Oct. 4, 1966

D. J. TOMPOS

3,276,303

PORTABLE SAMPLE CUTTER

Filed Jan. 18, 1965

3 Sheets-Sheet 1

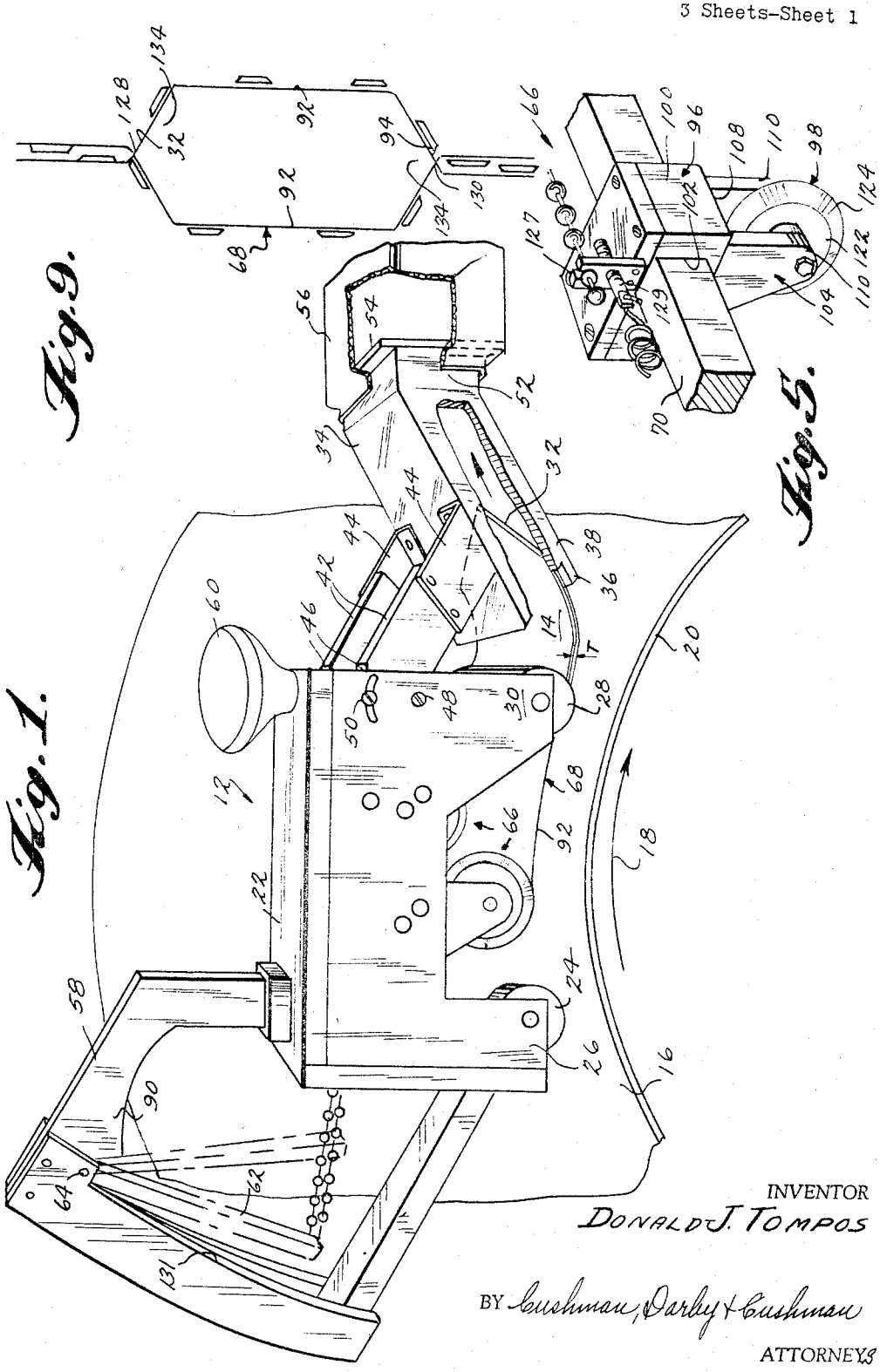


Fig. 1.

Fig. 9.

Fig. 5.

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3 Sheets-Sheet 2

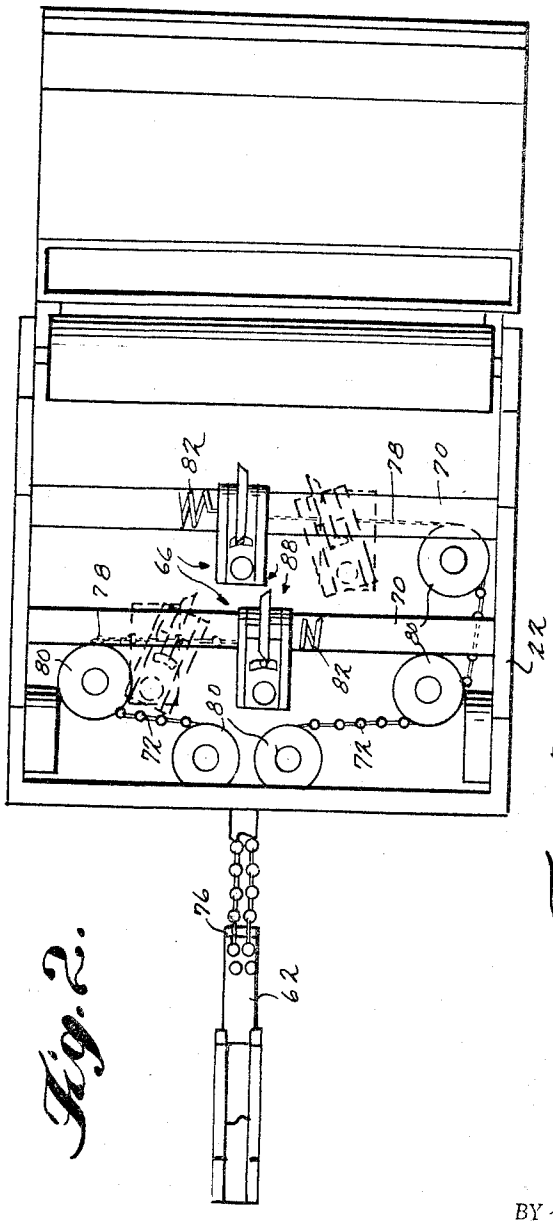


Fig. 2.

