United States Patent [19]

Wigand

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[45] **Oct. 7, 1980**

[54] **DEVICE FOR THE DESTRUCTION OF MICROFILM AND SIMILAR DATA CARRIERS**

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[22] Filed: **Oct. 10, 1978**

Related U.S. Application Data

[63] Continuation of Ser. No. 792,098, Apr. 29, 1977, abandoned.

[30] **Foreign Application Priority Data**

Sep. 15, 1976 [DE] Fed. Rep. of Germany 2641370

[51] **Int. Cl.**[3] **B02C 18/22**

[52] **U.S. Cl.** **241/34**; 83/356.3; 83/422; 241/160; 241/223; 241/243

[58] **Field of Search** 241/160, 223, 243, 222, 241/34, 32; 83/356.3, 356.1, 62, 422, 906, 355, 349

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Attorney, Agent, or Firm—Joseph A. Geiger

[57] **ABSTRACT**

A device for the destruction of microfilm and similar data carriers with microimage impressions which is designed to shred the data carriers by means of a rotating shredding cutter in the form of a plain milling cutter whose teeth move past a transversely extending stationary cutting edge. A strip feeding unit advances the data carrier strip past this cutting edge along a guide plate, said unit including a driven endless conveying member which forms a conveying gap with the guide plate. A second stationary cutting edge forms a second cutting point behind the first cutting point. The strip feeding unit is self-contained and movable against a spring bias in relation to the main frame and its guide plate, so that a safety switch, responding to such movement, stops the device when too many data carriers are fed into the device simultaneously.

21 Claims, 18 Drawing Figures

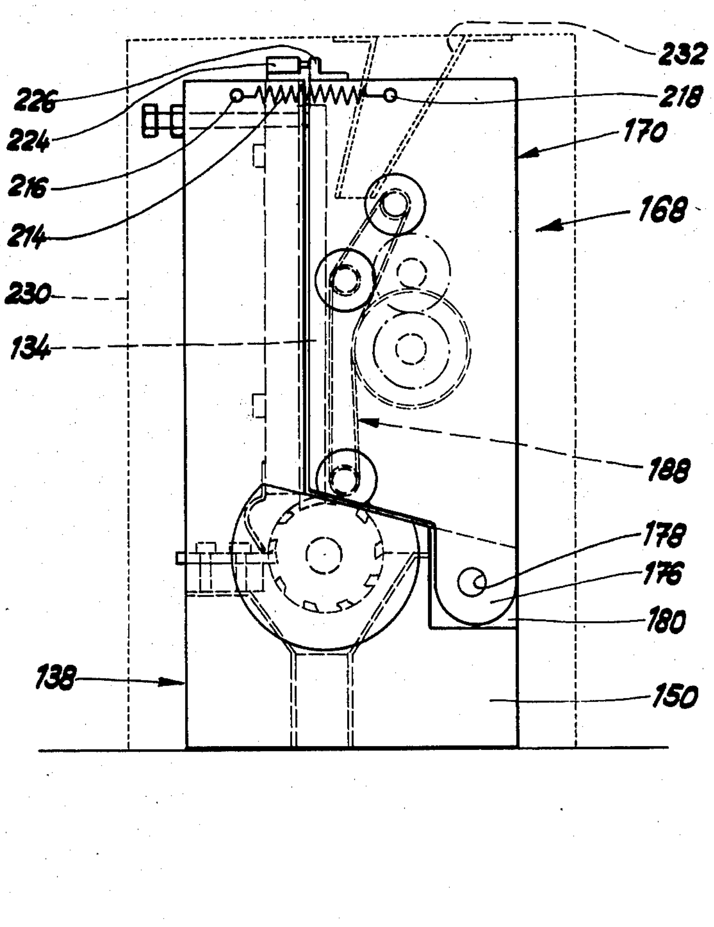

Fig. 1.

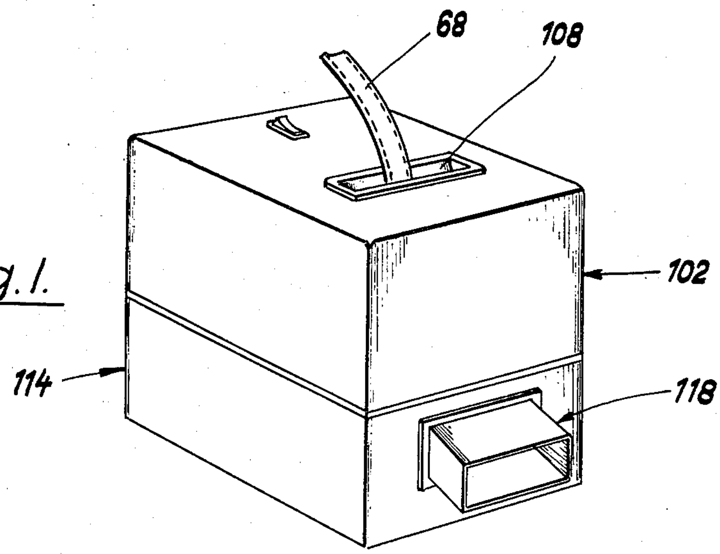
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Fig. 2.

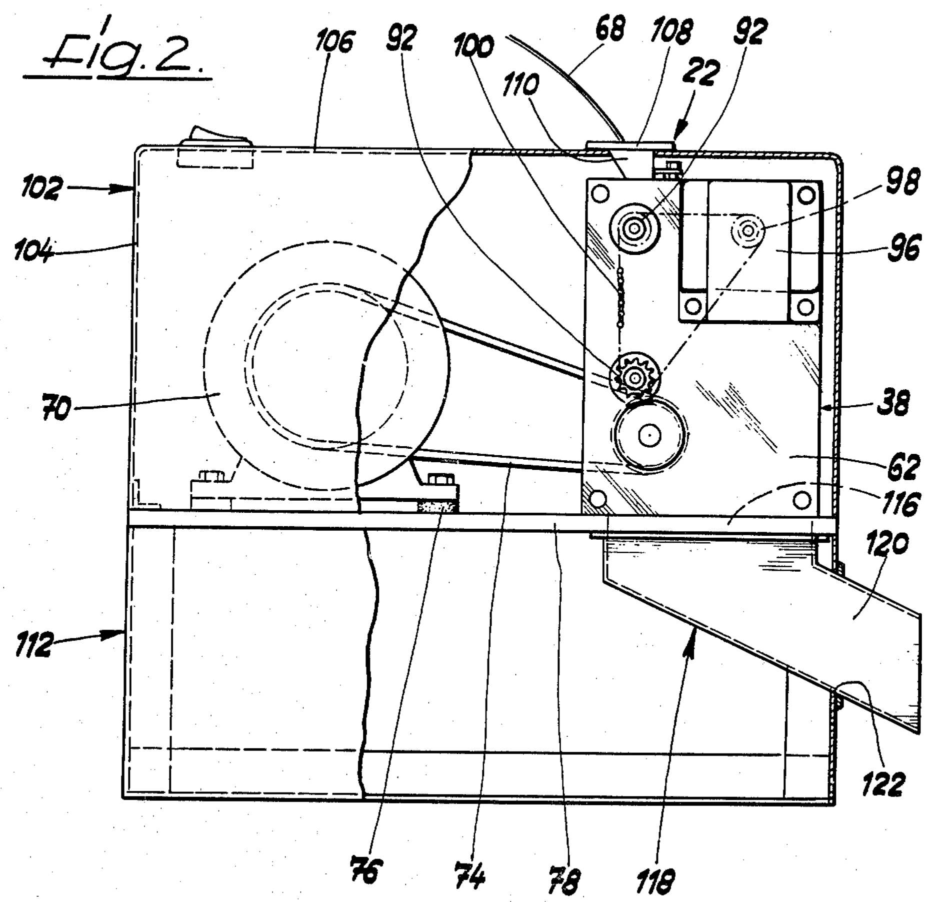
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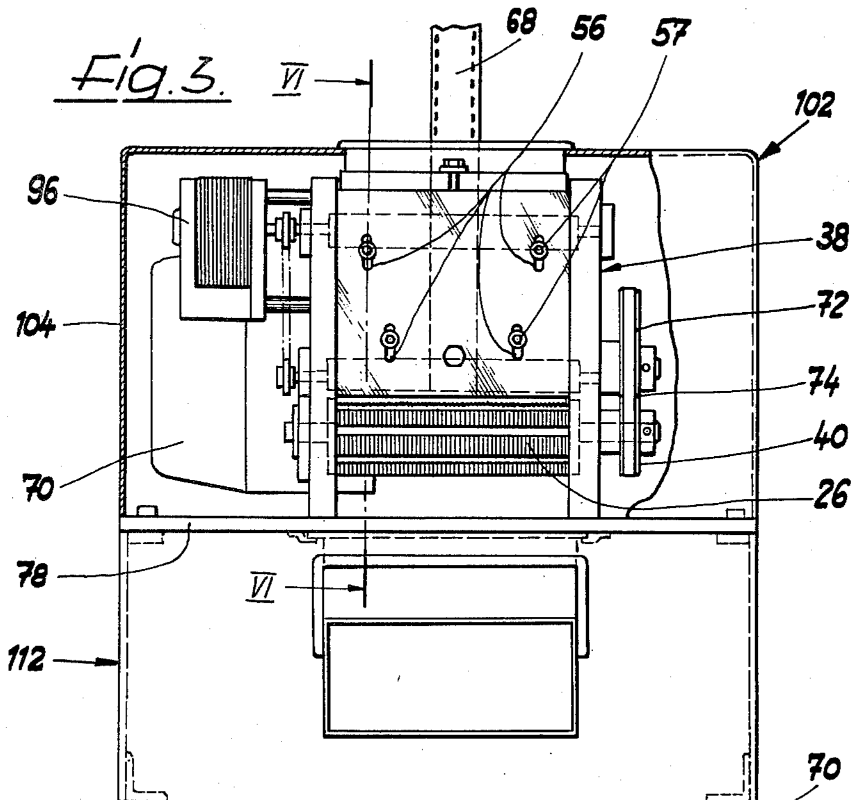
Fig.3.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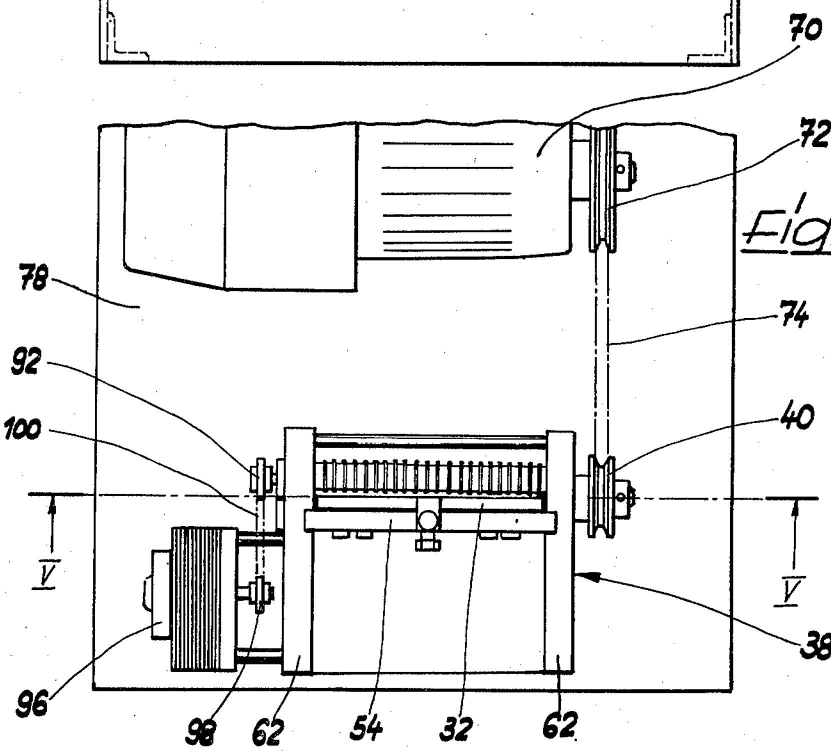
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Fig.4.

