Feb. 10, 1970 E. S. LINDAU 3,494,232

SLITTER AND CUTTER APPARATUS

Filed Aug. 10, 1967 2 Sheets-Sheet 1

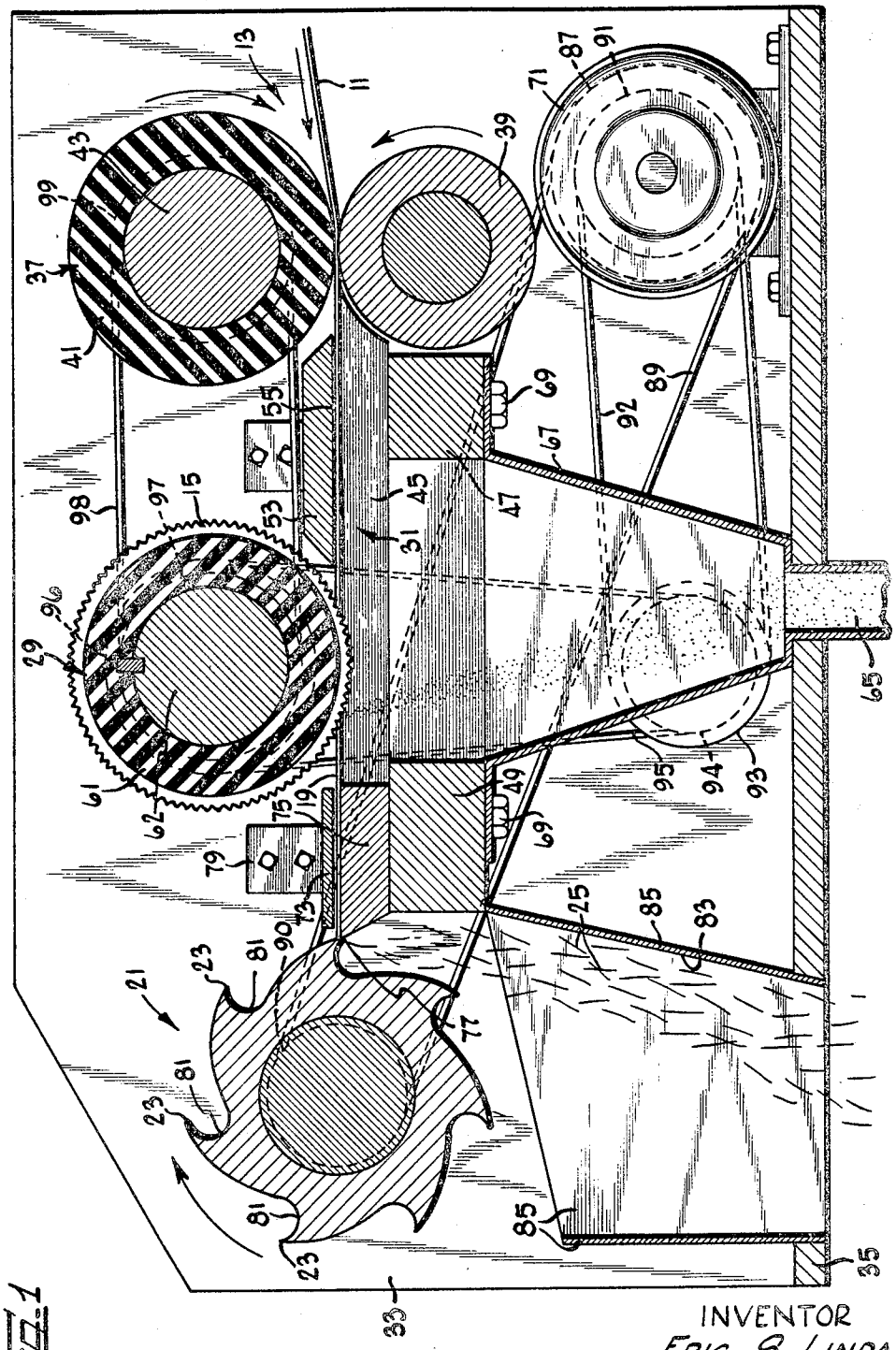


Fig. 1

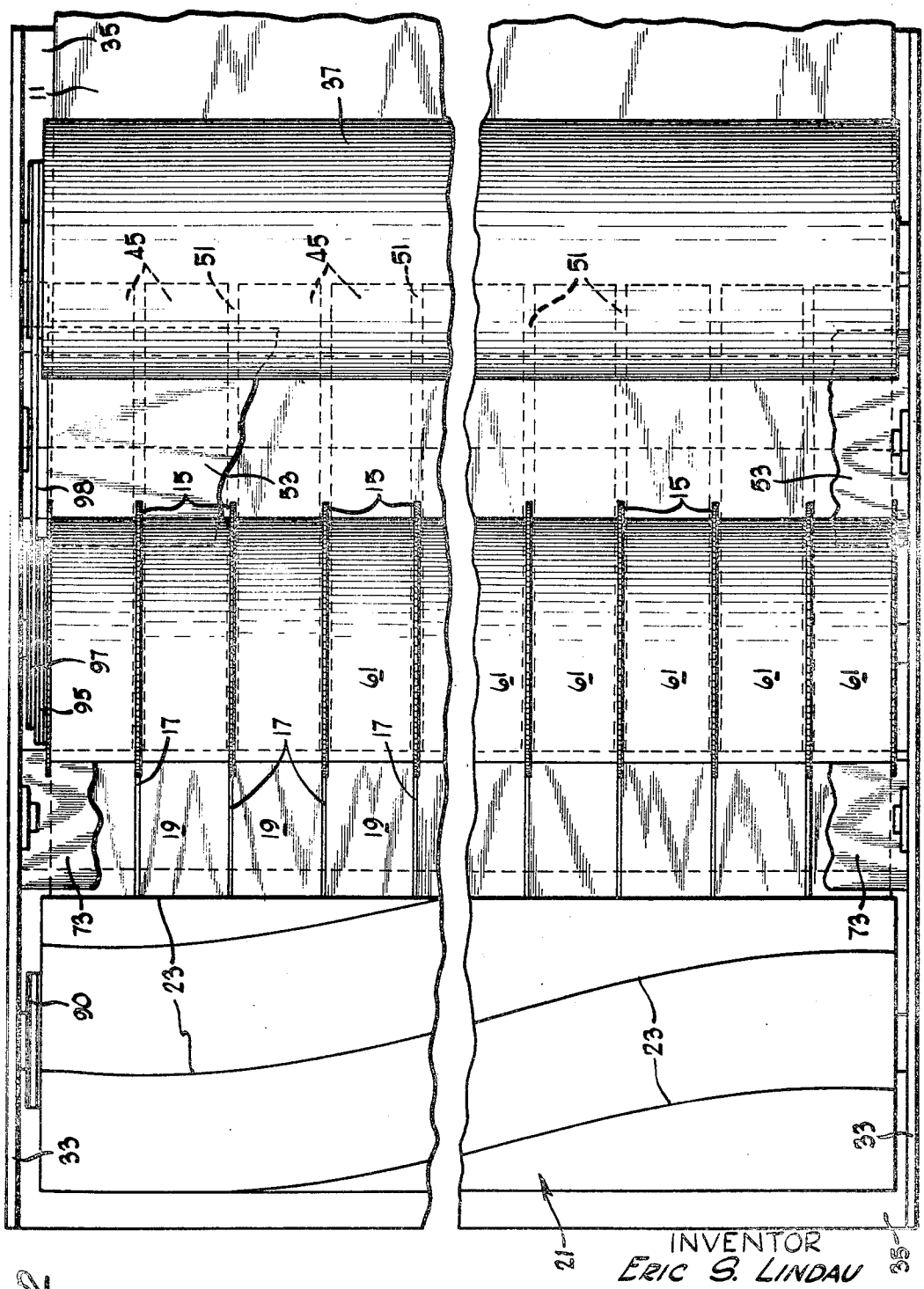
INVENTOR
ERIC S. LINDAU

BY Anderson, Luedeka, Fitch, Even, & Tabin
ATTORNEYS

Feb. 10, 1970 E. S. LINDAU 3,494,232

SLITTER AND CUTTER APPARATUS

Filed Aug. 10, 1967 2 Sheets-Sheet 2



INVENTOR
ERIC S. LINDAU

BY Anderson, Luedeka, Fitch, Even, & Tabin
ATTORNEYS

FIG. 2

United States Patent Office 3,494,232
Patented Feb. 10, 1970

3,494,232

SLITTER AND CUTTER APPARATUS

Eric S. Lindau, P.O. Box 483, Lake Forest, Ill. 60045

Filed Aug. 10, 1967, Ser. No. 659,691
Int. Cl. B26d 1/38
U.S. Cl. 83—100 3 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus in which large sheets or webs of tough material such as transparencies, wide photographic films, or X-ray films are cut into small discrete particles. The film is first slit into ribbons by toothed slitters and then a spiral cutting edge on a rotating blade moves progressively across the ribbons and severs them into individual chips.

This invention relates to an apparatus for cutting large sheets or webs of relatively tough material, such as transparencies, wide photographic films or X-ray films, into small discrete particles.

Such large size films are difficult to dispose of and are typically burned, which gives off offensive odors and toxic fumes, or are thrown away or mutilated by hand in a slow and laborious process. Such wide films are not easily cut across