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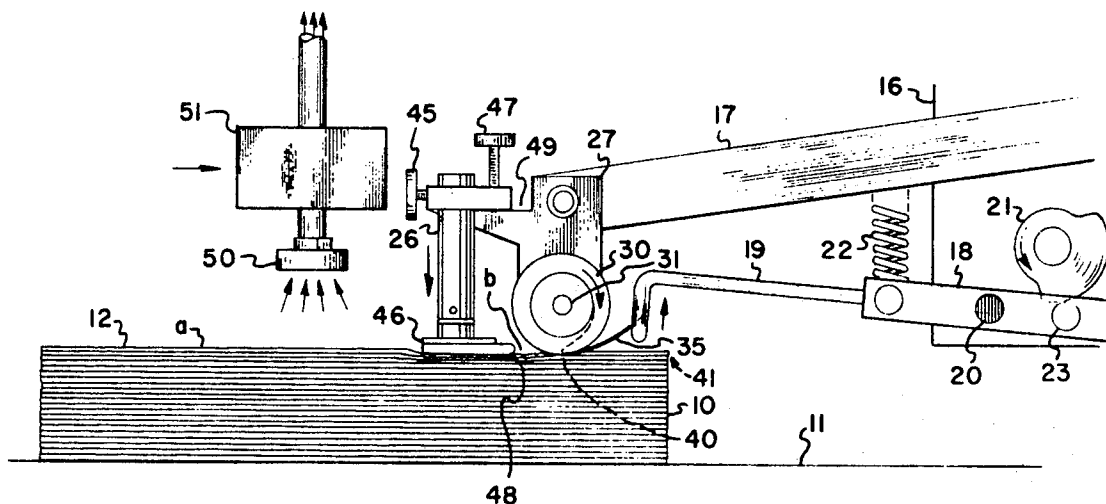
[54] **WORKPIECE DIFFERENTIATOR**
18 Claims, 7 Drawing Figs.

[52] U.S. Cl. 271/21
[51] Int. Cl. B65h 3/30
[50] Field of Search. 271/26, 21,
19, 20

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ABSTRACT: A rotating cylinder-type differentiator in which the high friction material of the differentiator is deformable and enlarges the area of contact in response to low pressure contact between the high friction material and the workpiece to be differentiated. The illustrated form of deformable material is a flying flap. The flying flap, which is attached at one end to the cylinder, flies out from the surface of the cylinder as the cylinder is rotated. The flyout feature functions to virtually increase the radius of the cylinder and actually increases the area of initial contact between the high friction material and the workpiece being separated. Alternate arrangements include a biased flap, a modified rotating cylinder and other forms of deformable, resilient material such as deformable, resilient sponge rubber and fluid containing materials.