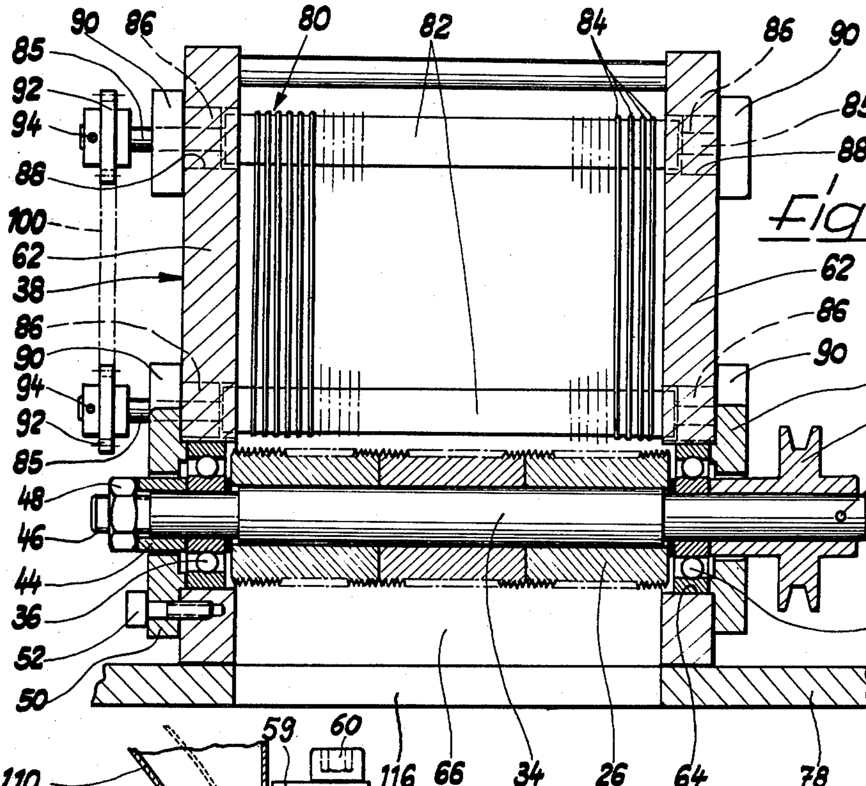


Fig. 5.

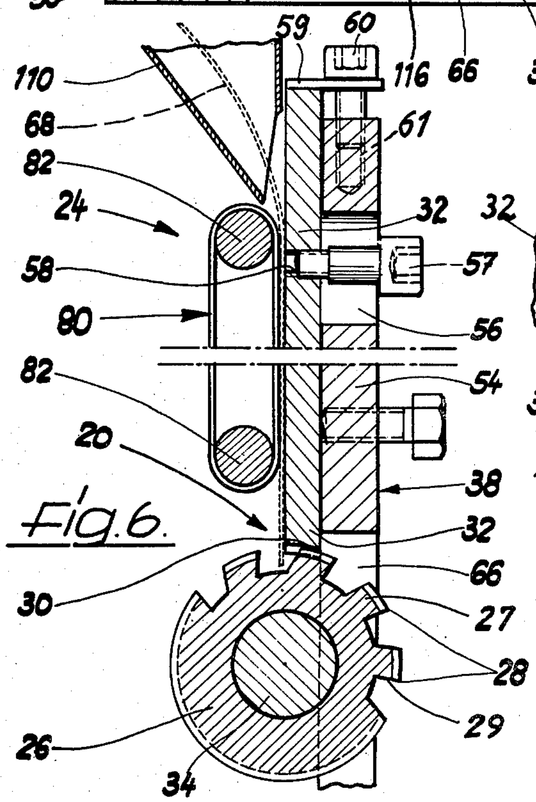
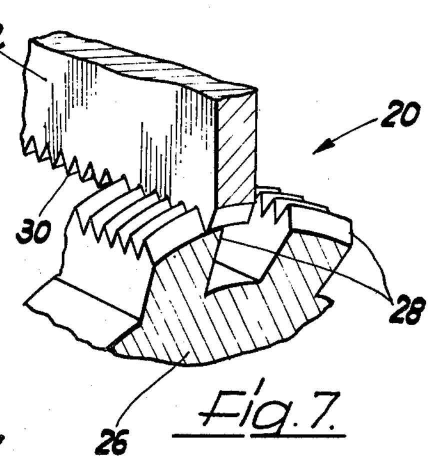


Fig. 6.



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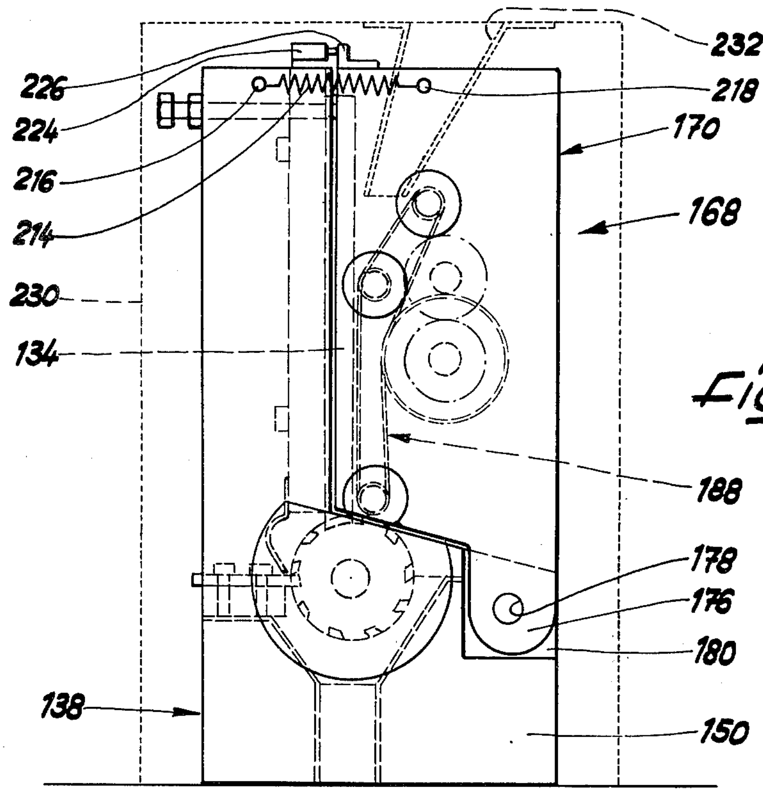
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Fig. 8.

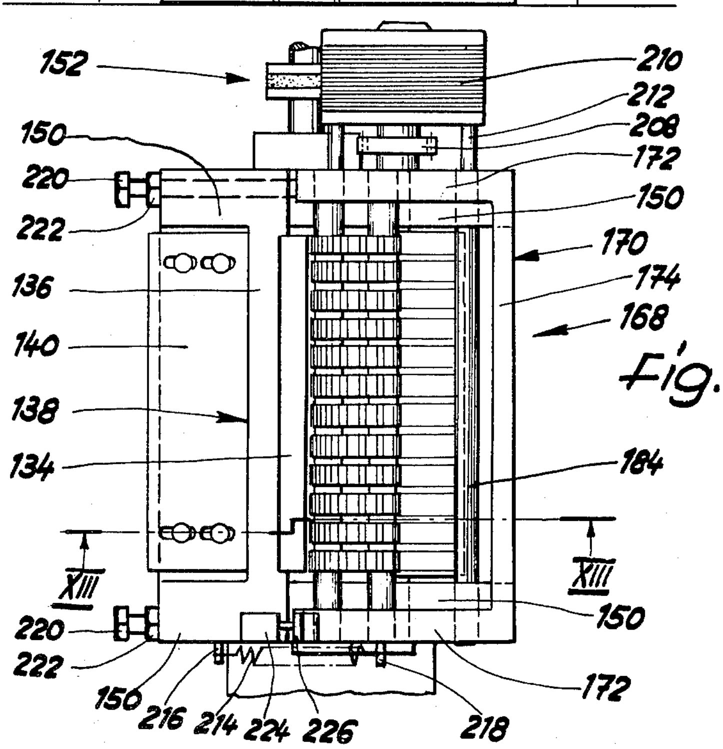
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Fig. 9.

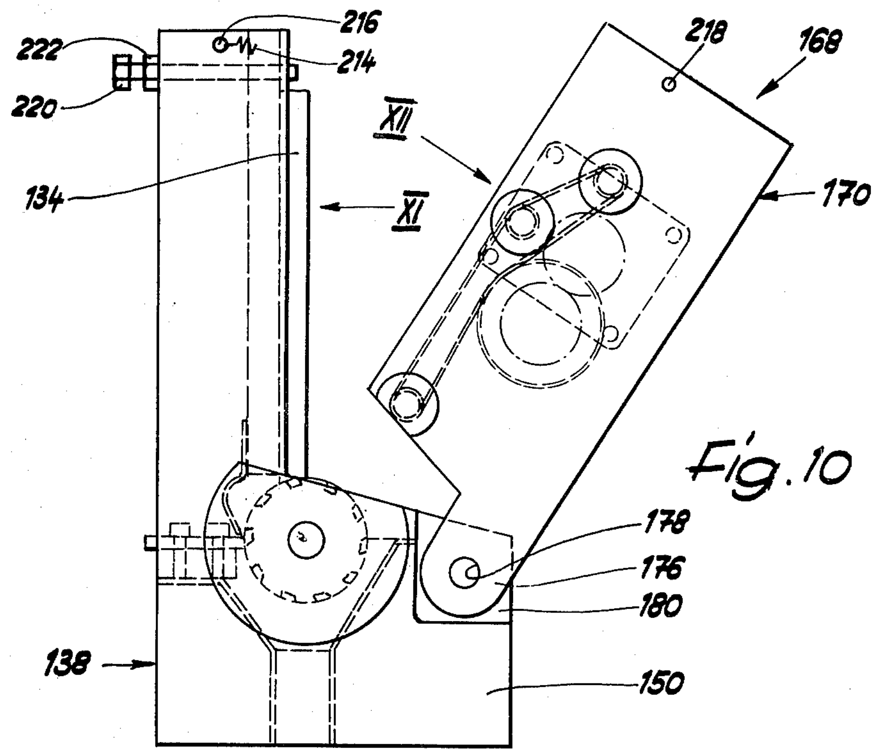
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Fig. 10

