supporting land areas on both sides of said blade of a radial extent such that the outermost tip of said blade lies within a straight line between the two web-supporting land areas,

(e) whereby the web will normally be supported on each side of said blade radially outward from the blade's edge.

6. Apparatus according to claim **5** in which the web-supporting land areas lie substantially on the roll's pitch circle, and the outermost tip of said blade lies within a chord between said web-supporting land areas.

7. In a roll for holding a moving web of material wrapped partially around its periphery in firm but slipping contact therewith by a vacuum means acting from within the said roll, the improvement which comprises providing the work supporting portion of said roll with a surface finished to provide a multiplicity of smoothly rounded and spaced apart land areas having vacuum communicating channels between said land areas.

8. In an apparatus for manufacturing film record cards, the combination comprising: a cooperating pair of feed rolls, means for feeding apertured cards in timed succession through said feed rolls, means for feeding a web of film material tangentially to the peripheral surface one of said feed rolls at a speed substantially less than the peripheral speed of said one feed roll, the peripheral surface of

said one feed roll including a work supporting portion having a multiplicity of smoothly rounded and spaced apart land areas having vacuum communicating channels between said land areas, vacuum means acting from within said one feed roll and communicating with said channels on said work supporting portion of said peripheral surface for holding said web of film material in firm but slipping contact with said work supporting portion of said peripheral roll surface, and means for cutting a part of the film material held by said vacuum means to said one feed roll from the remainder of such film material to form a patch applied to a card passing between said rolls.

9. The combination defined in claim 6 further characterized by a layer of porous woven material attached to

the periphery of said one feed roll and providing said multiplicity of smoothly rounded and spaced apart land areas and said vacuum communicating channels between said land areas.

References Cited

UNITED STATES PATENTS

1,175,940	3/1916	Farnsworth et al.	162—372
1,439,493	12/1922	Tohms	162—372 X
1,805,780	5/1931	Millspaugh	162—372
2,911,040	11/1959	Hornbostel	162—372 X
2,953,071	9/1960	Heywood	93—61

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