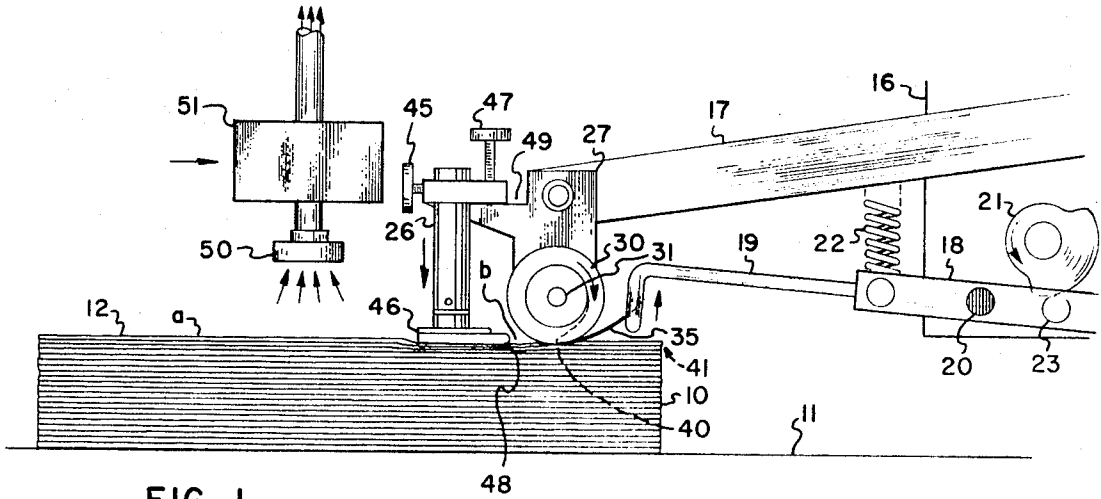


FIG. 1

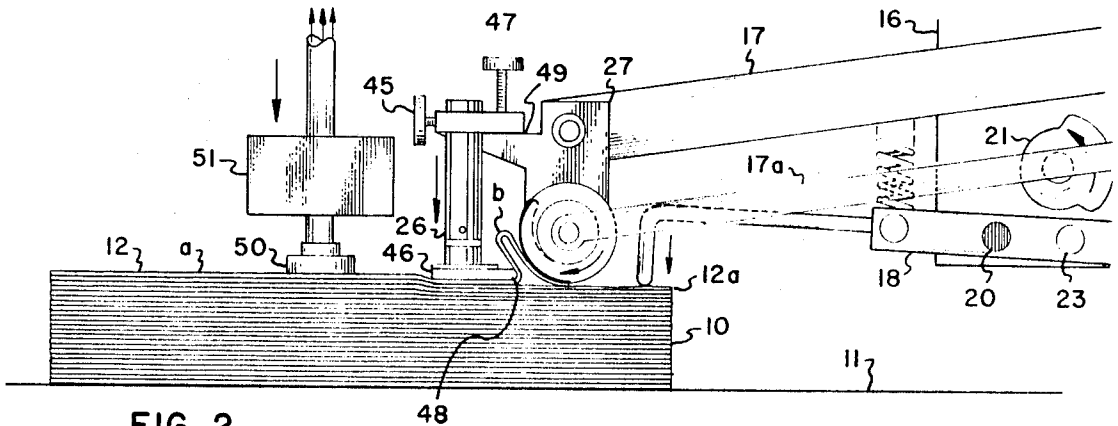


FIG. 2

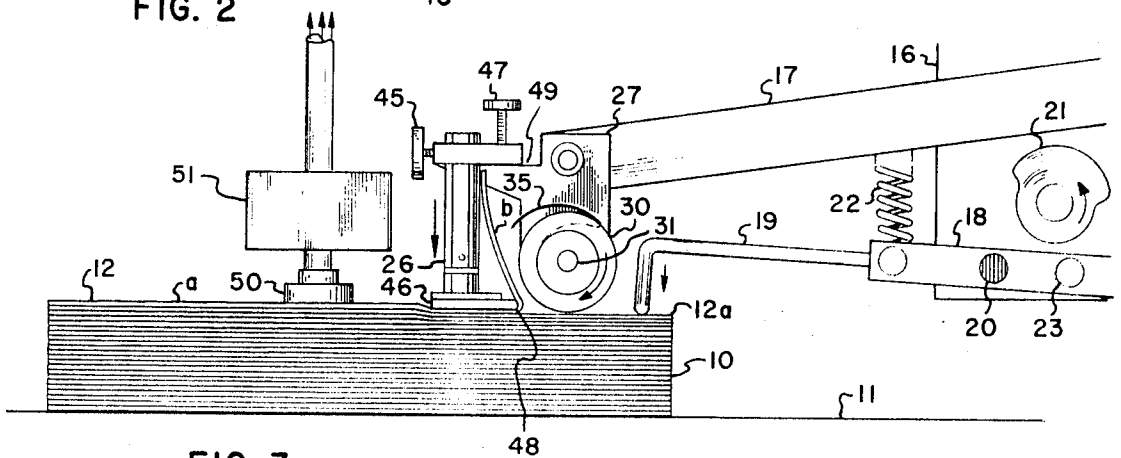


FIG. 3

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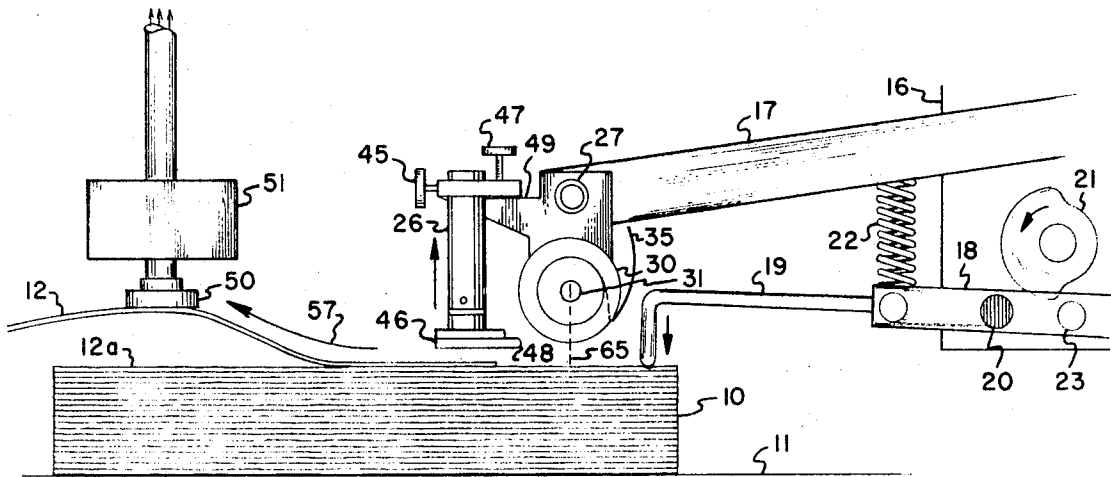


