July 11, 1967 E. E. MASTERSON ETAL 3,330,612

COVER SUSPENSION DEVICE

Filed July 16, 1965 2 Sheets-Sheet 1

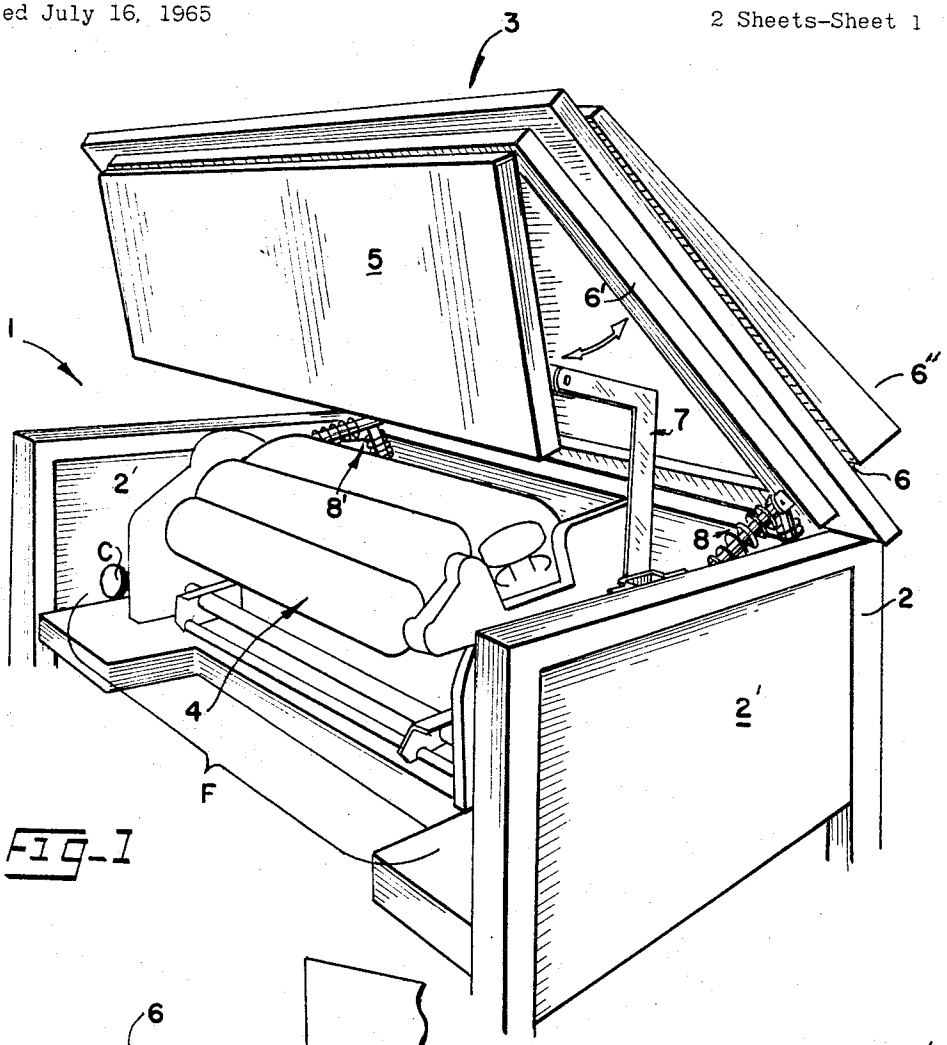


FIG-1

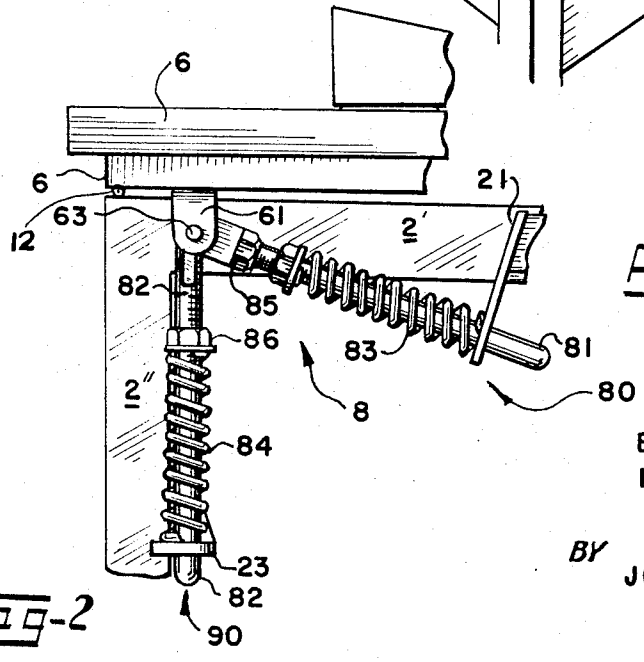


FIG-2

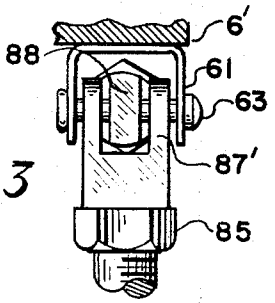


FIG-3