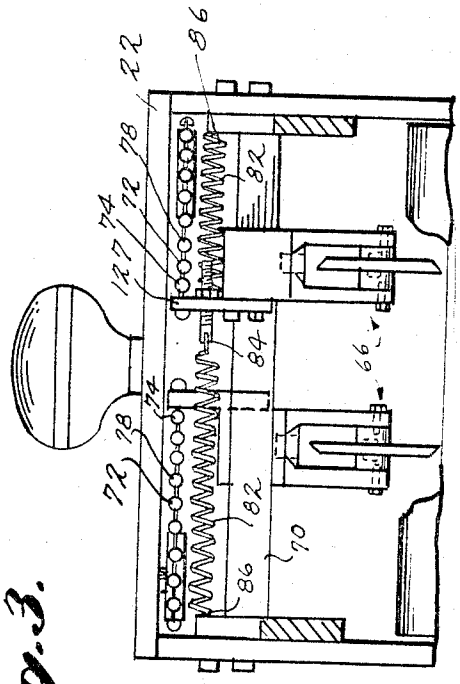


Fig. 3.

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PORTABLE SAMPLE CUTTER

Filed Jan. 18, 1965 3 Sheets-Sheet 3

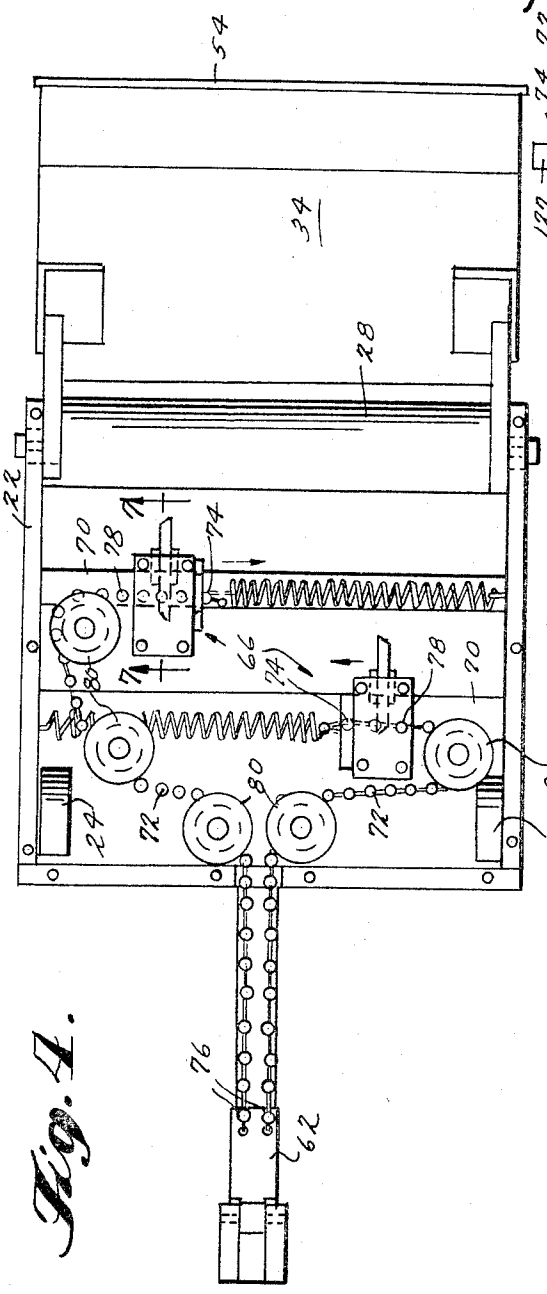


Fig. 4.

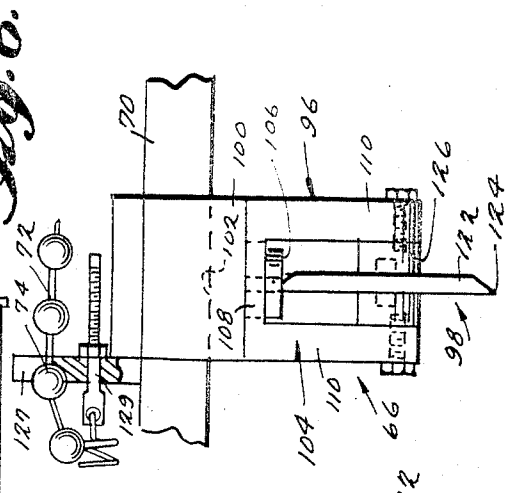


Fig. 6.

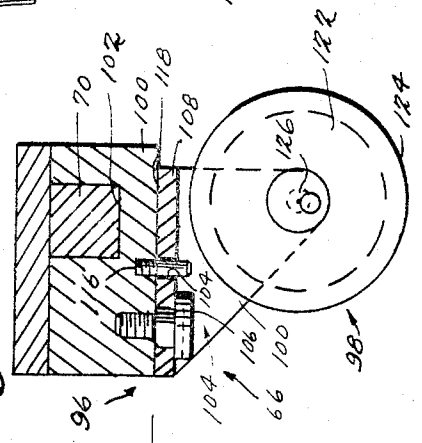


Fig. 7.

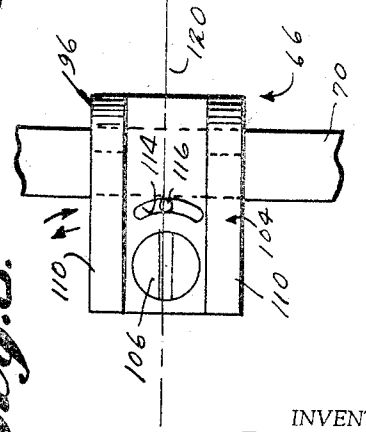


Fig. 8.