FIG. 4

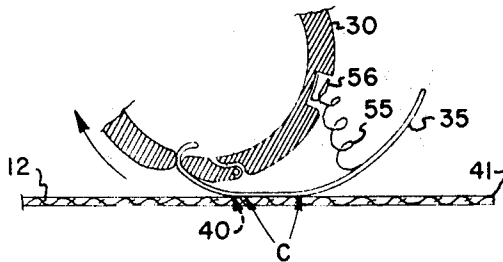


FIG. 6

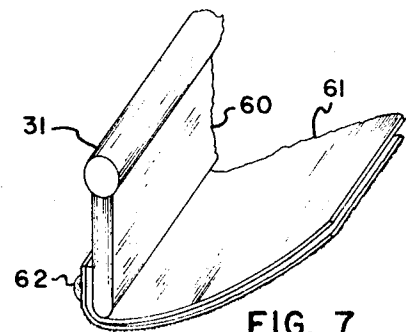


FIG. 7

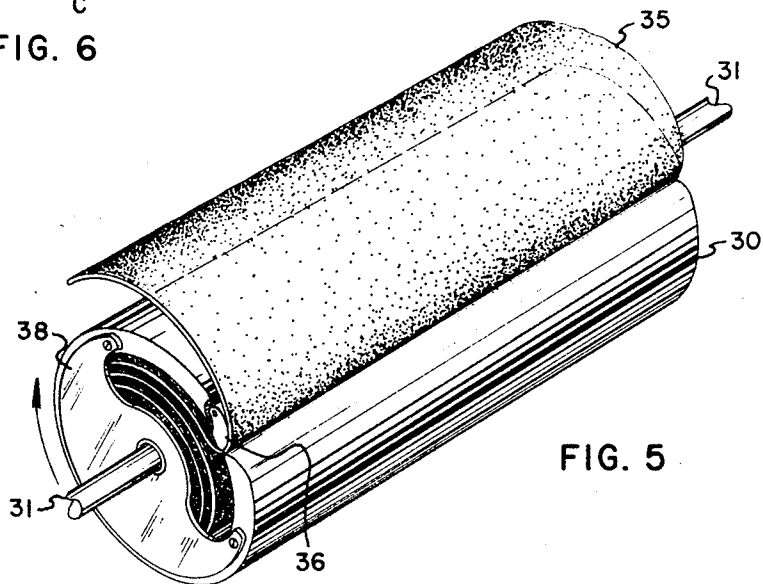


FIG. 5

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WORKPIECE DIFFERENTIATOR

The present invention relates to improved apparatus for separating the top workpiece of limp material from a stack of workpieces of limp material so that workpieces may be singularly separated from a stack and may be singularly removed from the stack. The art of so separating workpieces, one at a time from a stack of workpieces is normally referred to as "differentiating" and the apparatus for accomplishing the one-at-a-time separation is normally referred to as the "differentiator."

The differentiating of limp materials such as fabric material, whether natural, synthetic, or a combination of natural and synthetic, whether felted or nonfelted or any other form of limp material has very unique problems. Adjacent limp material workpieces in a stack of workpieces have a great tendency to bond together. This bond must be overcome, such as by being broken or sheared in order to accomplish unitary separation in singular units. Limp materials are very often porous to the extent that vacuum pickup apparatus sometimes picks two or more workpieces from the same stack instead of one piece. Many types of limp fabric material are delicate and may be easily marked, damaged, defaced and/or distorted by relatively rough handling by the differentiator apparatus.

In differentiating delicate, limp fabric, porous material workpieces singularly from a stack of delicate, limp fabric, porous material workpieces, the step of breaking the bond between adjacent workpieces without causing damage or injury to the material is very difficult. Differentiating the top workpieces singularly, by contact with a small area of the workpiece must exert sufficient friction between the differentiator and the top of the workpiece to overcome the bond between the top workpiece and second or adjacent workpiece in the stack. Such amount of friction on a small area of the delicate material very often damages and/or distorts the fiber, weave or material content of the material by damaging and/or displacing the fiber threads of the material, or marking and/or otherwise damaging or defacing the material of the workpiece being differentiated.

In prior rotating cylinder-type differentiators the high friction surface of the differentiator contacting the workpiece may be enlarged laterally (widthwise) to the width of the workpiece but to increase the contact area longitudinal (lengthwise) without increasing the pressure of the cylinder on the cylinder on the top workpiece was not accomplished, except for enlarging the diameter of the cylinder which is undesirable since this increases the mass of the differentiator apparatus.

My improved rotating cylinder-type differentiator employs a novel structure, heretofore undiscovered, which increases the high friction area of contact longitudinally between the differentiator and the top workpiece without increasing the pressure of the rotating cylinder.

In its preferred form my novel approach employs, what I have referred to as, a flying flap, high friction material which, aided by the natural force of inertia, reaches out and extends or increases the high friction contact area on the top surface of the top workpiece so that the high friction force on any incremental area of the contact area used to break or shear the bond between the top workpiece and the second or adjacent workpiece in a stack is reduced to the point where damage or injury to the fiber of the fabric by the differentiating friction force is eliminated.

The flying flap increases the virtual diameter of the cylinder without actually increasing the actual diameter of the cylinder as the cylinder is rotated. Inertial force causes the flap to fly out away from the cylinder surface when the cylinder is rotated and there is no obstruction which interferes with such flying out. Thus, a relatively small accurate portion of the cylinder circumference which normally contacts the flat upper surface of the top workpiece is enlarged by a virtual increase in the diameter (or radius) of the cylinder, created by a flying

flap of high friction material. In addition, the flying-out of the flying flap tends to deform and thus flatten the contour of the high friction surface thereby further enlarging the high friction surface contact area.