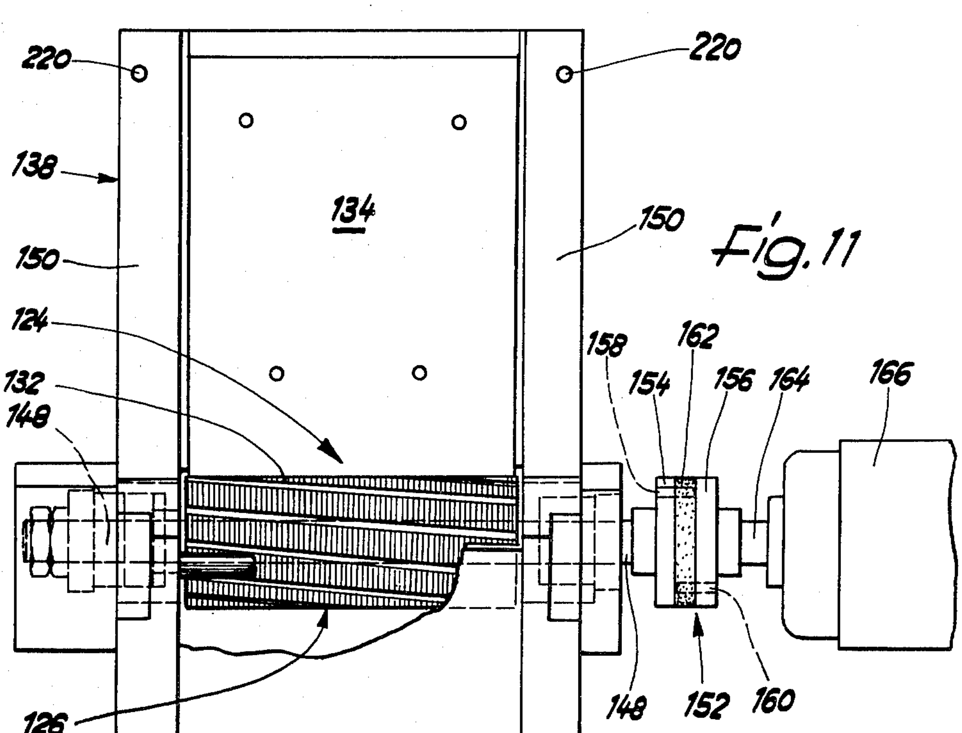
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Fig. 11

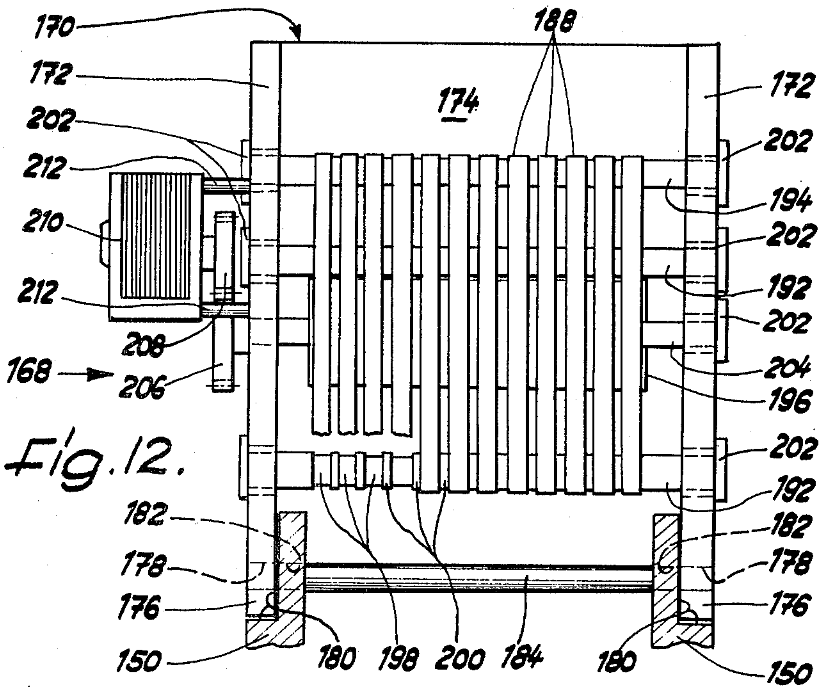
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Fig. 12.

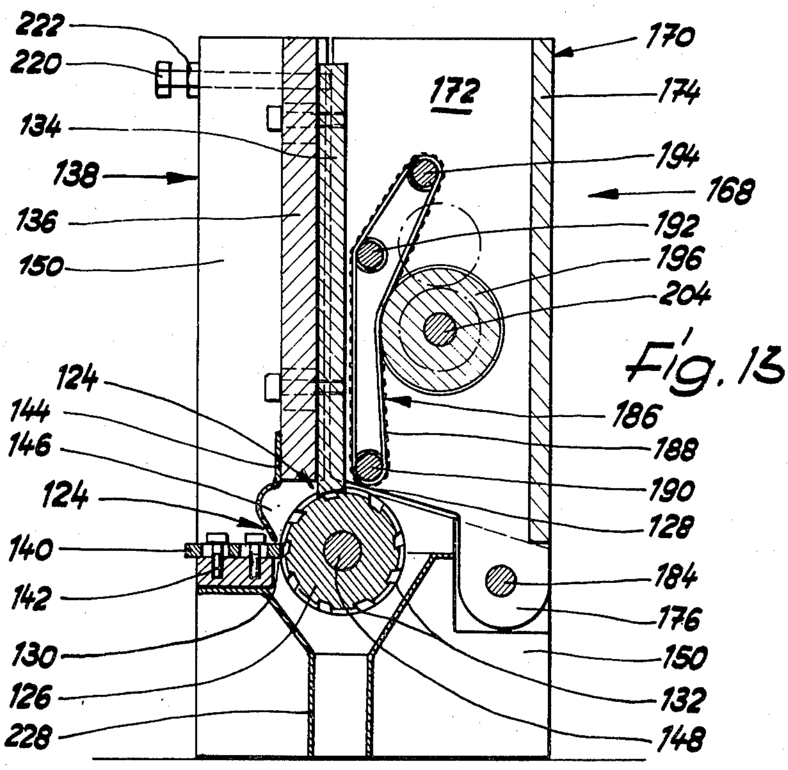
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Fig. 13

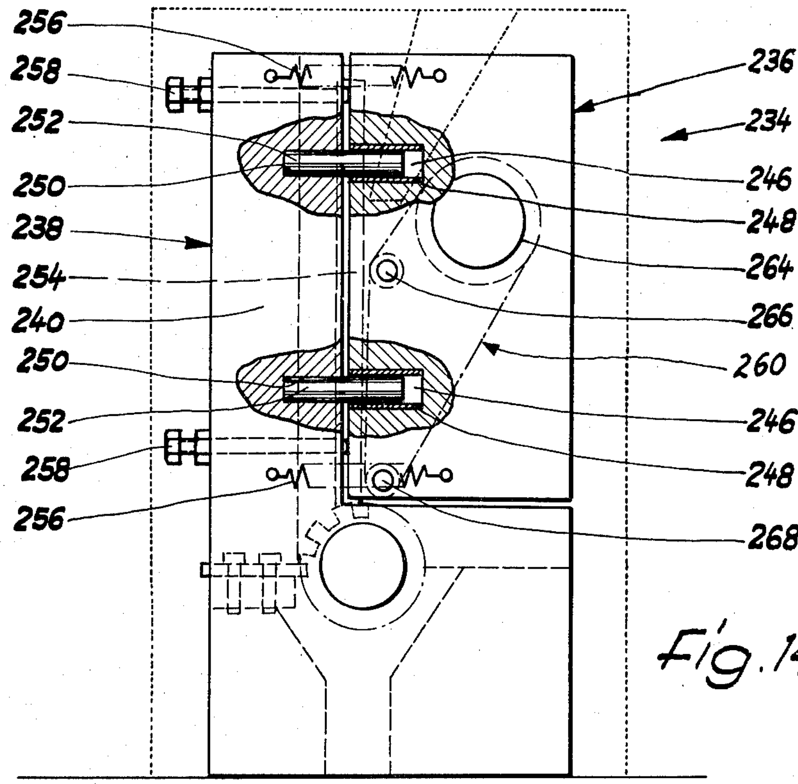
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Fig. 14

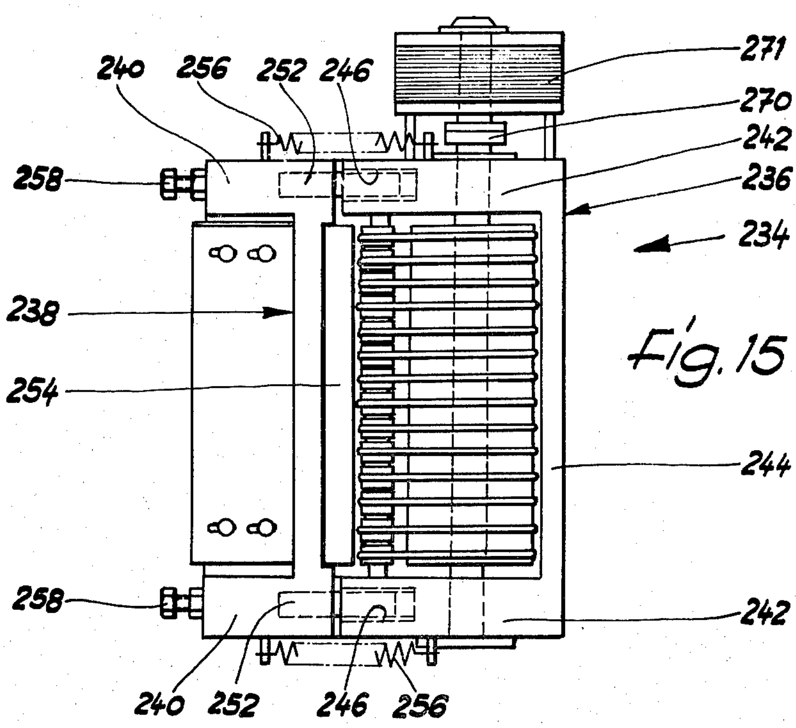
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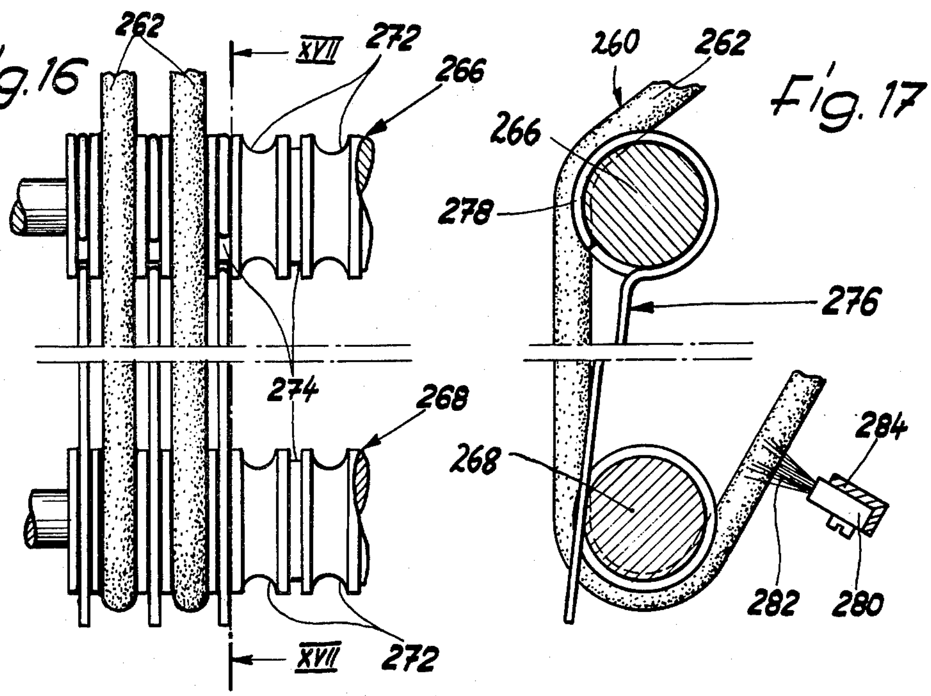
Fig. 15