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United States Patent Office

3,276,303

Patented Oct. 4, 1966

3,276,303

PORTABLE SAMPLE CUTTER

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Filed Jan. 18, 1965, Ser. No. 426,233
36 Claims. (Cl. 83—27)

This invention relates to a sampling device and method and more particularly to a device and method for obtaining a sample from moving sheet material.

The device may be used for cutting paper samples from the take-up reel of a paper making machine for the purpose of checking the moisture content of the paper. However, the invention is not limited to paper but rather is directed to any type of sheet material, such as paper, cellophane or other synthetic materials, from which it is necessary to obtain a sample for testing or analysis purposes. For obvious reasons, it is desirable to have a method and apparatus for obtaining samples from moving sheet material so that valuable time will not be lost by stopping the process in order to obtain such a sample from a stationary source.

In order to obtain a true sample from the moving sheet material that is not subject to minor variations that might occur along the edges of the sample, this invention provides an apparatus and process for obtaining a sample disposed from the edges of the longitudinally moving sheet material.

Broadly, therefore, the invention is directed in part to an apparatus for obtaining a sample from sheet material which is relatively movable with respect to the sample cutter comprising a pair of relatively movable slitting knife means for slitting or piercing the sheet material, and means to make the knife means effect contact between the slits formed thereby during the relative motion for slitting a sample from the sheet material. Generally, the sheet material is moving and the sample cutter is stationary, although the only important feature is relative motion between the two. Furthermore, the sample cutter usually comprises a frame member to which the slitting knife means are operatively secured, although a scissor construction might be utilized in which it might be contended that there was no frame element. Preferably, the slits formed by each knife means piercing the moving sheet material will contact each other in at least two places so as to sever a sample cleanly from the interior of the moving sheet material.

More specifically, it is an object of this invention to provide a portable sample cutter for obtaining a sample disposed from the edges of longitudinally moving sheet material comprising a frame member, a pair of slitting knife means operatively secured to the frame member with at least one of the knife means being transversely movable on the frame member with respect to the longitudinal direction of travel of the moving sheet material, the slitting knife means being longitudinally disposed with respect to each other, means to move at least one of the knife means from a first position transversely disposed to one side of the other knife means to a second position transversely disposed to the other side of the other knife means whereby the slits formed by each knife means piercing the moving sheet material will cross each other so as to sever the leading transverse edge of a sample cleanly from the sheet material, and means to return the knife means to the first position so that the slits will cross each other and cleanly sever the trailing transverse edge of the sample whereby the sample may be removed from the moving sheet material easily.

It is also an object of this invention to provide an improvement in the method for obtaining a sample from sheet material broadly comprising the steps of simultaneously piercing the sheet material with two slits and directing the slits into contact with each other so as to sever one transverse edge of the sample cleanly from the sheet material. Furthermore, the slits may be directed outwardly in opposite directions to enlarge the spacing between the slits and thereafter directed inwardly toward each other until they come in contact so as to sever the other transverse edge of the sample cleanly from the sheet material. Once the sheet material sample has been severed between the slits, it may be removed.

More specifically, this method comprises the steps of piercing the moving sheet material with two slits disposed from the longitudinal edge of the sheet material, directing the slits in a first direction inwardly toward each other, intersecting the slits so as to sever the leading transverse edge of the sample cleanly from the sheet material, continuing the slits in the first direction outwardly away from each other until they are spaced apart by a predetermined distance, directing the slits in a second direction inwardly toward each other, intersecting the slit so as to sever the trailing transverse edge of the sample cleanly from the sheet material thereby enabling the sample to be easily removed from the sheet material, and removing the sample from the sheet material.

It will be seen that the knife means completely severs the leading and trailing transverse edges of the sample along with the longitudinal edges of the sample so that the sample can be removed without any initial or final severing performed manually by the operator. Heretofore, as illustrated in the patent to Cundiff et al., 2,837,155, of June 3, 1958, sampling from moving sheet material required separate severing of the transverse edges of the sample after the sample was cut because the slits did not intersect or come into contact with each other. The invention described herein removes this defect in sampling procedure, which, in all probability, resulted in the sheet material operation being shut down so that the sample could be punched out of the sheet material manually. The utilization of the apparatus and method described herein provides a continuous operation which results in a sample being taken quickly and evenly without interfering with the operation of the particular material process. Naturally, such a continuous operation will result in numerous savings due to the reduced work force required to operate the sampling devices and due to the savings in machine downtime. It should also be noted that the sample obtained herefrom is continuous and may be of any desired length which provides a sufficient sample size for the desired testing purposes.

Furthermore, in sampling devices which require the sample to be at least partially punched out of the moving sheet material, it is generally necessary to take the sample from the moving sheet prior to its windup on the reel. Because the sample is cleanly severed from the moving sheet material and with the addition of a means for removing the cleanly severed sample from the moving sheet material, the device may be applied to the material after it has been wound on a take-up reel. Consequently, the chance of the device causing the sheet to break resulting in product waste is clearly reduced.

Likewise, within the area of avoiding material waste, it is an object of this invention to provide a means for varying the depth to which the knife means pierces the moving sheet material. Such a means will result in the precise number of layers of the sheet material being cut for a sample.

A further problem experienced in sampling such material as paper, wherein it is necessary to test or analyze the characteristics of the paper, such as its moisture content, is the fact that the sample changes its moisture content due to ineffective insulation from ambient changes

in temperature, relative humidity, and the like. Heretofore, it was necessary to sever several additional layers of material so that the top layers could be discarded as not being representative of the characteristics of the moving sheet material. It is, therefore, an object of this invention to reduce exposure of the sample to these ambient conditions. Accordingly, enclosure means are provided which are operatively associated with the removal means for receiving and storing the severed sample so as to maintain its characteristics. This enclosure means might comprise a bag or some other type of container into which the sample is directed, or the enclosure means could be formed within the frame member or housing of the sample cutter itself. Likewise, the sample could be directed through an enclosed means directly to a moisture or other characteristic testing machine. It is a further object of this invention to include a method by which the characteristics of the sample are maintained.