Preferably, the material used for the flying flap has sufficient resiliency to exhibit "springlike" behavior. The high friction characteristic may be a function of an adhesive quality of the surface.

The flying flap friction material is preferably emery cloth or emery paper or sand paper, coupled at one edge to the rotating cylinder with the opposite, edge free. If desired, other high friction material such as rubberized cloth, adhesive cloth or paper or other high friction material capable of flying-out upon rotation may be used in lieu of emery cloth or emery paper. When it is found that the rotation of the cylinder is too slow and/or the material content of the flying flap is too stiff to cause the flying flap to "flyout," the free edge of the flap may be biased or spring loaded by a light, resilient spring or spring material to effectively "pushout" the free end of the flying flap and thus effectively extend the virtual radius of the cylinder.

Another form of my differentiator includes a deformable, resilient material such as sponge rubber or other readily deformable means of a fluid-filled deformable high friction material, deformable in response to low pressure contact for providing an extended contact area, extending longitudinally over the surface of the workpiece to be differentiated with low contact pressure distributed over the contact area or surface.

It is an object of the present invention to provide an improved differentiator of the rotating cylinder type in which the high friction contact area is remote from the cylinder.

Another object is to provide an improved rotating cylinder-type differentiator in which the high friction contact area is a deformable, resilient material which effectively virtually increases the radius of the cylinder.

Another object is to provide an improved rotating type differentiator in which the high friction contact area is deformable under low pressure contact and enlarges the contact area between the high friction surface and the surface of the workpiece and distributes low contact pressure over the contact area.

These and other objects will become apparent from reading the following detailed description with reference to the accompanying drawings in which:

FIG. 1 is side elevation view of the preferred form of differentiator apparatus with the flying flap making the initial contact with the top workpiece on a stack of workpieces;

FIG. 2 is a side elevation view of the differentiator apparatus with the rotating cylinder in the process of relocating a portion of the top workpiece;

FIG. 3 is a side elevation view of the differentiator apparatus in which an isolated portion of the top workpiece has been fully relocated;

FIG. 4 is a side elevation view of the differentiator apparatus showing the top workpiece being removed from the stack;

FIG. 5 is perspective view of the cylinder of the differentiator showing the flying flap of high friction and a supply of high friction in storage;

FIG. 6 is a sectional view of part of the cylinder of the differentiator showing the flying flap making essentially initial contact with the top of a workpiece, and

FIG. 7 is a perspective view of part of an alternate arrangement of a modified "cylinder-type" flying flap differentiator.

Referring in more detail to the drawings FIGS. 1 through 4 inclusive illustrate various stages of the process of differentiating or separating the top workpiece from a stack of workpieces employing the present improved differentiator apparatus. A stack of workpieces 10 is positioned in a surface 11. The workpiece 12 is illustrated as the top workpiece in a stack of workpieces 10 although the workpiece 12 could be the only workpiece positioned on surface 11.

The differentiator apparatus includes a mounting 16 which supports the arm 17 and the rocker arm 18 of the stack retain-

ing or edge clamp 19. The rocker arm 18 is pivotally connected to the mounting 16 by the rod or pin 20. A cam lobe 21 is mounted on the mounting 16 and rotates, in phase with other rotating or driven members, by a drive means (not shown) for synchronously raising and lowering the stack retaining clamp 19 against a bias spring 22. The cam lobe 21 works against a cam follower 23 for raising (See FIG. 1) the stack retaining clamp 19 while the bias spring 22, positioned on the opposite side of the pivot pin 20, urges the clamp 19 downward for holding the stack 10.

The arm 17 is pivotally mounted on the mounting 16 so that the workpiece separating clamp 26 and the head or cylinder mounting 27 coupled to the arm 17 may be raised or lowered, with respect to the workpiece to be, or being, differentiated. In FIGS. 1, 2 and 3 the separating clamp 26 and head 27 are illustrated lowered onto the top workpiece 12. In FIG. 4 the separating clamp 26 and head 27 are illustrated raised above the top workpiece.

The head 27 supports a cylinder 30 which is mounted for rotating about the axle 31. The cylinder 30 is rotated in synchronism with the vertical movements or position of the separating clamp 26 and head 27 and each operated in synchronism with the rotating cam lobe 21.

Another cam lobe may be used to pivotally raise and lower the arm 17 so as to position the separating clamp 26 and 27 (and the cylinder 30) with respect to the top workpiece and a belt or chain drive (not shown) may be used to rotate the cylinder by means of a pulley wheel or gear (not shown) coupled to the axle, the cylinder 30 being rotated in synchronism with its own vertical motion.

Coupled to the cylinder 30, as clearly seen in FIGS. 5 and 6 is a sheet of high friction material forming a flap 35 such as emery cloth, for example. The high friction material is coupled to the cylinder 30 so that one end is free, forming such flap of material, in this case referred to as a flying flap. The exterior of the cylinder is essentially a smooth, low friction surface, relative to the workpiece. The high friction material is high friction relative to the same workpiece.