their entire length because of the toughness of the base material, which is usually cellulose acetate or some other tough plastic, and the tendency of the film to lift from the supporting base. There is a need for a machine capable of severing such wide films to destroy the information on the films and to produce small chips of film suitable for use in silver recovery processes. A desirable chip size is less than approximately one-half inch by one inch. Thus, films or X-rays wider than the usual 35 mm. movie film are severed both longitudinally and transversely into such small chips. To cut in a high and economical manner, the machine must be simple, long lasting and of compact size to be practical.

Accordingly, a general object of the invention is to provide an economical and high speed cutter for severing wide sheets or webs of phootgraphic film into small discrete particles.

A more specific object of the invention is to provide a cutting apparatus capable of slitting photographic or X-ray films longitudinally into ribbons and severing small chips from the ribbon.

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

FIGURE 1 is a sectional view taken along the line 2—2 of FIGURE 2 and illustrating a slitter and cutter apparatus embodying the novel features of the invention;

FIGURE 2 is a plan view of the apparatus of FIGURE 1.

As shown in the drawings for purposes of illustration, the invention is embodied, from a very general standpoint, in a cutter apparatus which receives wide-usually 5 inches or wider-sheets or webs **11** of material such as photographic or X-ray film. The film is fed forwardly by feed means, such as by the feed rollers **13**, to a series of rotatable toothed slitters **15** which cut slits or grooves **17** in the film, to form individual strips or ribbons **19** at the leading edge of the film. The ribbons move forwardly to a rotatable cutter **21** which has spiral blades **23** for progressively severing the ribbons into a plurality of small chips **25**. The sheet is difficut to feed forwardly and to hold flat while being cut, and to this end, it is preferred that individual feed rolls **29** be disposed between the cutter disks and extend to engage and feed the sheet forwardly, and also, it is preferred that a suction force be

applied to hold the sheet tight against a support **31** during both slitting and cutting. The suction also functions to remove dust, lint or other matter generated during the cutting operation.

Proceeding now with a detailed description of the slitter and cutter apparatus illustrated in the drawings, the apparatus is provided with spaced vertical side walls defined by a pair of vertical side plates **33** which are fixed at their lower ends to a main, horizontal base plate **35**. The apparatus may be small and quite compact in that it may be about the size of a conventional typewriter. The vertical side plates are relatively thick and serve to support bearings for journaling the rotating elements of the apparatus such as the feed rollers **13**.