While the advantages and accomplishments of the sample cutter described in this invention are numerous, it is an object of this invention to provide a device and process which is simple and inexpensive so as to present an overall desirable commercial device.

These and other objects of this invention are more clearly depicted in the following detailed description having specific reference to the attached drawings in which the embodiments of the invention are shown, not to limit the scope of the invention in any respect but so that the principles thereof might be more clearly demonstrated.

In the drawings:

FIGURE 1 is a perspective view of the sample cutter shown cutting a sample from a roll of moving sheet material;

FIGURE 2 is a bottom plan view of the sample cutter shown with the knife means in its original, unbiased position;

FIGURE 3 is a front sectional view of the sample cutter with the chute removed;

FIGURE 4 is a top plan view of the sample cutter with parts broken away to disclose the interior thereof;

FIGURE 5 is a perspective view of one of the knife means shown positioned on a transverse support member;

FIGURE 6 is a fragmentary front elevational view of the knife means;

FIGURE 7 is a sectional side elevational view taken substantially along the lines 7—7 of FIGURE 4;

FIGURE 8 is a bottom plan view of the knife means with the knife member removed to disclose the interior thereof; and

FIGURE 9 is a schematic plan view illustrating the movement of the knife members in slitting a sample from the moving sheet material.

Referring specifically to the drawings, FIGURE 1 is a perspective view of a portable sample cutter 12 shown removing a sample 14 of desired thickness T from a roll of sheet material 16 moving in a longitudinal direction as indicated by the arrow 18. It is obvious that the sheet material could be stationary and the sample cutter moved to obtain relative motion. In this latter situation in order to obtain a sample as shown in FIGURE 1, the sample cutter must be moved in a direction opposite to that indicated by arrow 18. The sample 14 is taken at a position disposed from the longitudinal edges 20 of the roll of longitudinally moving sheet material 16 so that the sample will not be subjected to distortion which often occurs on the edges of the sheet material. While a longitudinal sample is shown being obtained, a transverse sample could be cut if the sheet material were stationary and the sample cutter moved transversely with respect thereto.

As disclosed, the knife means 66 is housed in a frame member 22 having a first roller 24 attached to one end 26 of the frame member and a second roller 28 attached to a second end 30 of the frame member. The rollers allow the sample cutter 12 to be placed on the roll of moving sheet material 16 without dragging on the moving sheet material or otherwise hindering its longitudinal movement. In some situations, however, it may be desirable to utilize a runner or skid-type of base. The second roller 28 is shown extending all the way across the second end 30 of the frame member so that it can assist in picking up the leading transverse edge 32 of the sample 14 with respect to the longitudinal direction of travel of the material, once it has been cut from the moving sheet material. Generally the mere frictional engagement of the front roller 28 with the leading transverse edge 32 of the sample will lift it up slightly so that it can be picked up and removed from the roll of moving sheet material. However, it is within the scope of the invention to include an adhesive surface on the roller 28, suction or any other similar means which might be used to aid in picking up and removing the sample once it has been severed from the moving sheet material.

It is also desirable to have a chute 34 for aiding in the removal of the sample 14. As illustrated, the lower edge 36 of one end 38 of the chute 34 is positioned adjacent to the roll of moving sheet material for cooperating with the roller in picking up and removing the sample. Because of changes in the size of the roll of moving sheet material 16 and thus in the configuration of the circumference thereof, an adjusting means 40 is provided for allowing the lower edge 36 to be positioned adjacent to the roll of moving sheet material. As illustrated, a pair of support members 42 are secured at one end 44 to the chute 34, and at the other end 46 the support members are pivotally attached at 48 to the frame member 22. A slot and pin means 50 is associated with the other end 46 of the support member 42 and with the frame member 22 at a position disposed from the pivotal connection 48 so as to limit the pivotal movement of the chute. It is realized, of course, that within the scope of the invention any other common mechanical connecting means could be provided.

The other end 52 of the chute 34 has an enlarged facing 54 so that an encasing means 56, such as a plastic bag, can be easily attached thereto. The encasing means enables the sample to be caught once it is cut from the roll of moving sheet material. Thus, the encasing means prevents the characteristics of the sample, such as its moisture content, from being greatly affected by the ambient temperature, relative humidity and other undesirable variables. It will be appreciated that the chute could remove the sample directly to a testing or analysis machine by which certain characteristics of the sample are tested. Furthermore, the frame member 22 could be so configured that the sample 14 could be curled upwardly into a sample encasing means within the frame member 22 itself.

As illustrated, the frame member additionally comprises a first handle means 58 and a second handle means 60 secured at opposite ends, 26 and 30 respectively, for enabling the sample cutter to be hand-placed easily in an appropriate position to take a sample from the roll of moving sheet material. The first handle means 58 has an operating lever 62 pivotally secured thereto at 64 for movement into various operating positions. The operating lever is operatively secured to a pair of slitting knife means 66 which are used to pierce the moving sheet material.

As disclosed more specifically in FIGURES 2, 3 and 4, the knife means 66 is operatively secured to the frame member 22 with at least one of the knife means being movable with respect to the other knife means. The knife means is so secured to the frame means that when operatively moved by the operating lever 62, the slits 68, shown in FIGURES 1 and 9, formed by each knife means 66 piercing the roll of moving sheet material will contact each other in at least one place for cleanly severing one transverse edge, as at 32, of the sample with

respect to the longitudinal direction of travel of the sheet material from the interior of the moving sheet material. As illustrated, each knife means is slideably mounted to one of a pair of transverse support members **70** for transverse movement. Each transverse support member is secured at its opposite ends to the frame member and each is longitudinally disposed from the other.