Fig. 16

Fig. 17



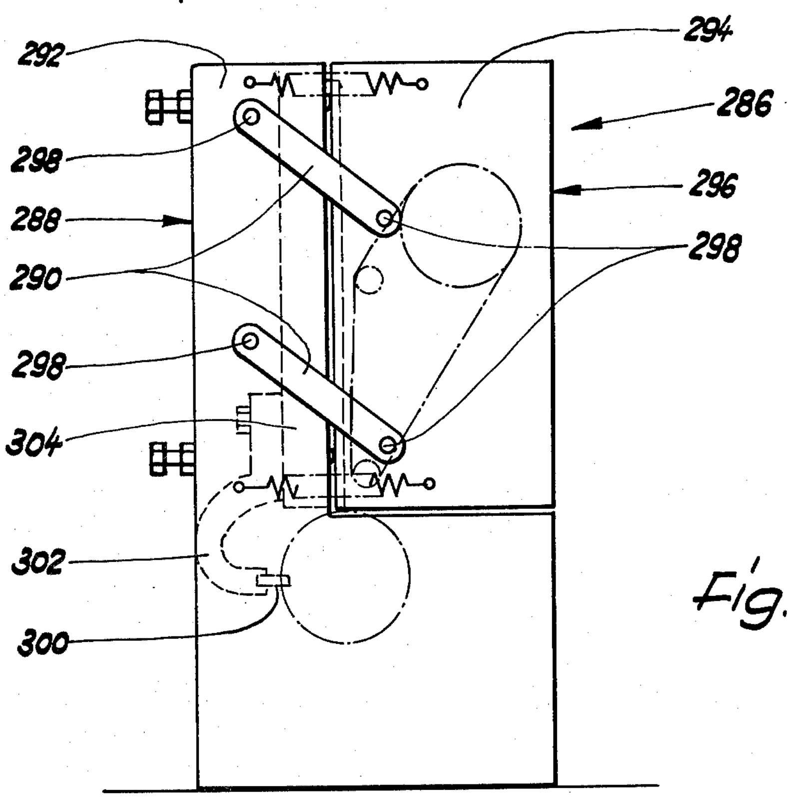


Fig. 18

DEVICE FOR THE DESTRUCTION OF MICROFILM AND SIMILAR DATA CARRIERS

This is a continuation of application Ser. No. 792,098 filed Apr. 29, 1977 now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to cutting and shredding devices, and, more particularly, to shredding devices designed for the destruction of microfilm and similar information carriers carrying microimage impressions.

2. Description of the Prior Art

In recent years, microfilm has come into increasing use as a microimage data carrier for the long-term storage of a great variety of information. Most commonly, these microfilm data carriers take the shape of film reels, film sheets, so-called microfiches, or microfilm sections which form a part of punched cards. The information which is stored on microfilm is of a permanent nature and cannot be erased, should it become obsolete. In the case of microfilm information of a confidential or proprietary nature which has become obsolete, or otherwise requires destruction, the destruction of the microimage data can only be accomplished by destroying the data carrier itself.

While one might assume that microfilm can be shredded in much the same way as paper is being shredded, it has been found that paper shredders are generally unsuitable for the destruction of microfilm, even if they are capable of cutting the much tougher film stock. More importantly, however, the size of the shreds produced by paper cutters is much too large for a safe destruction of the microimage information involved, considering the greatly reduced scale on which this information is registered on the microfilm carrier.

Known document shredders, as a rule, cut each sheet of paper into a large number of narrow longitudinal strips, as the sheet is fed between rotary cutters. For technical reasons, it is not possible to modify these cutters so that they form an arrangement of sufficiently compact and closely spaced dimensions that would enable them to effectively destroy microfilm.

A further shortcoming of these prior art devices lies in the uninterrupted working contact between the shredding cutters and the material to be shredded. This means that, because of the inevitable generation of friction, the shredding cutters build up heat which is transferred to the material to be shredded, with the result that the latter softens and develops a tendency to pack together, including the possibility of becoming bonded to the cutters.

Large-capacity shredder installations which are designed for the destruction of office materials of all kinds, including the shredding of entire file folders, are generally too bulky and also too costly for most applications. Also, these high-powered installations produce a shredded waste whose particles are still too large to be acceptable for the purpose of destroying microfilm data carriers.

The thermal destruction of microfilm data carriers is not practical, due to the move away from flammable film stock to nonflammable safety film stock. Increasingly, the material used for microfilm is a highly resistant film strip of polyester which is so resistant to tearing and cutting that the above-mentioned known shredding devices are simply incapable of cutting it. In many instances, therefore, where information could be advantageously stored on microfilm, such storage is foregone, because of the inability of effectively destroying the microfilm data, when they are obsolete.

SUMMARY OF THE INVENTION

It is, therefore, a primary objective of the present invention to offer a better solution to the problem of destroying microfilm data carriers, the solution being aimed at overcoming most or all of the above-mentioned shortcomings with a device which can be manufactured at a reasonable cost and which is capable of reliable operation on a continuous basis, if necessary.

In order to attain these objectives, the present invention suggests a novel device for the destruction of microfilm and similar data carriers which is designed to cut an advancing strip of microfilm in the transverse sense with at least two cutting edges which touch the film material only briefly, in an intermittant shear-type cutting action which is produced by an encounter of the cutting edges. This intermittant cutting action allows for the generated heat to dissipate sufficiently rapidly, so that, even under continuous operation, the temperature buildup on the cutting edges will safely remain below the critical level at which the microfilm strip which is being shredded would become soft. The cutting edges are preferably a succession of cutter teeth.

The novel device preferably also includes a strip feeding unit which imposes a controlled rate of advance to the material which is to be cut, this rate of advance being coordinated with the cutting frequency of the cutter teeth, so as to exactly control and maintain a desired succession of cuts at which the size of the resulting material shreds are so small that the microimage information on the shredded material is no longer readable and is thus safely destroyed.

The invention further suggests that the cooperating cutting edges preferably be so arranged that one of the cutting edges is stationary, while the other cutting edge is a cutter tooth moving past the stationary cutting edge at a minimal distance. The stationary cutting edge may simply be the edge of a guide plate. The cooperating moving cutting edge is part of a toothed shredding cutter, preferably in the shape of a plain milling cutter of cylindrical outline, whose rotational axis is parallel to the edge of the stationary cutter plate. Such a shredding cutter may be of the straight fluted type or of the helically fluted type. The use of a milling cutter of conventional tooth shape has the advantage that standard cutter grinding equipment can be used to sharpen the teeth, in case the shredding cutter is worn dull.

By way of a further improvement, the present invention also suggests that the cooperating cutting edges not be straight lines, but that they preferably have an undulating or zigzag configuration, so as to produce a serrated cut outline which increases the micronization of the microfilm material. The most simple zigzag line is a common thread profile, milling cutters with such a profile being commercially available, or relatively easy to manufacture.

A further improvement suggested by the present invention involves the arrangement of a second stationary cutting edge at a distance from the first cutting edge, along the path of the moving cutting edge, so that the previously produced film material shreds are subjected to a second shredding action, with the result that the microfilm material is effectively micronized and its information completely destroyed. Such an arrangement of two spaced stationary cutting edges, by doubling the cutting action of each cutter tooth, correspondingly increases the cutting capacity of the device, which means that the feed velocity of the microfilm can be increased, without necessitating a corresponding increase in the cutting frequency, as reflected by the peripheral speed of the shredding cutter and the circumferential pitch of the cutter teeth. Between the spaced stationary cutting edges is preferably arranged a special chamber into which the shreds from the first cutting action are ejected, the chamber having a shape which facilitates the intermingling of the ejected microfilm shreds, before they are cut again in a second shredding action, at the other stationary cutting edge.

Another suggestion offered by the present invention relates to means for forcibly feeding the film strip to the cutting edges at a controlled predetermined speed, which is preferably adjustable. This strip feeding means preferably includes a conveyor-type strip feeding unit which cooperates with the guide plate whose edge constitutes the first stationary cutting edge which cooperates with the shredding cutter.

Still another advantageous suggestion is realized in the preferred embodiment, in that the steel of which the shredding cutter is made is preferably harder and more resistant than the material of the cooperating guide plate which forms the stationary cutting edge, and that these two materials are so coordinated that they permit sliding friction between them during the cutting action. The shredding cutter, therefore, is preferably of hardened tool steel, while the cooperating stationary plate is of copper, bronze, brass, or a similar comparatively soft low-friction metal. With such a cutting combination, it is merely necessary to provide for a plate adjustment mechanism by means of which the plate can be slowly advanced against the rotating shredding cutter, in order to thereby produce a precisely matching counter-profile on the stationary cutting edge. At the same time, the service life of the cutting edges of the shredding cutter teeth is extended to a maximum, as the stationary cutting edge cannot damage the rotating cutting edges.. The aforementioned strip feeding unit and its drive, as well as the cooperating adjustable guide plate with its stationary cutting edge, are preferably arranged between vertical frame members of the device. The latter also accommodate suitable journals for the shredding cutter shaft.

The conveyor-type strip feeding unit preferably consists of at least two parallel guide rolls and of a plurality of endless round or flat belts arranged side by side over the width of the cooperating guide plate. One belt run is arranged parallel to and at a small distance from said plate. The endless belts may also be of the timing belt type, in which case the belt, or belts, are preferably inverted, so as to engage the film strip with the belt teeth. On the opposite side of the conveyor, the outwardly facing belt teeth can then be used to cooperate directly with the drive pulley of a gear motor. In the case of a smooth endless belt, or belts, the distal guide roller may be directly coupled to the gear motor, or it may be connected to it by means of a suitable chain drive or timing belt drive.