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Filed July 16, 1965 2 Sheets-Sheet 2

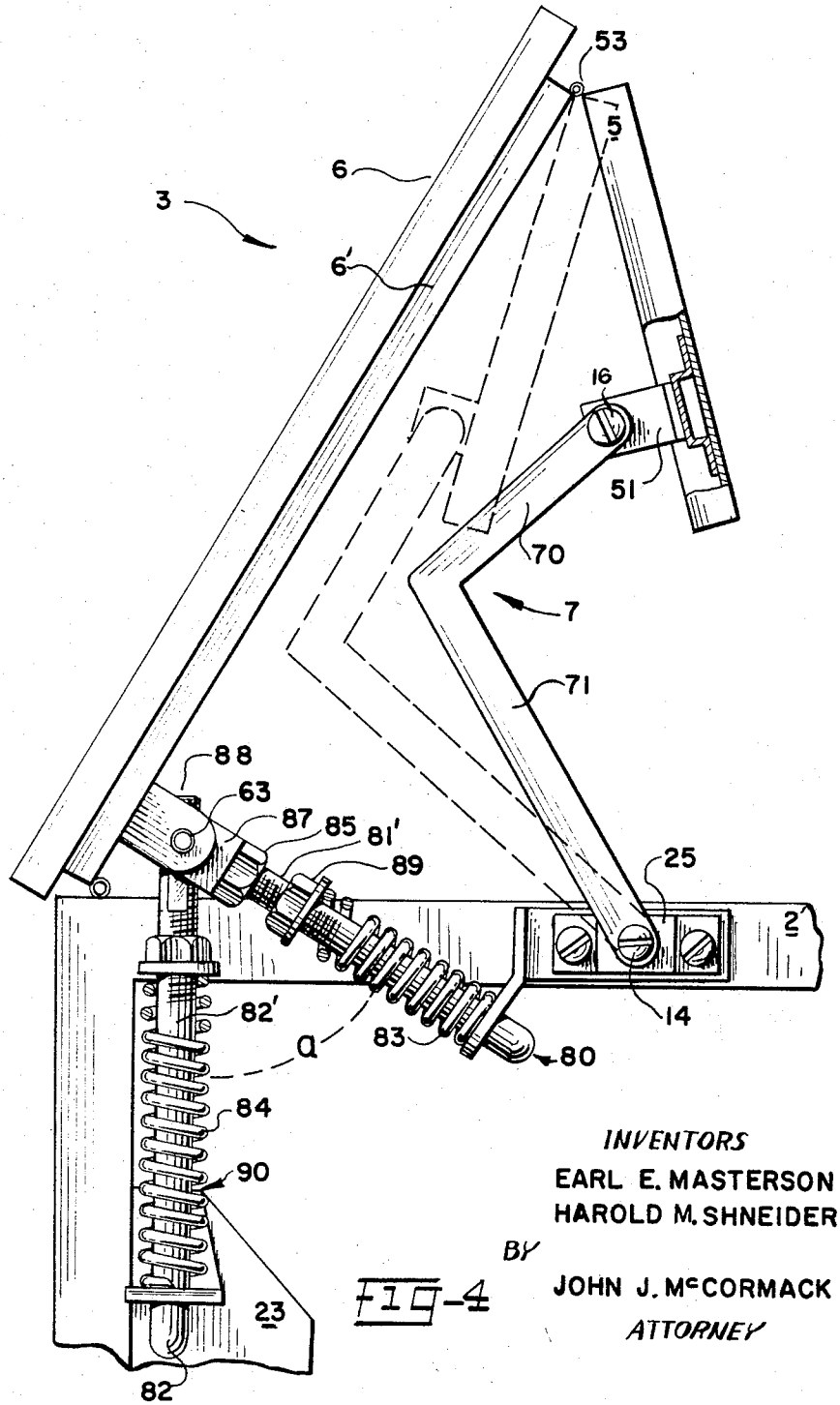


FIG-4

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United States Patent Office 3,330,612
Patented July 11, 1967