Each knife means **66** is secured to the operating lever **62** by a chain means **72** having a first end **74** and a second end **76**. The first end of each chain means is secured to the knife means and at least a portion **78** of each chain means extends in a first transverse direction. The portion **78** of the chain means is retained in the first transverse direction during the movement of the chain by extending the chain around a plurality of guide means **80** secured to the frame member **22** and positioned in such a manner that a longitudinal pull on the operating lever will cause the chain to exert an axial pull in the first transverse direction. A spring means **82** is attached at one end **84** to the knife means and at the other end **86** to the frame member and extends at least partially in a second transverse direction opposite to that in which the chain means lies. When the operating lever **62** is released, the spring means pulls the knife means in the second transverse direction until the knife means is positioned in its original unbiased position as indicated at **88** in FIGURE 2.

In order to sever a transverse edge of the sample cleanly from the moving sheet material, the slits formed by the knife means must come into contact with each other in at least one place. Because the transverse support members **70** are longitudinally disposed from each other, the knife means may be moved transversely past each other thereby enabling the slits formed by the knife means to cross one another thereby accomplishing a clean severance of one transverse edge.

In order to accomplish the objects of the invention, however, it is not necessary that the slits cross over each other, but rather the knife means in their unbiased starting positions could be exactly aligned so that the longitudinal slits formed by each are contiguous. However, the difficulties in exactly aligning the pair of knife means so that the slits formed by each are contiguous makes the desirable unbiased position of the knife means slightly disposed from each other in a direction such that the initial movement of the knife means will cause the slits formed by each to intersect. The unbiased position as indicated at **88** in FIGURE 2 is determined by the distance to which the chain means **72** will allow the knife means **66** to be pulled by the spring means **82**. The transverse movement of the chain means in one direction is limited by an abutment **90** shown in FIGURE 1 depending from the first handle means **80** and limiting the movement of the operating lever **62** which in turn limits the movement of the chain means in one transverse direction.

It will be seen that when the spring means returns the knife means to its unbiased position, as at **88**, the slits formed by the knife means will again cross over each other so that both the leading transverse edge **32**, the longitudinal extending edges **92** and the trailing transverse edge **94** will be cleanly severed from the roll of moving sheet material thereby defining a sample shown in FIGURE 9.

As disclosed in FIGURES 5 through 8, the slitting knife means **66** comprises a knife holder **96** which is slidably secured to the transverse support member **70** and a knife member **98** mounted in each holder. The knife holder comprises a block member **100** having an opening **102** extending therethrough for slideably receiving the transverse support member **70** and a yoke **104** pivotally secured at **106** to the block member **100** for movement in a horizontal plane.

The yoke has a base element **108** and two upwardly extending opposed arms **110** attached to the opposite

edges **112** of the base element **108**. The pivotal connection **106**, by which the yoke **104** is attached to the block member **110**, is secured through the base element **108** and the yoke so that the base element can move in a horizontal plane. In order to limit the horizontal movement of the base element, an arcuate slot **114** is cut therethrough at a position disposed from the pivotal attachment **106**. A pin **116** is secured to the surface **118** of the block member **110** adjacent to the base element **108** of the yoke and extends upwardly into the slot **114**. The slot **114** and pin **116** cooperate to limit the pivotal movement of the yoke. In one model of the invention the slot forms an arc of approximately 60° so that the yoke can move 30° to either side of the longitudinal axis **120** of the knife member **98**, as indicated in FIGURE 8. The longitudinal axis **120** is preferably substantially parallel to the longitudinal axis of the moving sheet material.

As illustrated, the knife member **98** comprises an annular cutting blade **122** which is tapered to an annular cutting edge **124**. The annular cutting blade **122** is supported between the upwardly extending arms **110** of the yoke **104**. In the preferable form of the invention, the cutting blade **122** is rotatably supported on an axle **126** secured to the upwardly extending arms **110**. As such, the blade **122** rotates at approximately the sample speed as the moving sheet material. It will be appreciated, however, that stationary or blade-type cutters may be used or that even power driven knives could be used, driven perhaps at a speed varying from the surface speed of the roll, such as one and one-half times the speed of the roll. It is obvious that numerous modifications can be made within the scope of the invention to the type of knife means used to cut the sample from the moving sheet material.

In order to vary the thickness T of the sample and, accordingly, in order to control the depth of the slit, it is preferable to include an adjusting means by which the knife elements can be extended beyond the frame means. In fact, it may even be desirable to have a knife means positioned so that it does not extend outside the confines of the frame member, or, expressed differently, so that it does not extend into contact with the moving sheet material, until it is adjustably moved into such position. Such an embodiment enables the sample cutter to be placed on the moving roll of material without initiating a slit thereon. At the appropriate time the slitting knives can be moved into contact with the moving sheet material. As illustrated, however, the knife means extends naturally to a position in which the blades slit the moving sheet material. However, the blades can be adjusted so that they form a deeper slit. Such adjustment might comprise the axle **126** being eccentrically mounted for limited adjustment with respect to the work so that the distance that the knife element extends beyond the frame means may be adjusted by the variance in the eccentricity. Inasmuch as most of the material being sampled is very thin, the variance in the eccentricity allows an excellent means of controlling the depth of the slit. Within the scope of the invention, other means of varying the depth of the slits may be employed.

As viewed in FIGURES 2 and 4, it would appear that the knife means **66** would have its transverse movement interfered with by the guide means **80**. However, as illustrated in FIGURES 3 and 6 the knife means is positioned below the guide means and has an arm **127** extending upwardly so that the first end **74** of the chain means **72** can be attached thereto and retained in a substantially horizontal position. Likewise, one end **84** of the spring means **82** is secured to the arm **127** by an adjustable means **129** which allows variations in the tension put on the spring. The maximum transverse movement of the knife means is limited by the upwardly extending arm coming into contact with the guide means at approximately the same time that the knife means comes

into contact with the side of the frame member. Furthermore, it can be seen that the maximum transverse movement could also be determined by the distance through which the operating lever could be pivoted, as limited by the abutment 90 and the rear portion 131 of the handle means, shown in FIGURE 1.