The invention further suggests that the novel strip feeding unit of the device be mounted inside a frame or housing, so as to form a self-contained unit which is so arranged in relation to the device that it can be removed, at least a short distance, for inspection and servicing access to the shredding cutter and to the cooperating guide plate. This removable self-contained strip feeding unit is preferably guided for either a pivoting motion or a straight-line motion.

The guided mobility of the removable strip feeding unit can also be taken advantage of by maintaining the unit in its operating position under a spring bias, against which it can move, in the event that several superposed film strips, or an object thicker than a single film strip is accidentally being fed into the device. This movement can be conveniently used to operate a safety switch.

By way of a further refinement of the invention, the aforesaid movement of the strip feeding unit can be used to actuate a three-stage switch which is so adjusted that the simultaneous insertion of only two layers of microfilm will not shut down the device, but will simply automatically reduce the speed of the strip feeding unit, while the simultaneous insertion of more than two thicknesses of microfilm will shut down the device.

BRIEF DESCRIPTION OF THE DRAWINGS

Further special features and advantages of the invention will become apparent from the description following below, when taken together with the accompanying drawings which illustrate; by way of example, several embodiments of the invention, represented in the various figures as follows:

FIG. **1** shows a first embodiment of the invention in a perspective outside view;

FIG. **2** shows the device of FIG. **1**, as seen in an elevational side view, with a portion of the hood cut away;

FIG. **3** is a front end view of the device of FIG. **1**;

FIG. **4** shows a portion of the device of FIG. **1** in a plan view;

FIG. **5** is a vertical transverse cross section through the device of FIG. **1**, as taken along the V—V of FIG **4**;

FIG. **6** is a partial longitudinal cross section through the device of FIG. **1**, as taken along line VI—VI of FIG. **3**;

FIG. **7** shows selected details of the device of FIG. **1** in an enlarged perspective representation;

FIG. **8** shows a second embodiment of the invention, as seen in an elevational side view;

FIG. **9** shows the lower portion of the device of FIG. **8** in a plan view;

FIG. **10** shows the embodiment of FIG. **8**, with a portion thereof pivoted out of position;

FIG. **11** shows the rear portion of the device of FIG. **8**, as seen along arrow XI of FIG. **10**;

FIG. **12** shows the pivotable front portion of the device of FIG. **8**, as seen along arrow XII of FIG. **10**;

FIG. **13** is a longitudinal cross section through the device of FIG. **8**, as taken along line XIII—XIII of FIG. **9**;

FIG. **14** shows a third embodiment of the invention, as seen in an elevational side view with portions thereof cross-sectioned;

FIG. **15** is a plan view of the device of FIG. **14**;

FIG. **16** shows enlarged details of the strip feeding unit of the embodiment of FIG. **14**, as seen from the front;

FIG. **17** shows the unit of FIG. **16** in a cross section taken along line XVII—XVII of FIG. **16**; and

FIG. **18** shows a fourth embodiment of the invention, as seen in an elevational side view.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, FIGS. **1** through **7** thereof illustrate a first embodiment of a shredding device for microfilm and similar data carriers, as suggested by the present invention. This device consists essentially of a shredding unit **20** (FIG. **7**), a strip intake unit **22** (FIG. **2**), and a strip feeding unit **24** (FIG. **6**), portions of cooperating units being, in some cases, spatially and operationally combined.

The shredding unit **20** of the device is essentially constituted by a shredding cutter **26** which has the form of a conventional plain milling cutter. The rotating cutter **26** cooperates with a stationary cutting member **32** in a shearing configuration (see FIGS. **6** and **7**). The shredding cutter **26** is preferably cylindrical in its overall outline, having a number of cutter teeth **27**. The actual shape of the moving cutting edges **28** on the cutter teeth **27** of the rotating shredding cutter **26**, and the matching stationary cutting edge **30** of the guide plate **32**, while they could be straight lines, are preferably so shaped that they form a sawtooth-like profile, when viewed in a plane which is perpendicular to the path of relative cutting edge movement. This sawtooth-like cutting profile is preferably defined by a regular zigzag line resembling the outline of a common thread profile, as shown in FIG. **7**.

The shredding cutter **26** may thus be a commercially available plain milling cutter, fabricated of tool steel and hardened, much like conventional milling cutters. The cutting faces **29** of the cutter teeth **27** may be radially oriented, or slightly undercut, and extend preferably parallel to the rotational axis of the cutter in the longitudinal sense (FIG. **3**). As is common in the manufacture of milling cutters, the peripheral face of the teeth **27** are preferably undercut, along the outline of a logarithmic spiral, for example. The use of a conventional milling tool to serve as the shredding cutter **26** has the advantage that it also greatly simplifies any later sharpening that may be necessary, should the cutting edges **28** of the cutter teeth **27** become dull. In this case, the cutting faces **29** of the shredding cutter **26** can be reground like the cutting faces of any other plain milling cutter, using conventional grinding equipment.

The stationary cutting edge **30** is constituted by the lower edge of a stationary cutting member or guide plate **32**. Rather than being hardened like the teeth **27** of the shredding cutter **26**, the stationary cutting edge **30** is preferably of much lesser resistance, the plate **32** being fabricated of a material like copper, bronze, or brass, for example. This choice of materials offers two distinct advantages: On the one hand, the combination of the hardened, smoothly ground tool steel of the cutter teeth **27** with the soft copper-based metal of the stationary guide plate **32** gives a good paring for sliding friction at the cutting edges. On the other hand, the hardened shredding cutter **26** can be conveniently used to produce an exactly matching edge shape on the stationary cutting edge **30**, by machining the latter, as the guide plate **32** is advanced towards the shredding cutter **26**. This machining operation can be readily repeated, whenever the stationary cutting edge **30** has worn dull.

Like other plain milling cutters, the shredding cutter **26** has a central mounting bore with which it is seated on its spindle. In the case at hand, the spindle is a transversely extending cutter shaft **34**. Because of the considerable axial length of the shredding cutter **26**, the latter is actually not a single milling cutter, but is preferably composed of three axially adjoining milling cutters. While it is, of course, possible to produce a one-piece shredding cutter, the use of several standardized cutters simplifies the construction of the device, reducing its manufacturing cost accordingly. The cutter shaft **34** is journalled near both axial ends of the shredding cutter **26** by means of two ball bearings **36** which are seated in a frame **38** (FIGS. **3** and **5**), the shaft reaching axially beyond the latter. On one of the protruding extremities of the cutter shaft **34** is mounted a V-belt pulley **40**, being fixedly connected to the shaft **34** by means of a cross pin **42**. The inner race of the associated ball bearing is thus axially confined between the shredding cutter **26** and the pulley **40**. On the opposite extremity of the cutter shaft **34** is provided a threaded length portion **46** on which is seated a clamping nut **48** which axially clamps the inner race of the other ball bearing against the shredding cutter **26**, using an intermediate spacer sleeve **44**. The entire shredding cutter assembly is thus axially clamped on the cutter shaft **34**, the clamping action being provided by the nut **48** and the pin **42**. Two positioning flanges **50**, arranged on opposite outer sides of the frame **38**, serve to axially position the outer races of the ball bearings **36** in relation to said frame.

As can be seen in FIG. **4**, the frame **38** has a generally H-shaped configuration, when seen from above. This shape is constituted by two laterally spaced, generally upright frame members **62** and a transversely extending, also generally upright cross member **54**. On the inner side of this cross member **54** is mounted the earlier-mentioned stationary cutting member or guide plate **32** whose lower edge serves as the stationary cutting edge **30** (see also FIG. **6**). The guide plate **2** is vertically adjustable in relation to the cross member **54**, being clampable to the latter, following an adjustment operation. In order to provide this adjustability, the cross member **54** of the frame **38** has four vertically extending slots or oblong bores **56**, for the accommodation of a corresponding number of clamping bolts **57** whose heads engage the cross member **54** from the outer side and whose threads engage matching threaded bores **58** of the guide plate **32** on the opposite side of the cross member **54**. In view of the need for the guide plate **32** to be held rattle-free against the cross member **54** during the vertical advancement of the guide plate against the shredding cutter **26**, the clamping bolts **57** are preferably left slightly, tightened, while the edge cutting adjustment takes place. In order to provide a fine-adjustment for this edge cutting operation, there is preferably arranged a horizontal bracket **59** on the upper edge of the guide plate **32**, the bracket reaching over the upper edge of the cross member **54**. As can be seen in FIG. **6**, this configuration conveniently accommodates a central adjusting bolt **60** by means of which the guide plate **32** can be forcibly and slowly advanced downwardly towards the shredding cutter **26**. The adjusting bolt **62** engages a matching threaded bore **61** in the upper portion of the cross member **54**.

The two upright frame members **62** of the frame **38** have axially aligned bearing seats **64** for the earlier-mentioned ball bearings **36** of the cutter shaft **34**. The position of the rotational axis of the shredding cutter assembly is preferably arranged in vertical alignment with that side of the guide plate **32** which faces away from the cross member **54** and whose lower edge serves as the stationary cutting edge **30** (FIG. **3**). This arrangement of the shredding cutter **26** means that an appropriate vertical recess or cutout **66** must be provided in the lower portion of the cross member **54** to accommodate the shredding cutter **26**. This recess **66** extends preferably from a point just above the level of the cutting edges **28** and **30** all the way down to the base plane of the frame **38**.

The material which is to be shredded by the device is represented in an exemplary manner by a microfilm strip **68** which can be seen in FIGS. **1–3**. In FIG. **6**, the uncut strip **68** is indicated by dotted lines, for better visual distinction. As can be seen in this figure, the uncut strip **68** is fed downwardly, along the guide plate **32**, until it reaches the cutting point, where the moving cutting edges **28** of the shredding cutter **26** meet the stationary cutting edge **30** of the guide plate **32**. While the guide plate **32** positions the arriving uncut strip **68**, those portions of the upright frame members **62** which face the narrow edges of the strip **68** serve as its lateral guides. In order to prevent the possibility that strip material which is being fed against one of these lateral guide portions of a frame member **62** may perhaps escape the axial extremity of the shredding cutter **26**, the latter is preferably extended in both axial directions so as to reach a short distance into the larger bearing seats **64** which accommodate the ball bearings of the cutter assembly **34** in the frame members **62** (see FIG. **5**). The guide plate **32** and the associated lateral guide portions of the frame members **62** thus form a stationary portion of the strip intake unit **22**, in extension of the guide funnel **110**, of which the lower extremity is shown in FIG. **6**.

The drive for the shredding cutter **26** is provided by means of an electric motor **70** (FIG. **4**). A drive pulley **72**, mounted on the drive shaft of the motor **70**, and larger in diameter than the pulley **40** on the cutter shaft **34**, is connected to the said smaller pulley by means of a V-belt **74**. The motor **70** is preferably mounted on a base plate **78**, using vibration-absorbing elastic spacers **76**. The earlier-mentioned frame **38** is likewise bolted to the base plate **78**.