As the cylinder 30 rotates on its axle 31, the flying flap 35 tends to effectively increase the radius of the cylinder, aided by the force of inertia, by flying out.

The one end of the flying flap 35 is coupled to the cylinder 30 by a snap catch 36. Other means of securing the high friction material to the cylinder may be used if desired. The cylinder 30 is illustrated as a hollow cylinder and a length of the high friction material of the flying flap may be stored in the cylinder. A pair of end plates such as 38 may be coupled to the ends of the cylinder and also serve as bearing mounts for the axle 31.

The flying flap 35 is adjustable lengthwise. The snap catch 36 may be released and high friction material may be drawn from the inside of the cylinder to lengthen the flying flap to the extent of the amount stored in the cylinder.

It is preferred that the length of the flying flap be substantially equal to the length of the workpiece measured from the point of initial contact 40 by the flying flap with the workpiece 12 (as seen in FIG. 1) to the end 41 of the portion of the workpiece 12 to be displaced. In some cases the flying flap 35 may be shorter in length than the distance between point of initial contact 40 and the end 41. It should not be longer than the distance to the workpiece end 41, because the flap might then engage the next adjacent workpiece after the top workpiece has been partially relocated into the position as shown in FIG. 2.

The separating clamp 26 is adjustable both vertically and horizontally. The thumb screw 45 represents an adjustment means for moving the clamp 36 horizontally for adjusting the position of the foot 46 of clamp 26 relative to the contact point 40.

The thumb screw 47 represents an adjustment means for moving the clamp 26 (and the foot 46) vertically, with respect to the shoulder 49 on the head 27. By adjusting the vertical position of the clamp 26 (and the foot 46) the position of the

cylinder 30, relative to the top workpiece, may also be adjusted.

A bar 17a (shown in FIG. 2 and omitted from FIGS. 1, 3 and 4 for the sake of clarity) forms part of a parallelogram linkage for supporting the head 27. This type of coupling prevents unwanted tipping or tilting of the head assembly, including the head 27, the separating clamp 26 and clamp foot 46. It will be appreciated that as each successive top workpiece is removed or differentiated from the stack, the head assembly will go lower, with respect to the surface 11, when lowered on stack 10. A parallelogram linkage for supporting the head assembly assures that the vertical position, i.e. essentially normal to the surface of the top workpiece on the stack, is maintained.

In the technique of using the present differentiator apparatus, the desirable position of the bottom of the cylinder 30 relative to the top workpiece 12 at the time when the clamp 46 is resting upon the workpiece 12, and the distance between the edge 48 of the foot 46 and the cylinder 30 depends upon the stiffness of the workpiece being differentiated. For very stiff and/or heavy bodied material such as denim, twill, canvas and other closely and/or coarse woven materials, for example, the differentiator apparatus has been found to operate satisfactorily with the cylinder closely adjacent and contacting the top workpiece 12 at the time when the clamp 46 resets upon the top workpiece and the distance between the toe 48 and the point of initial contact of the high friction material (point 40 in FIG. 1) relatively large. For very flimsy and delicate material, such as material used to make lingerie, for example, satisfactory operation has been obtained with the cylinder somewhat separated or spaced from the top workpiece at the time when the clamp somewhat separated or spaced from the top workpiece at the time when the clamp 46 resets upon the top workpiece 12 so that the flying flap 35 makes light pressure contact with the top workpiece, such as illustrated in FIG. 6, and the clamp 26 positioned so that the toe 48 is relatively close to the point of initial contact, 40.

The distance or spacing between the toe 48 and the point of initial contact 40 ultimately depends upon many factors. Among these factors consideration should be given to the diameter of the cylinder 30; the thickness of the foot 46 at the toe 48; the characteristics of the flying flap, i.e. its roughness, and stiffness; the fabric of the workpiece i.e. characteristics of the threads; the tightness of the weave, and the delicate nature of the material of the workpiece.

The distance or spacing may best be measured as the distance from the toe 48 to a vertical passing through the axis of the cylinder 30. The vertical is seen as broken line 65 in FIG. 4. By adjusting the spacing between the toe 48 and the contact point 40 the spacing between the toe 48 and the surface of the cylinder 30 is being adjusted.

It will be appreciated that in order to relocate the section b sufficient spacing must be provided between the toe 48 and the surface of the cylinder 30 (see FIG. 2). The space required depends partly on how tightly the material of the workpiece will bend or flex.

In successful practice it has been found that the distance or spacing between the toe 48 and the surface of the cylinder 30 at least exceeds twice the thickness of the workpiece plus the thickness of the flying flap 35.

Briefly viewing the various phases of the operating cycle of the differentiator apparatus, FIG. 1 shows the initial step or phase where the differentiating assembly has been lowered onto the stack 10 with the separator clamp 26, and particularly the foot 46 separating the top workpiece 12 into two sections, a and b. The section b is to be relocated. The stack retaining or edge clamp 19 is held off the stack by the cam lobe 21 contacting the cam follower 23. The cylinder 30 is rotating on the axle 31 and the flying flap 35 is making initial contact with the upper surface of the top workpiece 21 within the section b. The take-away mechanism, represented by a vacuum pickup with a head 50 and a vacuum chamber 51 is employed to removed the top workpiece after the workpiece is initially isolated or separated from the other workpieces on stack 10.