To feed the film, whether it is an aerial film wound on a reel supported on a spindle (not shown) or one of a series from a stack of X-ray films, the leading edge of the film is inserted into the nip of upper and lower feed rollers **37** and **39** which rotate to feed the film forwardly, i.e., right to left in FIGURE 1. The upper feed roller **37** has an outer resilient sleeve **41** of rubber secured to an internal metal shaft **43** which is journaled in suitable bearings mounted on the side plates **33**. In this instance, the lower feed roller **39** is of a smaller diameter and is made of metal. The lower feed roller is journaled in bearings (not shown) for rotating about a generally horizontal axis parallel to the axis of the rotation of the upper feed roller **37**. It is preferred that the feed rollers touch with light pressure at the nip to grip the film which is usually about 1/16 of an inch thick. Preferably, the feed rollers are adjustably mounted so as to enable use with various thicknesses of film.

From the feed rollers **37** and **39**, the sheets move across the upper surface of the film support means **31** which is formed herein by a series of 3/8 inch wide bars **45** extending longitudinally in the direction of film travel. The bars **45** span a pair of horizontal, transversely extending bars **47** and **49**. Each of the bars **45** is separated from its adjacent bar by a 1/8 inch slot **51** (FIGURE 2) to receive the lower peripheral edges of the slitters **15** and to allow suction pressure to hold the film **11** on the flat upper surface of the bars **31**.

A film guide and hold-down means is provided between the feed rollers **13** and the slitter cutters **15** to hold the film flat and prevent its lifting or buckling. The guide and hold-down means are in the form of a bar **53** of triangular cross section fastened between the opposing side plates **33** with its lower surface **55** spaced over the upper surface of the lower support bars **31**. The slanted walls of the guide bar **53** extend close to the peripheral surface of the slitters and the feed rollers and thereby assure a support across substantially the entire space therebetween. To assist in holding the film and preventing its buckling during the slitting operation, particularly at the sides of slits being formed in the film, sleeves **61** of resilient rubber material are disposed at the rotatable slitter shaft **62** which is journaled for rotation in suitable bearings mounted on the side walls **33**. The lower surfaces of the sleeves **61** extend into engagement with the upper surface of the film and hold the film down against the support bars **31**. Thus, the sleeves are effective between the slitters and are effective at positions closely adjacent the point of actual slitting to hold down the strips and give them a forward push.

The films are usually made of cellulose acetate or from other tough plastic which is difficult to cut. Good results are obtained from the slitters, however, by the use of saw teeth on the outer peripheral edge of the slitter. The slitters **15** are relatively thin, being less than 1/8 inch in width in the preferred embodiment of the invention. Each slitter disk is abutted by one of the resilient rubber sleeves **61** along its radial face to hold the slitter

against bending or deflection. The combination of the resilient sleeves and disks have been found to be most effective in cutting such tough material which may tend to buckle or lift.

For the purpose of holding the film **11** during the slitting and cutting operations, it is preferred to provide a suction pressure to the underside of the film by means of a duct **65** which is connected to a suitable source of suction such as a vacuum pump (not shown). This suction also removes the dust and particles resulting from the sawing and slitting action of the slitters **15**. More specifically, the suction is effective to remove the dust from the grooves **51** to prevent their clogging and also to assist in cleaning the teeth of the slitters. In this instance, a sealed header duct **67** is fastened to the lower side of the transverse support bars **47** and **49** by fasteners **69** and extends transversely across the underside of all of the spaced bars **45**. The header duct **67**, in this instance, has tapered side walls leading to the duct **65** which is attached to be connected to an external vacuum pump (not shown). However, it is within the purview of the present invention to provide a vacuum pump on the base plate **35** and to drive the same by a motor such as the driving motor **71** for the slitters and feed roll **37**. In any event, the suction holds the strips formed at the leading edge of the film down on the bars **31** as they move under a horizontally disposed support plate **73** which is spaced about an upper surface on a fixed cutter block **75** having a forward cutting edge **77** for cooperation with the rotatable cutter blade **23**. The guide plate **73** is supported by suitable bracket arms **79** fixed to the side plates **33** to be spaced above the cutter block at a distance suitable to receive the film. The stationary blade is suitably fixed to the transverse support bar **49** preferably in a manner so as to be adjustable to position the cutting edge **77** parallel to and at a predetermined clearance with the rotatable cutter blades **23**.