A controlled speed of advance of the uncut strip **68** towards the cutting point is assured by means of the strip feeding unit **24** of the device. This speed of advance, in combination with the number of teeth and speed of rotation of the shredding cutter **26** determines the width of the shreds which are produced by the device. While it would be possible to adjust the rotational speed of the shredding cutter **26**, it is preferable to provide adjustments, if desired, in the speed with which the uncut strip **68** is fed to the cutting point, as the latter speed is much slower and requires a gear drive in any case.

The strip feeding unit **24** consists essentially of a conveyor with an endless conveying member **80** which is guided on two vertically spaced parallel guide rolls **82**, so as to form two vertical runs of which one extends at a close distance from the face of the guide plate **32** to a point which is located near the stationary cutting edge **30** of the latter. As can best be seen in FIG. **5**, the conveying member **80** consists actually of a number of endless belt members **84** which are arranged side by side on the two guide rolls **82**. A preferred shape of the endless belt members **84** is round, the belt members being simply rubber O-ring belts. Some of these belts are shown in FIG. **5**.

As can also be seen in FIG. **5**, the guide rolls **82** of the strip feeding unit **24** reach a short distance into the upright frame members **62**, much like the shredding cutter **26**, each guide roller having a bearing trunnion **85** on each axial extremity engaged by a suitable journal bushing **86** which is seated in the respective frame member **62**. The two journal bushing **86** have flanges **90** by means of which they are removably mounted in the frame members **62**, using appropriate clamping bolts. The trunnions **85** on one axial side of the guide rolls **82** extend a distance beyond their journals, having chain sprockets **92** mounted thereon by means of pins **94**. In alignment with these two chain sprockets **92** is arranged a third chain sprocket **98** (see FIG. **2**) which is mounted on the drive shaft of a gear motor **96** which can be seen in FIGS. **3** and **4**. The motor **96** is likewise mounted on the upright frame member **62**, on the same side on which the strip feeding unit drive is arranged. A link chain **100** connects the motor sprocket **98** with the two guide roller sprockets **92**. The strip feeding unit drive and the earlier-described V-belt drive for the shredding cutter **26** are preferably arranged on opposite sides of the frame **38**.

FIGS. **1**, **2** and **3** further show that the preferred embodiment of the device includes a protective cover in the form of a hood **102**. The side walls **104** of the hood reach downwardly to the base plate **78** to which they are attached by means of suitable screws (not shown). As can best be seen in FIG. **2**, the top wall **106** of the hood **102** includes an intake opening **108** which leads to a guide funnel **110**. The lower end portion of the latter can be seen in FIG. **6**, reaching downwardly to a point next to the guide roll **82** of the strip feeding unit **24**, where its conveying member **80** forms an intake gap with the guide plate **32** of the strip intake unit **22**. The arriving uncut strip **68** is thus safely guided into said intake gap, where the moving conveying member **80** engages the strip **68**, advancing it downwardly towards the cutting point, at a controlled speed.

In FIGS. **1**, **2** and **3**, the device of the invention is further shown to include a trough-shaped base **112** which carries the base plate **78**. The latter is bolted to the side walls **114** of the base **112**. Underneath the cutting point is arranged an outlet opening **116** in the base plate **78**. This outlet opening leads to an outlet chute **118** which is attached to the base plate **78**. The chute **118** includes an inclined outlet duct **120** of rectangular cross section, the duct **120** leading to the outside of the device, through a wall aperture **122** in the front side wall of the base **112**. To the protruding extremity of the outlet duct **120** can be attached a suitable waste bag or other container, intended to receive the data carrier shreds. Suitable clamping means may be provided to attach the waste bag to the mouth of the outlet duct **120**.

As an alternative to the low base **112** which is shown in the drawings, the device may be provided with a modified base which is tall enough to accommodate a waste container directly underneath the chute **118**. In this case, the oblique outlet duct **120** could be replaced with a simple vertical funnel. The base in this case would preferably be provided with a removable side wall, or with a suitable door in one of the side walls.

A second embodiment of the invention is illustrated in FIGS. **8** through **12**. This embodiment features a somewhat modified shredding arrangement and an extensively modified strip feeding unit for the microfilm or other data carrying material which is to be shredded. Other portions of this embodiment of the invention are identical with, or similar to, corresponding parts and components of the previously described embodiment. Reference should therefore be had to the latter for those components and characteristics of this embodiment which are not specifically described hereinbelow.

The shredding assembly of this device is again formed by a shredding cutter **126** which has the form of a plain milling cutter, and which cooperates with two stationary cutting edges **128** and **130**. As in the previously described embodiment, the shredding cutter **126** has a number of cutting teeth on its circumference, each forming a moving cutting edge **132**. While the general shape of the cutting teeth is substantially unchanged from the prior embodiment, the orientation of the cutting faces in the axial sense is shown to be inclined in relation to the rotational axis of the cutter shaft **148**. This inclination, i.e. the helix angle of the cutter teeth flutes, is approximately five degrees (see FIG. **11**). It should be understood, of course, that the shredding cutter of the previously described embodiment could be similarly helically fluted. The advantage of such a helically fluted shredding cutter over a straight fluted shredding cutter is that it executes its cutting action in a scissors motion, progressing from one side to the other, thereby providing a smoother and quieter operation. The actual cutting profile of the moving cutting edges **132** and of the two stationary cutting edges **128** and **130** is again preferably zig-zag-shaped, using a regular thread profile, for example.

As in the previously described embodiment, the decive of FIGS. **8**—**13** includes a guide plate **134** whose lower forward edge serves as a stationary cutting edge **128**, the guide plate **134** being again adjustably clamped to a vertical cross member **136** of a main frame **138**. The same main frame also carries a second plate **140** which, like the guide plate **134**, extends against the shredding cutter **126**, thereby serving as a second stationary cutting edge **130**, at a second cutting point which is 90 degrees offset from the first cutting point at the stationary cutting edge **128**. In the sense of shredding cutter rotation, the second cutting point is thus located one-quarter revolution behind the first cutting point.

The second plate **140** is oriented horizontally, being supported by a horizontal cross member **142** of the main frame **138**. Because of the horizontal plate **140** does not have to perform a guiding function like the vertical plate **134**, it is much shorter in the radial direction than the latter. However, like the guide plate **134**, it is adjustable in the radial sense, capable of being advanced towards the shredding cutter **126**, for the establishment of a precisely matching second stationary cutting edge **130**, through a machining action by the shredding cutter **126**.

Between the two cutting points, defined by the first and second stationary cutting edges **128** and **130** and by the moving cutting edges **132** of the shredding cutter **126**, is arranged a guide cover **144** which forms an enclosed space with the periphery of the shredding cutter **126** and the lower extremity of the vertical cross member **136**. The guide cover **144** is preferably a sheet metal cover extending transversely between the upright members **150** of the main frame **138** and being removably attached to the lower rear edge of the vertical cross member **136** by means of clamping screws. The cross-sectional shape of the guide cover **144** is such that it forms a rounded flow chamber **146** (FIG. **13**) with the lower end face of the cross member **136**, the chamber producing a whirling action on the shreds which are carried into the chamber by the teeth of the shredding cutter **126**. As an alternative to the guide cover just described, the latter may also be modified, so as to take the place of the second cross member **142**, if the guide cover is designed to be strong enough and so shaped that the second plate **140** can be adjustably clamped to it.

As can be seen in FIG. **11**, the shredding cutter **126** is mounted on a cutter shaft **148**. As in the previously described embodiment, the cutter shaft **148** is journalled in the two upright frame members **150** of the main frame **138** by means of suitable ball bearings. The drive for the shredding cutter is again provided by an electric motor **166**, but the V-belt drive of the first embodiment is replaced by an elastic coupling **152** connecting an extremity of the cutter shaft **148** with the axially aligned drive shaft **164** of the motor **166**. The elastic coupling **152** is of the elastic-disc type, having two flanged coupling members **154** and **156** fixedly mounted on the extremities of the shafts **148** and **164**, respectively, and an elastic coupling disc **162** arranged axially between the coupling members **154** and **156**. The elastic coupling disc **162** has four regularly spaced bores near its periphery. Engaging these bores are matching coupling pins **158** and **160** which are solidary with the flanges of the coupling members **154** and **156**, respectively, the two pairs of pins being angularly offset by 90 degrees. The electric motor **166** and the main frame **138**, which carries the various operating components of the device, are mounted on a common base plate which is not shown in the figures relating to this embodiment.

The strip feeding unit **168** of this embodiment, as shown in FIGS. **8**, **10**, and **13**, differs from the strip feeding unit of the previously described embodiment in that it forms a self-contained subassembly. For this purpose, the unit has its own pivot frame **170** which has a generally U-shaped cross section, as can be seen in FIG. **9**. The pivot frame **170** thus consists of two lateral frame portions **172** and a transverse frame portion **174** which joins the frame portions **172** on the front side of frame **170**. The lateral frame portions **172** have ear extensions **176** on their lower extremities with aligned pivot bores **178** arranged therein. Appropriate cutouts in the upright frame members **150** of the main frame **138** accommodate the lateral frame portion **172** of the pivot frame **170**, so that, together, the main frames **138** and the pivot frame **170** form a compact assembly. In the area of the ear extensions **176** of the lateral frame members **172** are arranged appropriate recesses **180** in the upright frame members **150** of the main frame **138**, so that the narrower ear extensions **176** fit into the recesses **180**, while being outwardly aligned with the upright frame members **150**. The latter have pivot bores **182** in alignment with the pivot bores **178** of the ear extensions **176**, accommodating therein a pivot shaft **184** which defines a horizontal pivot axis for the pivot frame **170** of the strip feeding unit **168** in relation to the main frame **138** and the units which are carried by the latter.

Details of the strip feeding unit **168** can be seen in FIGS. **12** and **13**. The unit itself is again in the form of a vertical conveyor, consisting essentially of an endless conveying member **186** which preferably takes the form of a plurality of endless timing belts **188** arranged side by side between the lateral frame portions **172** of the pivot frame **170**. These timing belts **188**, rather than having their teeth facing inwardly, as is commonly the case, are turned inside out, as can best be seen in FIG. **13**. Three parallel guide rolls **190**, **192**, and **194** support and guide the timing belts **188**. The three guide rolls are spaced at unequal distances from the first cuttig point at the periphery of the shredding cutter **126**. In a first portion of the timing belt run, defined by the near guide roll **190** and the intermediate guide rolls **192**, the timing belts **188** extend parallel to the forward surface of the vertical guide plate **134**, forming a small conveying gap therewith through which the uncut strip (not shown) is advanced downwardly towards the cutting point. A second portion of the timing belt run, defined by the intermediate guide roll **192** and the distal guide roll **194**, extends at an obtuse angle to the first conveyor run portion, i.e. upwardly and away from the guide plate **134**, thereby forming a funnel-like entry to the earlier-mentioned conveying gap between the first conveyor run portion and the guide plate **134**.