Attention is direction to FIG. 6 which shows the flying flap 35 making the initial contact with the upper surface of the top workpiece 12. It will be noted that a relatively large area of contact C is created by the flying flap 35. This large area of contact C extends from the initial point of contact 40 over toward the end 41 of the workpiece thus providing a large region of high friction engagement. With such a relatively large contact area only minimal pressure between the flying flap 35 and the workpiece 12 is needed to overcome the bond between the top workpiece 12 and the workpiece adjacent to the top workpiece on the stack. The use of only a minimal pressure is very important when the material content of the workpiece is dainty and/or flimsy.

In addition, FIG. 6 illustrates an alternate arrangement with the flying flap 35 spring loaded by a very light spring such as represented by 55. The spring 55 is compressible under very light pressure to recess into the chamber 56. If rotation of the cylinder 30 is slow and/or not enough inertia force is generated to cause the flying flap 35 to "flyout" as desired, a resilient means such a spring or other resilient material or component may be used to urge and hold the flying end of the flying flapout, away from the surface of the cylinder, when there is substantially no pressure to force the flap against the surface of the cylinder 30.

It will be noted that the length of the flap is such that the end of the flying flap substantially coincides with the end 41 of the workpiece 12.

In FIG. 2 it will be noted that the cylinder 30 has rotated some 90° and the portion *b* of the workpiece 12 has been almost totally removed from the stack. The adjacent workpiece 12a has been exposed in the portion or segment *b* and the cam lobe 21, rotating in synchronism with the cylinder 30 released the cam follower 23 and the spring 22 urges the edge clamp 19 down onto the exposed portion of the stack.

The take-away head 50/51 has been lowered onto the stack in that portion *a*.

FIG. 3 shows the cylinder 30 having advanced in rotation another 90° and the segment *b* of workpiece 12 has been totally relocated. The relocation of the segment *b* is effected by the high friction material of the flying flap breaking or shearing the bond between adjacent workpieces (the top workpiece and the next workpiece in the stack) in this stack 10 so the flying flap advances or rotates and pulls the segment *b* of the workpiece 12 along with the flying flap. The flying flap continues to rotate, pulling away from the relocated segment during such rotational advance.

The action of the separating clamp 26 and the clamp foot 46 is passive. The clamp separates the top workpiece into two parts, *a* and *b*. The part *b* is the part that is relocated or repositioned while the part *a* remains substantially undisturbed during relocation of part *b*.

With the part *b* separated or removed (physically) from the stack (FIG. 3) the remainder of the stack may be secured to the surface 11 by the edge clamp 19.

FIG. 4 shows that the separating clamp 26 has been raised off the stack and the cylinder 30 has been rotated another 90°. The separating clamp 26 is lifted (along with the head 27 and cylinder 30 by pivotally elevating the arm 17 about a pivot not shown) which may be similar to pivot 20 through cooperation of a rotating cam lobe and follower (not shown) which may be similar to cam lobe 21 and cam follower 23.

With the separating clamp 26 and foot 46 elevated above the stack the workpiece 12 may be removed by the take-away mechanism.

If the take-away mechanism is a vacuum head, as illustrated and the vacuum cup 59 holds two or more workpieces such as 12 and 12a, only the top workpiece 12 may be removed because the workpiece 12 has been differentiated from the stack by relocated of its portion *b* and the rest of the workpieces in the stack are secured to the surface 11, as a unit by the edge clamp 19.

The take-away head 50/51 preferably follows a path such as represented by the arrow 57 to effect a shearing-separating action for removing the top workpiece from the stack.

Referring the FIG. 7, a modified arrangement a flying flap differentiator mounted cylinder is shown. The axle 31 is FIG. 7 corresponds to the axle 31 in the FIGS. 1 through 5 and may be mounted and serve for a drive receiving means. The surface or circumference of the cylinder 30 (as seen in FIG. 5, for example) has been reduced in FIG. 7 so that it is a segment of the surface. This is illustrated as 61. The segment is coupled to a leaf 60 which extends from the axle 31. The segment 61 is coupled to the leaf 60 which extends from the axle 31. The segment 61 is coupled to the leaf 60 by a screw 62.

The high friction material forming the flying flap 35 is coupled to the modified "cylinder" by the screw 62. The segment 61 backs-up the flying flap 35.

It will be seen in the preferred form and in the alternate or modified forms of the flying flap differentiator that the flying flap is backed-up by the surface of the cylinder. This essentially limits the reduction of the radius assumed by the flying flap high friction material during removal or repositioning of the removable section of the top workpiece. The increase of the virtual radius, which effectively increases the contact area of the flying flap, is a function of the speed of rotation of the cylinder, the resiliency or springlike behavior of the flying flap material and/or the strength or effectiveness of the spring or resilient material of the component removing the flying flap from the surface or backup portion of the cylinder.