The film strips are difficult to sever with a single shearing action, particularly with a small portable machine of the type described herein. It has been found that the strips or ribbons sever quite easily by being progressively cut across their strips from right to left as seen in FIGURE 2 as the edges of the spiral shaped cutting blades rotate close toward the straight cutting edge **77**. Thus, the strip is cut progressively from right to left across its width and each blade **23** progressively severs the strips from right to left.

In the preferred embodiment of the invention, six such spiral cutting blades **23** are formed and spaced equidistantly about the rotatable cutter **21** by spirally formed grooves **81** cut into the periphery of a metal cylindrical shaft. The ends of the shaft are formed with stub shaft ends which extend into suitable bearings (not shown) in the side walls for journaling the cutter **21**. As the ribbons are severed they form small chips which fall into a collective chute **83** formed by a series of enclosed walls **85** which lead downwardly to form suitable collecting container (not shown).

To drive the feeding and cutting means of the apparatus, it is preferred to employ a series of drive belts connected to the common drive motor **71**. The rotatable cutter **21** is driven at a higher speed than the speed of the feed rollers **13** and slitters **15**. To this end, a sheave **87** fastened to the motor drive shaft drives a belt **89** extending to a sheave **90** fastened to the rotatable cutter **21**.

To provide a speed reduction, the driving motor employs a smaller sheave **91** which drives a second belt **92** to turn an idler sheave **93** fastened to another smaller diameter sheave **94** about which runs a belt **95** extending vertically to a sheave **96** fastened to the support shaft **62** for the slitters. A second and smaller sheave **97** is fixed to the sheave **96** and drives a belt **98** extending to the sheave **99** fixed to the upper feed roller **37**. Thus, with the turning of the motor **71** the rotatable cutter **21**, slitters **15** and feed roller **13** are all driven in timed relationship and at the appropriate speeds.

From the foregoing, it will be seen that the relatively tough film is held against a supporting surface throughout substantially its entire length between a pair of feed rollers, slitters and cutters. Saw-toothed cutters disposed between driving sleeves provide a simple but effective manner of holding film while slitting the same.

While a preferred embodiment has been shown and described, it will be understood that there is no intent to limit the invention by such disclosure but, rather, it is intended to cover all modifications and alternative constructons falling within the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. An apparatus for cutting an X-ray or photographic film longitudinally and transversely into a plurality of chips, said apparatus comprising means to feed said film forwardly along a given path, slitter disks with toothed peripheral surfaces mounted for rotation and spaced transversely across the path of film travel to slit the sheet, motor means to rotate said tooth slitters to slit said film as it travels forwardly into a plurality of individual ribbons of film, and a rotatable cutter having a spiral cutting edge for severing progressively across the ribbons to cut individual chaps from each of said ribbons.

2. An apparatus in accordance with claim **1** in which the sheet of film rests on a support plate and each of the slitter disks extends into an aligned groove in the support plate, and in which means is provided to remove dust by suction from said grooves.

3. An apparatus in accordance with claim **1** in which rings space said slitter disks from each other and in which said rings extend to engage said sheet at a position closely adjacent to but spaced transversely of the slitter, said rings being rotatable with said slitters and feeding said film.

References Cited

UNITED STATES PATENTS

672,899	4/1901	Haasch	83—430
1,314,885	9/1919	Marko	83—408 X
1,939,925	12/1933	Schwartz	83—471 X
3,217,988	11/1965	Lightfoot et al.	83—408 X
3,224,311	12/1965	Wagner	83—408 X
3,293,962	12/1966	Gianaris	83—470
3,324,753	6/1967	Lindau	83—925 X

FOREIGN PATENTS

61,110	7/1939	Norway.
226,208	6/1943	Switzerland.

WILLIAM S. LAWSON, Primary Examiner

U.S. Cl. X.R.

83—408, 430, 470, 596, 925