Unlike in the previously described embodiment, where the two guide rolls of the strip feeding device are both driven, the three guide rolls **190**, **192** and **194** of this embodiment are idling rolls. The drive for the timing belts **188** is provided by means of a drive drum **196** which engages the outer side of the timing belts i.e. their toothed side. For this purpose, the center of the drive drum **96** is so located between the near guide roll **190** and the distal guide roll **194** that the return run portion of the timing belts between these two guide rolls is deflected inwardly towards the other two portions of the belt run, thereby providing a certain deflection of the timing belts around the drive drum **196**.

The guide rolls **190**, **192**, and **194** are of comparatively small diameter. As can be seen in FIG. **12**, each roll has on its periphery a series of shallow grooves **198**, forming intermediate narrow collars **200** for a positive lateral guidance of the timing belts **188**. The axial extremities of each guide roll are journalled inside flanged journal bushings **202** which are received in appropriate bores of the lateral frame portions **172** of the pivot frame **170**. The drive shaft **204** which carries the drive drum **196** has preferably the same diameter as the guide rolls, so that identical journalled bushings can be used for its support in the pivot frame **170**. One axial end portion of the drive shaft **204** extends beyond the associated lateral frame portion **172**, carrying on its protruding extremity a first gear **206** which is engaged by a second gear **208** mounted on the drive shaft of the gear motor **210**. The latter may be the same motor as has been suggested in connection with the first embodiment, being again mounted in a cantilever fashion on the pivot frame **170** with the aid of spacer studs **212**.

FIGS. **8** and **9** show the pivotable strip feeding unit **168** in its normal operating position. It is maintained in this position by means of two tension springs **214**, of which only the spring on one side of the device is shown in FIG. **9**. Both the main frame **138** and the pivot frame **172** have appropriate laterally extending anchor pins **216** and **218**, respectively, with spring positioning grooves engaged by the rounded end hooks of the tension springs **214**. Two abutment bolts **220**, arranged in the upper end portions of the upright frame members **150**, serve as adjustable stops which counteract the bias of the tension springs **214** so as to establish an adjustable spacing between the main frame **138** and the pivot frame **170**, thereby making it possible to adjust the conveying gap between the guide plate **134** and the endless belt member **186**. The two abutment bolts **220** are secured by means of counter nuts **222**.

In FIGS. **8** and **9** is further shown a position switch **224** which is mounted on top of the main frame **138**. A cooperating actuating bracket **226** is arranged on top of the pivot frame **170**, in alignment with the switch **224**. The position of the bracket **226** is preferably adjustable in the direction of switch actuation. The position switch **224** acts as a safety switch, responding when the strip feeding unit is pivoted away from its normal operating position, as when more than one layer of data carrier are accidentally fed between the endless conveyor member **186** and the guide plate **134**, or when the strip feeding unit is pivoted out of place as the result of the accidental entry of some other object into the device. Such a pivoting motion of the strip feeding unit causes the position switch **224** to interrupt an electrical circuit, which may be the circuit for the gear motor **210** of the strip feeding unit **168**, or which may be a circuit which also controls the motor **166** driving the shredding cutter **126**, thereby shutting down either the strip feed alone, or the entire device.

As an alternative to the simple safety cutoff feature of the position switch **224**, the latter may be a three-stage switch whose first stage is again closed, for normal operation of the device, when the pivot frame **170** of the strip feeding unit is in its normal position relative to the main frame **138**, and whose third stage is similarly open, interrupting an operational circuit which controls either the strip feeding unit alone, or the entire device. Between these two end stages, the three-stage switch has a second, intermediate stage which it will reach after a very small movement of the pivot frame **170** away from the main frame **138**, whereby the drive of the strip feeding unit is switched from its normal circuit to a different circuit so as to run at half-speed, for example. The small pivoting movement which shifts the switch to its intermediate switching stage may be indicative, for example, of two or three layers of data carriers being fed into the device simultaneously. In such a case, the automatic slowdown of the strip feeding unit works to compensate for the feed-in of multiple layers, so that the shredding operation can continue at the reduced speed. The device automatically switches back to full speed, as soon as the multiple-layer material has been shredded. But, whenever more than the permissible two or three superposed layers of data carriers are fed into the device, the position switch **224** responds by shutting down the device, in order to prevent the possible blocking of the shredding cutter which could lead to a burnout of the drive motor **166** or some other damage.

FIG. **13** further shows that this embodiment of the device includes a funnel-shaped outlet chute **228** for the shredded material, the chute **228** having a vertical outlet portion. The base plate of the device (not shown), on top of which the main frame **138** would be supported, has an appropriate aperture for the outlet chute **228**, so that the shredded material falls through it into a suitable receptacle. The latter may be a solid container, or a special attachable bag, for example.

In FIG. **8** is further shown a hood-like protective cover **230**, indicated by dotted lines. The top panel of the cover **230** carries an inclined guide funnel **232** through which the uncut strip is guided onto the inclined belt run portion of the strip feeding unit **168** which leads to the conveying gap at the guide plate **134**.

A third embodiment of the invention is illustrated in FIGS. **14** through **17**. This embodiment is a modification of the previously described embodiment, differing therefrom primarily in the arrangement of the movable self-contained strip feeding unit in relation to the remainder of the device, and by the construction of the strip feeding unit itself. In all other respects, the details of this embodiment are identical with, or similar to, the details of the previously described embodiment. Reference should therefore be had to the foregoing description for those components and characteristics of this embodiment which are not specifically described hereinbelow.

Referring to FIGS. **14** and **15**, it can be seen that this embodiment has a self-contained strip feeding unit **234** which is similar to that of the second embodiment. Again, the components of the strip feeding unit are mounted inside a separate movable frame **236** of U-shaped outline (see FIG. **15**). FIG. **14** shows that the elevational outline of the movable frame **236** is rectangular, with vertical and horizontal lines matching parallel vertical and horizontal lines of a recess in the upright frame members **240** of the stationary main frame **238**.

Unlike the profile of the pivot frame **170** (FIG. **9**) of the previous embodiment, the movable frame **236** has lateral frame portions **242** which are approximately twice as heavy as the transverse frame portion **244** which joins the lateral frame portions at their forward edge. The lateral frame portions **242** are heavier, because each of them accommodates two vertically spaced blind bores **246** which extend horizontally and parallel to each other and are open towards the adjacent forward end faces of the upright frame members **240** of the main frame **238**. The vertical spacing of the blind bores **246** is preferably greater than their respective distances from the upper and lower extremities of the movable frame **236**. Inside each blind bore is seated a guide bushing **246** of a suitable homogeneous bearing metal or of composite construction. In the latter case, the wall of the guide bore of a guide bushing **248** is formed by a layer of, or at least embedded particles of polytetrafluoroethylene, in order to give the bushing good dry-friction characteristics.

In both upright frame members **240** of the main frame **238** are likewise arranged two vertically spaced blind bores **250**, in alignment with the blind bores **246** of the lateral frame portions **242** of the movable frame **236**. In the four blind bores **250** are seated four guide pins **252** of hardened steel, protruding horizontally from their seating bores and reaching into the guide bores of the guide bushings **248**. The four pairings of guide bushings **248** and guide pins **252** thus form a straight-line guide for the movable frame **236** which carries the strip feeding unit **234**, so that the latter is displaceable on a path which is substantially perpendicular to the guide surface of the vertical guide plate **254**, along which the uncut strip is advanced downwardly towards the shredding cutter.

As in the previously described embodiment, the movable frame **236** is spring-biased towards the stationary main frame **238**, using suitable tension springs **256**. While the pivot frame **170** of the previous embodiment requires only one spring on each side of its frame, near the upper edge thereof, the straightline mobility of the frame **236** necessitates four tension springs **256** arranged near the upper and lower edges of the lateral frame portions **242** of frame **236**. Similarly, the adjustment of the correct guide gap between the guide plate **254** and the strip feeding unit **234** necessitates four stop bolts **258**, rather than the previously required two bolts, the stop bolts **258** extending horizontally through the upright frame members **240**, not far from the upper and lower extremities of the movable frame **236**.

The general outline of the conveyor-type strip feeding unit **236** is given in stippled lines in FIG. **14**. Again, the latter is essentially an endless conveying member **260** consisting of a number of identical endless O-ring belts **262** which are arranged side by side on common guide rolls. The endless O-ring belts may be of rubber or of a rubber-like material, such as polystyrene, for example. These belts are shown, at an enlarged scale, in FIGS. **16** and **17**, having a comparatively large diameter of approximately 7 mm, so as to offer considerable transverse compressive elasticity.

The outline of the conveyor run of the conveying member **260** is generally similar to that of the previously described guide rolls **264**, **266**, and **268**. As can be seen in FIGS. **16** and **17**, the near guide roll **268** and the intermediate guide roll **266** are again identical and of comparatively small diameter, while the distal guide roll **264** is much larger in diameter, serving also as a driving member of the unit. For this purpose, the guide roll **264** is directly coupled to an axially aligned drive motor **271**, using an elastic coupling **270**.

As can best be seen in FIG. **16**, the guide rolls **266** and **268** have shallow guide grooves **272** arranged on their peripheries. Similar guide grooves are also arranged on the larger guide roll **264**. The profile of the shallow guide grooves **262** is preferably a section of a circle, matching the cross-sectional shape of the endless O-ring belts.

This version of the strip feeding unit further features a means for extending the guide gap, from the point where the endless conveying member **260** returns about its near guide roll **268**, closer to the cutting point defined by the stationary and moving cutting edges. This means consists essentially of a series of narrow guide pins **276** which are arranged between the O-ring belts **262**, without touching the latter. For this purpose, the two small guide rolls **266** and **268** have arranged on their peripheries a series of positioning grooves **274** of axially narrow rectangular outline which alternate with the previously described shallow guide grooves **272** for the O-ring belts **262**. Each of the guide pins **276** has a circular open eye portion **278** with which it engages a positioning groove **274** of the intermediate guide roll **266**, so as to be held in place by the latter, without impeding its rotation.

A straight portion of each guide pin **276** extends downwardly from the intermediate guide roll **266** and past the near guide roll **268**, engaging a positioning groove **274** of the latter for lateral guidance. These straight portions of the guide pins **276**, which may also be slightly kinked or otherwise curved, if necessary, form a downward extension of the guide gap which is defined by the guide plate **254** (FIG. **15**) and the cooperating surface portion of the rotating O-ring belts, in their vertical belt run portion between the intermediate guide roll **266** and the near guide roll **268**. The guide pins **276** are preferably of spring steel or of some other resiliently yielding material, so that they can be shaped to apply a slight pressure against the uncut strip in the direction of the guide plate **254**, in the vicinity of the cutting point. Because of their minimal space requirements, the guide pins **276** can reach almost to the very cutting point itself, thereby preventing unguided end pieces of the data carriers from falling out of control in the space between the lower end of the guide gap and the cutting point.