While the knife means is shown actuated by a chain means and a spring means, it is within the scope of the invention to utilize other common mechanical equivalents. For instance, if thick paper, such as cardboard, is being sampled, or perhaps a plastic or the like, the spring may not have sufficient strength to return the knife means to its original unbiased position. Pneumatic cylinders could then be attached to the unit to provide sufficient force to return the knife means.

In operation, the utilization of this sample cutting device provides a unique method of obtaining a sample disposed from the edge of sheet material moving relative to the cuting device comprising the steps of piercing the sheet material with two slits 68, preferably disposed from one edge, as at 20, of the roll of sheet material 16, directing the slits into contact with each other, as at 128 in FIGURE 9, so as to sever one transverse edge, as at 32, of the sample clearly from the sheet material. Such steps provide a great improvement in present procedures inasmuch as one transverse edge is completely severed from the sheet material. Thereafter, the slits are directed outwardly in opposite directions to enlarge the spacing between the slits and subsequently directed inwardly toward each other until they come in contact, as at 130 in FIGURE 9, so as to sever the other transverse edge, as at 94, of the sample clearly from the sheet material allowing the sample, severed between the slits, to be easily removed.

Generally, the sheet material is pierced by the two slits simultaneously and the slits formed by such simultaneous piercing are parallel. If the slits, as initially formed in the moving sheet material, are disposed from each other, it is necessary to direct them in a first direction inwardly towards each other until they intersect so that the leading transverse edge of the sample can be severed cleanly from the sheet material. The slits are then directed outwardly away from each other in the same first direction until they are spaced apart by a predetermined distance.

The slits are retained in their spaced apart relationship for a predetermined length, as measured by the desired length of the sample to be obtained from the moving sheet material. The desired length is in part determined by the size of the sample necessary for determining, for instance, the moisture content thereof. Once a sample of sufficient length has been obtained, the slits are redirected in a second direction inwardly towards each other until they intersect so as to sever the trailing edge of the sample cleanly from the sheet material thereby enabling the sample to be easily removed therefrom.

The slits are moved towards and away from each other by actuating the operating lever. As illustrated, a pull on the operating lever by hand causes the blades to move inwardly towards each other and then outwardly from each other after the point of intersection. In other words, the blades are moved in opposite directions toward the longitudinal edges of the sheet material, and in a direction such that they will intersect each other. When the operating lever is retained in a set position, a sample of predetermined length and predetermined width may be obtained. Thereafter, when the operating lever is released, the springs return the knife members to their original position thereby moving the knife members in opposite directions towards each other until they intersect and then away from each other until they reach their original positions.

As seen in FIGURE 9, a sample having tapered end portions 134 is formed by the simultaneous transverse movement of the knife holders and longitudinal movement of the material. The knife member is pivotally connected to the block member so that the cutting edge of each knife can be substantially aligned with these diagonal cuts thereby reducing the chance of ripping the sheet. If the cutting edge came down to a point, it would not be necessary to provide this pivotal action between the knife member and the block member. The longitudinal movement of the sheet material and the transverse movement of the knife means causes the knife blade to swivel into a diagonal alignment, limited by the slot 114 and pin 116, whenever these two movement forces operate against the knife blade. Once the knife means is positioned at a desired distance apart, the transverse movement of the knife means is ceased and the longitudinal movement of the sheet material causes the knife blade to swivel into alignment substantially parallel to the longitudinal axis of the moving sheet material. The various positions of the knife member are illustrated beside the slits forming a sample in FIGURE 9.

It will be appreciated that the above method also includes the step of removing the sample once it has been severed by the slits. Although removal means are provided to aid in removing the sample from the moving sheet material, it should be pointed out that the mere cross-over action of the slitting knife members 98 will have a tendency to lift up the leading transverse edge of the sample. Furthermore, it is desirable to remove the sample into an encasing means so as to preserve its characteristics, such as its moisture content. The encasing means could include a plastic bag in which the sample would be retained in a coiled, loose, randomly folded, or bunched condition, as it has been found that this is the most desirable way to store a sample in order to prevent variances in its particular characteristics.

It will be seen that the provision of an encasing means and the steps of directing the sample into the encasing means could well be adapted to existing sample cutting machines and methods. Likewise, it is preferable to change existing sample cutters and methods of obtaining samples to include the means and method of bringing the two slits into contact with each other so that the sample can be cleanly severed from the sheet material. Such a modification to existing machines might be more difficult because of the construction of the cutters and the use of one transverse member on which each cutter is received.

Although described as primarily a hand-held and hand-operated device, it can be seen that with a few modifications the device could be modified to operate automatically through the incorporation of electric or pneumatic operating systems. Furthermore, the process was shown obtaining a sample from a roll of material inasmuch as the layers of material found on a roll provide a firm foundation for receiving the cutting force of the blades. It has been found that the material occasionally rips when a sample is taken from a moving sheet material without some sort of support. However, it is realized that it may be desirable to cut samples in other locations in the process, perhaps even without a supporting foundation thereunder, and accordingly the apparatus and method is not limited to obtaining a sample from a roll of moving sheet material. In such instances it may even be desirable to eliminate the rollers and utilize a runner or skid-type of base.

The invention has been primarily described with sheet material which is moving, but, as previously stated, the sheet material in all instances could be stationary and the sample cutter moved to obtain this relative movement. Moving the sample cutter by hand might prove to be quite awkward, but if the sample cutter were incorporated into an automatic sample program, the sample cutter itself could be moved automatically thereby affording even and unvaried relative motion.