In an alternate form, the high friction material may be deformable, resilient sponge rubber which, under its own resiliency extends beyond the actual radius of the cylinder when it is free from pressure, and when in contact with the surface of the workpiece, deforms and enlarges the area of contact. Such readily deformable material enlarges the actual contact area and enlarges the actual contact area and distributes a low pressure contact over the enlarged contacted area.

In another alternate form, the high friction material may be a fluid-filled encapsulation, the contour of which is readily deformable under pressure.

In describing the apparatus of my improved differentiator I have described some techniques of usage and have mentioned some alternate arrangements. Other changes, substitutions and rearrangements maybe made, as will be familiar to those skilled in the art, without departing from the spirit of the invention as defined in the appended claims.

What I claim is:

1. Apparatus for separating the top workpiece from a stack of workpieces including;

support means for supporting a stack of workpieces,

first clamp means engageable upon the top the stack for isolating a first portion of the top workpiece against lateral displacement,

a rotatable friction member having a high friction surface engageable with the upper surface of the top workpiece near said first clamp means, said rotatable friction member engageable on a second portion of said workpiece, said rotatable friction member including a cylinder mounted for rotating on an axle

a sheet of high friction material having substantially resilient characteristics and at least one surface of which is a high friction surface with respect to the surface of the workpieces in said stack and

means for coupling one end of said sheet to said cylinder, thereby leaving the other end a free end,

drive means for rotating said rotatable friction member for displacing said second portion of said workpiece to a position so that said second portion is relocated wholly between said first clamp and said friction member for exposing a portion of the adjacent workpiece in said stack, said exposed portion of said adjacent workpiece corresponding to said portion of said top workpiece wholly located,

second clamp means for engaging the exposed said corresponding portion of said adjacent workpiece on said stock for arresting the remainder of said stack and

means for disengaging said first clamp means from said top workpiece for permitting removal of said top workpiece from said arrested stack.

2. Apparatus for separating the top workpiece from a stack of workpieces as in claim 1 and in which said rotatable friction member further includes means for biasing the free end of said sheet away from the surface of said cylinder.

3. Apparatus for separating the top workpiece from a stack of workpieces as in claim 1 and in which said cylinder is substantially hollow and serves for storing a portion of said sheet of high friction material.

4. Apparatus for separating the top workpiece from a stack of workpieces including:

support means for supporting a stack of workpieces,

first clamp means engageable upon the top of the stack for arresting all the workpieces in the stack and for separating the top workpiece on the stack into a first portion and a second portion,

a rotatable friction member engageable with the upper surface of the top workpiece and wholly within said first portion of said top workpiece, said rotatable friction member including

an axle and means for rotating said axle about its longitudinal axis,

a circumferentially shaped flap having at least one high friction surface,

means coupled to said axle forming at least a circumferential segment having the same radius throughout, and

means for coupling said circumferentially shaped flap to said means forming at least a circumferential segment so that one end of said flap is free and flies out from said segment in response to inertia when said friction member is rotated,

drive means for rotating said friction member for bringing said flap in contact with the upper surface of said workpiece within said portion for displacing said first portion and for exposing a portion of the adjacent workpiece in the stack corresponding to the portion of the top workpiece so displaced,

second clamp means for engaging the stack upon the said exposed portion of the adjacent workpiece for arresting the stack, except for said top workpiece and

means for disengaging said first clamp means for releasing all the workpiece so arrested by engagement by said first clamp means for permitting removal of said top workpiece from the stack so arrested by said second clamp means.

5. Apparatus for separating the top workpiece from a stack of workpieces as in claim 4 and in which said circumferentially shaped flap is

a sheet of material having at least one surface having high friction characteristics.

6. Apparatus for separating the top workpiece from a stack of workpieces as in claim 4 and in which said circumferentially shaped flap is

a sheet of material having at least one surface having high friction characteristics and

said material of said sheet is sufficiently resilient to exhibit springlike behavior.

7. Apparatus for separating the top workpiece from a stack of workpieces as in claim 5 and further including

means for biasing the free end of said flap of sheet material away from said means forming at least a circumferential segment.

8. Apparatus for separating the top workpiece from a stack of workpieces as in claim 5 and in which said means forming at least a circumferential segment is a cylinder and said cylinder includes

a hollow portion for internally storing part of the sheet of material for providing a reserve of high friction surface material.

9. Apparatus for separating the top workpiece from a stack of workpieces and for removing the separated workpiece from the stack including;

means for supporting a stack of workpieces,

first clamp means engageable upon the top of the stack for arresting all the workpieces in the stack and for separating the top workpiece on the stack into a first portion and a second portion,

a rotatable friction member engageable with the upper surface of the top workpiece and within said first portion of said top workpiece, said rotatable friction member including

a cylinder and means for rotating said cylinder about its longitudinal axis,

a sheet of high friction material one end of which is connected to said cylinder with the other end thereof free for forming a flying flap and

means for coupling said sheet to said cylinder,

drive means for rotating said friction member for bringing the flying flap into contact with the upper surface of the top workpiece for displacing the first portion of the top workpiece and for exposing a corresponding portion of the adjacent workpiece in the stack,

second clamp means for engaging the stack upon the said exposed portion of the adjacent workpiece for arresting the stack of workpieces except for said top workpiece, and

means for disengaging said first clamp means for releasing said top workpiece from arrest for permitting removal of said top workpiece from the stack.