In FIG. **17** is also shown a device for cleaning the endless conveyor member **260**, using an elongated wiper brush **280** which extends transversely to the O-ring belts and engages the latter at their return run portion, just after leaving the near guide roll **268**. The natural bristles **282** of the wiper brush **280** are in continuous contact with the rotating belts **262**, so as to remove from the latter any shreds and dust particles that may have become attached thereto. The wiper brush **280** is mounted on an L-shaped support bracket **284** which is attached to the lateral frame members **242** of the movable frame **236**. This belt cleaning device could, of course, also be used in conjunction with the previously described first and second embodiments of the invention.

In FIG. **18** is shown a fourth embodiment of the invention, representing a modification of the previously described third embodiment which is shown in FIGS. **14–17**. The proposed modification concerns itself essentially with the manner in which mobility is provided for the self-contained strip feeding unit **286**, in relation to the stationary main frame **288** of the device. This embodiment, therefore, suggests the arrangement of a simple parallel linkage between the movable frame **296** and the stationary main frame **288**, the parallel linkage consisting of two cooperating pairs of simple links **290** which are arranged on opposite sides of the two frames. For this purpose, the upright frame members **292** of the main frame **288** and the lateral frame portions **294** of the movable frame **296** have aligned lateral faces to which the extremities of the links **290** are pivotably attached by means of suitable pivot connections **298**.

As can be seen in FIG. **18**, the pivot connections on the upright frame members **292** are located above the associated pivot connections on the lateral frame portions **294** of the movable frame **296**, so that the longitudinal axes of the links **290** extend at an angle of approximately 35 degrees from a plane which is perpendicular to the feed direction of the uncut strips. This parallel linkage thus provides a mobility of the strip feeding unit **286** in an upward and outward direction relative to the stationary guide plate of the device. Consequently, the weight of the strip feeding unit assists the tension springs in providing a preload which holds the strip feeding unit in its normal operating position against the stop bolts. The extent to which the weight of the unit contributes to this preload is determined by the choice of the angle of inclination of the parallel linkage.

FIG. **18** also shows, in connection with the fourth embodiment of the invention, a modification of the mounting arrangement for the second stationary cutting edge which has been described in detail in connection with the second embodiment of the invention (FIGS. **8–13**). As is shown in dotted lines in the drawing, the stationary cutting edge is provided as part of a short horizontal blade-like plate **300** which is press-fitted into the mouth portion of a hook-shaped support member **302**. The latter, by virtue of its curved shape, also fulfills the role of the previously suggested guide cover **144** (FIG. **13**). However, because the support member **302** is subjected to the cutting forces at the second cutting point, its wall must be much heavier than that of the guide cover **144**. Like the latter, it is removably mounted on the back side of the vertical cross member **304** of the main frame **288**, using clamping bolts.

It should be evident from the foregoing description that various components and subassemblies which have been described in connection with a particular one of the four preferred embodiments can in many cases also be used in connection with one or more of the other embodiments, and that various features which are disclosed in connection with different embodiments may also be combined in a way which is not specifically shown in the drawings.

It should further be understood, of course, that the foregoing disclosure describes only preferred embodiments of the invention and that it is intended to cover all changes and modifications of these examples of the invention which fall within the scope of the appended claims.

I claim the following:

1. A shredding device adapted for the destruction of microfilm and similar information carriers with microimage impressions, the device comprising in combination:

- a main frame;
- a shredding cutter with a power drive, the cutter being rotatably supported by the main frame and having the general shape of a milling cutter with a plurality of angularly spaced longitudinal cutting edges arranged on its periphery;
- a first stationary cutting edge supported by the main frame so as to cooperate with the rotating cutting edges of the shredding cutter to define a first cutting position therewith; and
- a strip feeding unit operable to feed and guide information carrier material to said first cutting position, the strip feeding unit being supported by the main frame and comprising:
- a stationary guide plate having a guide surface oriented substantially radially with respect to the shredding cutter and leading to said first cutting position, where the guide plate carries said first stationary cutting edge;
- means for forcibly advancing strip material along the stationary guide plate, towards the first cutting position, said strip advancing means including a plurality of rotating strip advancing members and a drive therefor, at least some of said members being arranged side-by-side and spaced apart in a direction transverse to the direction of strip advance, and each of said members forming a strip feed gap with the guide plate; and
- a feeding unit frame supporting the strip advancing means, including means operable to retract the strip advancing members in a direction away from the guide plate, for access to the strip feeding gaps.

2. A microfilm shredding device as defined in claim **1**, wherein

- the strip advancing means is a strip feeding conveyor, having at least two conveyor guide rolls and a plurality of endless belt members which are supported on the guide rolls and represent said rotating strip advancing members;
- the strip feeding conveyor is arranged in such a way that a straight portion of each belt member extends substantially parallel to the guide surface of the stationary guide plate, thereby forming said strip feed gaps; and
- the drive for the strip advancing members is a conveyor drive.

3. A microfilm shredding device as defined in claim **2**, further comprising:

- a second stationary cutting edge supported by the main frame so as to likewise cooperate with the rotating cutting edges of the shredding cutter, thereby defining a second cutting position which is located a distance behind the first cutting position in the sense of cutter rotation; and
- cover means forming an enclosure between the first and second cutting positions for the conveyance of the cut information carrier shreds from the first to

the second cutting position, the shape of said enclosure bulging outwardly to allow for the intermingling of the shreds during conveyance.

4. A microfilm shredding device as defined in claim **2**, wherein

the strip feeding conveyor has at least three guide rolls arranged at unequal distances from the first cutting position;

the gap-forming straight belt member portions extend between a first, nearest guide roll and a second guide roll of intermediate spacing; and

adjoining inclined belt member portions extend from the second guide roll to a third, more distant, guide roll, at such an angle to the guide surface of the guide plate that the inclined belt member portions move towards the guide surface in a converging sense.

5. A microflim shredding device as defined in claim **4**, wherein

the endless belt members further include return portions extending between the first and third guide rolls; and

the conveyor drive includes a drive member engaging the return portions of the belt members.

6. A microfilm shredding device as defined in claim **4** or claim **5**, wherein

the endless belt members are timing belts, so supported on the guide rolls that the teeth of each timing belt face towards the strip feed gap, on the one side, and towards the drive member of the conveyor drive, on the opposite side of the belt circumference.

7. A microfilm shredding device as defined in claim **4** or claim **5**, wherein

the endless belt members are O-rings of round cross section, the O-rings being guided by annular grooves in the guide rolls.

8. A microfilm shredding device as defined in claim **7**, wherein

the endless belt members include return portions extending between the first and third guide rolls; and

the strip feeding conveyor further includes a stationary wiper brush engaging the return portions of the endless belt members near the point where they leave the first guide roll.

9. A microfilm shredding device as defined in claim **1**, or claim **2**, or claim **4**, wherein

the strip advancing means further includes a plurality of elongated stationary guide members which are arranged between the transversely spaced strip advancing members so as to alternate therewith; and

the guide members have one extremity located in the vicinity of the first cutting position and at least an adjoining end portion extending substantially parallel to the guide surface of the stationary guide plate.

10. A microfilm shredding device as defined in claim **9**, wherein

the guide members are guide needles which are arranged laterally between the endless belt members;

the first and second guide rolls for the belt members include shallow annular grooves positioning the guide needles in the lateral sense; and

each guide needle engages an annular groove of the second guide roller with an end loop in the shape of an eye, so as to be pivotable towards the stationary guide plate, around the center of the second guide roll.

11. A microfilm shredding device as defined in claim **1**, or claim **2**, or claim **4**, wherein

the feeding unit frame, the strip advancing means, and the associated drive form a displaceable feeding unit subassembly which includes, as part of said retracting means, means for guiding the feeding unit subassembly between a first, operative position of the strip advancing means and a second, retracted position of the strip advancing means.

12. A microfilm shredding device as defined in claim **11**, wherein

the operative position of the strip advancing means is determined by feeding unit abutment means arranged between the feeding unit frame and the main frame.

13. A microfilm shredding device as defined in claim **12**, wherein

the width of the strip feed gaps is adjustable through adjustment of the feeding unit abutment means.

14. A microfilm shredding device as defined in claim **12**, further comprising

means biasing the feeding unit subassembly towards the operative position of the strip advancing means.

15. A microfilm shredding device as defined in claim **14**, wherein

said biasing means includes at least one spring.

16. A microfilm shredding device as defined in claim **14**, wherein

the drive for the strip advancing means operates independently of the power drive of the shredding cutter; and

the strip feeding unit further includes a safety switch which is arranged between the feeding unit frame and the main frame, the safety switch being adjusted to shut down the conveyor drive, when the feeding unit subassembly is displaced away from the operative position of the strip advancing means by an excess of information carrier material entering the strip feed gaps.

17. A microfilm shredding device as defined in claim **14**, wherein

the drive for the strip advancing means operates independently of the power drive of the shredding cutter and has at least one slow-operating speed, in addition to a normal operating speed; and

the strip feeding unit further includes a control switch having at least three switching positions which, respectively, control the normal operating speed, at least one slow-operating speed, and the shutdown of the advancing means drive, the control switch being arranged between the feeding unit frame and the main frame and adjusted to respond to displacements of the feeding unit frame in such a way that, when the feeding unit subassembly is in its normal abutted position, the advancing means drive operates at normal speed, and when the feeding unit subassembly is displaced a small distance away from its abutted position, due to a small excess of information carrier material entering the strip feed gaps, the advancing means drive operates at a slow-operating speed, and when the feeding unit subassembly is displaced a greater distance away from its abutted position, due to a large excess of information carrier material entering the strip feed gaps, the advancing means drive is shut down.

18. A microfilm shredding device as defined in claim **11**, wherein

the displaceability of the feeding unit subassembly is obtained by means of a pivot connection between the feeding unit frame and the main frame, on an axis which is parallel to the axis of the shredding cutter, the pivot connection being located in relation to the shredding cutter axis in such a way that, in a pivoting displacement, that part of the strip advancing means which is located closest to the first cutting position moves away from the cutter and away from the guide plate, in an approximately diagonal direction.

19. A microfilm shredding device as defined in claim **11**, wherein

the displaceability of the feeding unit subassembly is obtained by means of a straight-line guide between the feeding unit frame and the main frame, the straight-line guide including guide pins in one frame and cooperating guide bushings in the other frame, the direction of displaceability being substantially perpendicular to the guide surface of the guide plate.

20. A microfilm shredding device as defined in claim **11**, wherein

the displaceability of the feeding unit subassembly is obtained by means of a parallel-linkage-type pivot connection between the feeding unit frame and the main frame, the pivot connection including a plurality of two-point links of identical length connecting the two frames in such a way that the feeding unit subassembly, in a pivoting displacement, moves away from the shredding cutter and away from the guide plate, in an approximately diagonal direction.

21. A microfilm shredding device as defined in claim **11**, wherein

the drive for the strip feed conveyor includes a speed-adjustable electric motor supported by the feeding unit frame in a coaxial arrangement with the third guide roll of the strip feed conveyor, and elastic coupling means arranged between the motor and said guide roll.

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