While a preferred form of the invention has been illustrated in the drawings and discussed above, it should be adequately clear that considerable modification may be made thereto without departing from the principles of the

invention. Therefore, the foregoing should be considered in an illustrative sense rather than a limiting sense, and accordingly the extent of this invention should be limited only by the spirit and scope of the claims appended hereto.

I claim:

1. A portable sample cutter for obtaining a sample from sheet material, the sample cutter and the sheet material being relatively movable with respect to each other, comprising:

a pair of relatively movable slitting knife means for slitting the sheet material; and

means to make the knife means effect contact between the slits formed thereby during the relative motion for slitting a sample from the sheet material.

2. The sample cutter defined in claim 1 wherein the means to make the knife means effect a contact between the slits causes the slits to cross over each other.

3. The sample cutter defined in claim 1 wherein each slitting knife means is offset from the other slitting knife means in the direction of relative movement of the sample cutter and the sheet material.

4. A portable sample cutter for obtaining a sample disposed from the longitudinal edges of longitudinally moving sheet material comprising:

a pair of slitting knife means for piercing the moving sheet material with at least one of the knife means being movable with respect to the other knife means; and

means to move at least one of the knife means in relation to the other knife means to cause the slit formed by each knife means piercing the moving sheet material to contact each other in at least one place so as to sever at least one transverse edge of the sample with respect to the longitudinal direction of travel of the sheet material cleanly from the interior of the moving sheet material.

5. The sample cutter defined in claim 4 wherein the slits formed by each knife means piercing the moving sheet material will contact each other in at least two places so as to sever the sample cleanly from the interior of the moving sheet material.

6. The sample cutter defined in claim 5 additionally comprising: means to remove the severed sample formed by the slits between the places of contact by the two slits.

7. The sample cutter defined in claim 6 additionally comprising: enclosure means operatively associated with the removal means for receiving and storing the severed sample so as to maintain the characteristics of the sample.

8. A portable sample cutter for obtaining a sample disposed from the edges of longitudinally moving sheet material comprising:

frame means;

a pair of slitting knife means for piercing the moving sheet material operatively secured to the frame means and extending at least partially beyond the confines of the frame means into contact with the moving sheet material so as to pierce it, with at least one of the knife means being movable with respect to the other knife means; and

means to move at least one of the knife means from a first position transversely disposed to one side of the other knife means to a second position transversely disposed to the other side of the other knife means whereby the slits formed by each knife means piercing the moving sheet material will cross each other so as to sever the leading transverse edge of a tapered sample cleanly from the sheet material.

9. The sample cutter defined in claim 8 additionally comprising: means to return the holders to the first position so as to sever cleanly the trailing transverse edge of the sample so that the sample may be removed from the moving sheet material easily.

10. A portable sample cutter for obtaining a sample disposed from the edges of longitudinally moving sheet material comprising:

a frame member;

a pair of slitting knife means operatively secured to the frame member with at least one of the knife means being transversely movable on the frame member with respect to the longitudinal direction of travel of the moving sheet material, the slitting knife means being longitudinally disposed with respect to each other;

means to move at least one of the knife means from a first position transversely disposed to one side of the other knife means to a second position transversely disposed to the other side of the other knife means whereby the slits formed by each knife means piercing the moving sheet material will cross each other so as to sever the leading transverse edge of a sample cleanly from the sheet material; and

means to return the knife means to the first position so that the slits will cross each other and cleanly sever the trailing transverse edge of the sample whereby the sample may be removed from the moving sheet material easily.

11. The sample cutter defined in claim 10 additionally comprising: means for extending the slitting knife means beyond the frame means into contact with the moving sheet material, the extending means being adjustable so as to vary the distance that the knife means extends beyond the frame means thereby controlling the depth of the slit and the sample.

12. The sample cutter defined in claim 10 additionally comprising: means for removing the severed sample, formed by the slits between the points of intersection of the two slits, from the moving sheet material.

13. The sample cutter defined in claim 12 additionally comprising: enclosure means operatively associated with the removal means for receiving and storing the severed sample so as to maintain the characteristics of the sample.

14. The sample cutter defined in claim 10 wherein each slitting knife means comprises a knife holder operatively secured to the frame member and a knife member mounted in the holder.

15. The sample cutter defined in claim 14 wherein each knife holder comprises a block member operatively secured to the frame member, and a yoke having a base element and two upwardly extending opposed arms attached to opposite edges of the base element, the yoke being pivotally attached at its base element to the block member for movement in a horizontal plane.

16. The sample cutter defined in claim 15 wherein the base element has an arcuate slot cut therethrough and disposed from the point of pivotal attachment to the block member and wherein the block member additionally comprises a pin depending therefrom and received in the slot, the slot and pin cooperating to limit the pivotal movement of the yoke.

17. The sample cutter defined in claim 15 wherein each knife holder additionally comprises an axle means having the knife member mounted thereon and being adjustably supported between the upwardly extending arms of the yoke.

18. The sample cutter defined in claim 17 additionally comprising means for adjusting the distance that the knife element extends beyond the frame means thereby controlling the depth of the slit and the sample, the adjusting means comprising the axle means being eccentrically mounted so as to vary the distance by the variance in the eccentricity.

19. The sample cutter defined in claim 15 additionally comprising at least a pair of transversely extending and longitudinally disposed support members secured to the frame member, each block member being slideably mounted on one support member for transverse movement.

20. The sample cutter defined in claim 10 wherein the means to move at least one of the knife means from a first position to a second position comprises a chain means having a first and second end, the first end of the chain means being attached to the knife means and at least a portion of the chain means extending in a first transverse direction, guide means connected to the frame member and having the chain means associated therewith so as to maintain at least a portion of the chain means transversely disposed by which an axial pull can be exerted on the knife means in the direction of its movement, trigger means pivotally secured to the frame member having the second end of the chain means attached thereto, the trigger means being movable between a first position wherein the knife means is disposed in its first position and a second position wherein the knife means has been transversely moved to its second position by means of the pull of the chain means, and wherein the means to return at least one of the knife means to the first position comprises a spring means operatively attached at one end to the frame member and at the other end to the knife means, the spring means being operatively associated with the knife means so as to return it to its first position when the trigger means is released.