10. Apparatus for separating the top workpieces as in claim 9 and further including

means engageable with the second portion of said top workpiece for coupling to said top workpiece and

means for driving said engageable means for removing said top workpiece from the stack of workpieces.

11. Fabric workpiece differentiator apparatus for differentiating the top fabric workpiece for separating the top workpiece from a stack of workpieces comprising;

support means for supporting the stack of workpieces,

first clamp means,

mounting means carrying said first clamp means in a position located over said stack of workpieces and spaced inwardly from the edge of the top workpiece,

means for moving said first clamp means downwardly into engagement with the top workpiece at a position spaced inwardly from the edge thereof,

a rotatable friction member engageable upon the top workpiece at a position close to said first clamp means, said position being between said first clamp means and said edge of the top workpiece,

said rotatable friction member including deformable resilient means increasing the virtual radius of said rotatable member for engaging the top surface of the top workpiece with a high friction grip over an extended area of contact extending longitudinally over the top surface of the workpiece with low pressure contact over said extended area, said resilient means extending outwardly from said rotatable member and engaging the top surface of the top workpiece over an extended area of contact remote from the rotatable member,

drive means for rotating said rotatable member for moving said resilient means toward said first clamp means while said resilient means is engaging the top workpiece for displacing the edge portion of the top workpiece upwardly away from the stack to a relocated position upwardly generally between said rotatable member and said first clamp means,

second clamp means,

means for engaging said second clamp means on the stack nearer the edge thereof than said rotatable member, and

means for disengaging said first clamp means from said top workpiece for permitting removal thereof from the stack

while said second clamp means serves to hold the stack in position on the support means.

12. Fabric workpiece differentiator apparatus for differentiating the top fabric workpiece from a stack of workpieces as claimed in claim 11, in which said resilient means engages the top surface of the top workpiece over an extended area extending from an initial point of contact over the top surface of the workpiece a portion of the distance toward said edge of the workpiece.

13. Apparatus for separating the top workpiece from a stack of workpieces including:

means for supporting a stack of workpieces,

first clamp means engageable on the top of the stack for isolating a first portion of the top workpiece against lateral displacement,

a rotatable friction member having a high friction surface engageable with the upper surface of the top workpiece near said first clamp means, said rotatable friction member engageable on a second portion of said workpiece, said friction member including,

deformable, resilient means normally extending to a virtual radius and deformable under low pressure for enlarging the area of engagement with said upper surface,

drive means for rotating said rotatable friction member for displacing said second portion to a position wholly relocated between said first clamp and said friction member for exposing a portion of the adjacent work-

in the stack, said exposed portion of said adjacent workpiece corresponding to said portion of said top workpiece wholly relocated,

second clamp means for engaging said exposed portion on said stack for arresting the remainder of said stack and means for disengaging said first clamp means from said top workpiece for permitting removal of said top workpiece from said arrested stack.

14. Apparatus for separating the top workpiece from a stack of workpieces as in claim 13 and in which said rotatable friction member further includes

a cylinder mounted for rotating on an axle and

said deformable, resilient means normally extends beyond the radius of said cylinder for forming an extended virtual radius.

15. Apparatus for separating the top workpiece from a stack of workpieces as in claim 13 and in which said rotatable friction member includes

an axle on which said rotatable friction member rotates, means coupled to said axle defining a radius therefrom and said deformable resilient means is coupled to said means coupled to said axle.

16. Apparatus for separating the top workpiece from a stack of workpieces from a stack of workpieces as in claim 13 and in which said rotatable friction member includes

an axle on which said rotatable friction member rotates, means coupled to said axle for supporting said deformable, resilient means and

said deformable, resilient means is sponge rubber.

17. Apparatus for separating the top workpiece from a stack of workpieces including;

means for supporting a stack of workpieces

clamp means engageable on the top of the stack for separating the top workpiece into a first section and a second section,

a rotatable friction member engageable with the upper surface of the top workpiece near said clamp means on said second portion, said rotatable friction member including, means for defining an axis on which said rotatable friction member rotates,

means, coupled to said means for defining an axis for defining a radius extending from said axis,

deformable resilient means having a high friction surface and coupled to said radius defining means adapted for increasing the radius of said radius defining means in absence of engagement of said deformable resilient means with said upper surface of said top workpiece and said deformable, resilient means adapted for reducing the increase of said increased radius upon engagement with said upper surface of said workpiece for enlarging the area of engagement with said upper surface,

drive means for rotating said rotatable friction member for displacing said second section to the relocated position wholly between said clamp means and said friction member and

means for disengaging said clamp means for permitting removal of said top workpiece from said stack.

18. Apparatus for separating the top workpiece from a stack as in claim 17 and further including

second clamp means engageable upon the remainder of the stack after said second section of said top workpiece is relocated for arresting the remainder of said stack.

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