21. The sample cutter defined in claim 20 wherein there are two knife means, each of which has a chain means and spring means operatively associated therewith, each chain means having one end attached to the trigger means, the chain means and spring means associated with one knife means extending at least partially in opposite transverse direction from the chain means and spring means respectively associated with the other knife means so as to move the two knife means in opposite directions with respect to each other.

22. In a sample cutter for obtaining a sample disposed from the edges of longitudinally moving sheet material of the type having a frame member, a pair of slitting knife means for slitting the moving sheet material operatively connected to the frame member with at least one of the knife means being transversely movable with respect to the longitudinal direction of travel for the moving sheet material, and means to move at least one of the knife means transversely, the improvement comprising:

support means operatively connected to the frame member and having the knife means mountable thereon, at least one of the knife means being movably mounted thereon, the support means being so arranged that the slits formed by the pair of knife means intersect each other thereby enabling a sample to be cleanly severed from the moving sheet material.

23. In a sample cutter for obtaining a sample disposed from the edges of moving sheet material of the type having a frame member, a pair of slitting knife means for slitting the moving sheet material operatively connected to the frame member with at least one of the knife means being transversely movable with respect to the longitudinal direction of travel of the moving sheet material, and means to move at least one of the knife means transversely so as to slit a sample from the moving sheet material, the improvement comprising:

means for removing the slit sample from the moving sheet; and

enclosure means operatively associated with the removal means for receiving and storing the slit sample so as to maintain its characteristics.

24. In a method of obtaining a sample from sheet material, the improvement comprising the steps of:

simultaneously piercing the sheet material with two slits; and

directing the slits into contact with each other so as to sever one transverse edge of the sample cleanly from the sheet material.

25. In a method of obtaining a sample from sheet material, the improvement comprising the steps of:

piercing the moving sheet material with two slits; and

crossing the slits over each other so as to sever one transverse edge of the sample cleanly from the sheet material.

26. A method of obtaining a sample disposed from the edge of longitudinally moving sheet material comprising the steps of:

piercing the moving sheet material with two slits disposed from the longitudinal edge of the sheet material;

directing the slits into contact with each other so as to sever the leading transverse edge of the sample cleanly from the sheet material;

directing the slits outwardly in opposite directions to enlarge the spacing between the slits;

directing the slits inwardly toward each other until they come in contact so as to sever the trailing transverse edge of the sample cleanly from the sheet material; and

removing the sheet material sample severed between the slits.

27. A method of obtaining a sample disposed from the edge of longitudinally moving sheet material comprising the steps of:

simultaneously piercing the moving sheet material with two slits disposed from the longitudinal edge of the sheet material;

directing the slits in a first direction inwardly toward each other;

intersecting the slits so as to sever the leading transverse edge of the sample cleanly from the sheet material;

continuing the slits in the first direction outwardly away from each other until they are spaced apart by a predetermined distance;

directing the slits in a second direction inwardly toward each other;

intersecting the slit so as to sever the trailing transverse edge of the sample cleanly from the sheet material thereby enabling the sample to be easily removed from the sheet material; and

removing the sample from the sheet material.

28. The method as defined in claim 27 additionally comprising the step of maintaining the slits at a predetermined distance apart for a predetermined length after the slits have assumed the predetermined distance apart and prior to directing the slits in the second position.

29. The method as defined in claim 27 additionally comprising the step of directing the sample after it has been removed from the sheet material in a continuous operation into an encasing means so as to preserve the characteristics of the sample.

30. In a method for obtaining a sample from the interior of longitudinally moving sheet material of the type comprising the steps of forming two slits in the moving sheet material disposed from the edge of the sheet material, directing the slits in opposite directions toward the longitudinal edges of the sheet material, directing the slits inwardly toward each other, and removing the sample from the sheet material, the improvement comprising:

intersecting the slits in at least one place so as to sever at least one transverse edge cleanly from the moving sheet material.

31. The improvement defined in claim 30 wherein the slits intersect each other in two disposed places so as to sever both the leading transverse edge and the trailing transverse edge cleanly from the sheet material whereby the sample way be easily removed from the sheet material.

32. In a method for obtaining a sample from the interior of longitudinally moving sheet material of the type comprising the steps of forming two slits in the moving sheet material disposed from the edge of the sheet material, directing the slits in opposite directions toward the longitudinal edges of the sheet material, directing the slits inwardly toward each other, and removing the sample from the sheet material, the improvement comprising:

directing the sample after it has been removed from the sheet material in a continuous operation into an encasing means so as to preserve the characteristics of the sample.

33. In a sample cutter for obtaining a sample from moving sheet material of the type having movable knife means for cutting the moving sheet material so as to slit a sample therefrom, the improvement comprising:

means for removing the slit sample from the moving sheet; and

enclosure means operatively associated with the removal means for receiving and storing the slit sample so as to maintain its characteristics.

34. A sample cutter for obtaining a sample from moving sheet material comprising:

a frame member;

a pair of slitting knife means for cutting the moving sheet material operatively connected to the frame member with at least one of the knife means being transversely movable with respect to the longitudinal direction of travel of the moving sheet material;

means to move at least one of the knife means transversely so as to slit a sample from the moving sheet material;

means for removing the slit sample from the moving sheet; and

enclosure means operatively associated with the removal means for receiving and storing the slit sample so as to maintain its characteristics.

35. In a method of slitting a sample from sheet material, the improvement comprising the steps of:

removing the sample from the sheet material;

directing the sample, after being removed from the sheet material, in a continuous operation into an encasing means; and

protecting the characteristics of the sample by the encasing means.

36. A method of obtaining a sample from sheet material comprising the steps of:

slitting a sample from the sheet material;

removing the sample from the sheet material;

directing the sample in a continuous operation into an encasing means; and

protecting the characteristics of the sample by the encasing means.

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