3,330,612

COVER SUSPENSION DEVICE

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Filed July 16, 1965, Ser. No. 472,517
12 Claims. (Cl. 312—319)

The present invention relates to closure means for processing apparatus, and more particularly, to articulaaed cover means and suspension means therefor.

The human operator is not yet expandable for attending data processing machines. Thus, machines, such as High Speed Printers and the like are customarily provided with cover means adapted to, among other things, protect attendants from the annoyance and possible hazards of whirling machinery, flying dust, noise and the like. Such covers, of course, also protect the machinery, such as from ambient dirt, grit, etc. Consequently, it is commonly necessary to provide such machinery with cover means which is effective in covering the apparatus and yet is nonetheless easily accesible, to and moveable by, attendants. Such covers must characteristically be simple and convenient to operate with a minimum of exertion and strain; be hazard-free, compact and the like. The present invention is direction to an improved bi-part cover for High Speed Printing Machinery and the like which meets these objectives.

A common shortcoming associated with such data processing apparatus and its cover is that either the cover encloses the machinery imperfectly or else impairs accessibility. For instance, some such covers provide a mere top-closure over apparatus which is otherwise surrounded by fixed walls and thus relatively inaccesible except from the top. For instance, a common problem associated with the operation and servicing of High Speed Printers is "front-accessibility," there being a number of operating parts and maintenance points which are conveniently accessible only from the front. The present invention provides an articulated, bi-part "corner-cover" for such printers and associated devices which alleviates the foregoing problems and also gives improved machine-accessibility, providing a closure which effectively constitutes a removable cover over top and side portions. Thus it is thus an object of the invention to provide cover means which addresses the above problems. Another object of the invention is to provide such a cover means which is conveniently manipulated by attendants. Still another object is to provide such a cover means which provides a removable combination top and side closure and provides improved machine accessibility and convenience.

Another problem associated with apparatus like the above-mentioned High-Speed Printers and their associated covers, is the problem of "cover-stability." It is at best annoying, and a worst unsafe, for a machine cover to, of itself, seek equilibrium positions other than those in which the operator leaves them. Such a tendency is the commonly observed instability of sprung covers which, when opened somewhat by an operator (to some degree intermediate "open" and "closed" exremes), will seek to reclose themselves, mashing fingers, etc. A similar drawback is that, when opened slightly, other sprung covers seek to fly upward. Either type of cover is unstable at positions intermediate its excursion extremes. The present invention provides an articulated cover means having an improved suspension system which counter-balances it so as to be stable and tend neither to fall back to a closed position nor fly upward away from the operator, except close to extreme positions. For instance, a printer attendant, frequently a frail girl, when opening the top

cover, often has to dodge it as it flies upward seeking the "fully-open" position. This action is hazardous, tending at times to strike overhanging elbows, chins and the like. The invention avoids this problem by providing a cover suspension which keeps the cover under control at all times. More particularly, this suspension system includes a spring-loaded arrangement for bi-part "corner-covers" (which characteristically have a complex, shifting center of gravity), which arrangement acts to maintain the cover in upraised equilibrium at virtually all raised positions, except at "open" and "closed" extremes, thus exhibiting an "intermediate equilibrium." It will be recognized by those skilled in the art that, due to the elusive center of gravity provided by the swinging action of the cover apron, such a bi-part, articulated structure offers problems in counterbalancing suspension design if the above objects are to be achieved. The double spring arrangement of the invention has been found to provide a simple answer to this problem.

Further this improved suspension means has greater safety in that it applies only gentle opening or closing forces at the extremes respectively of cover excursion, and likewise requires moderate opening or closing forces. The spring suspension means provided according to the invention is arranged to comprise bi-part pairs of cooperating horizontal and vertical spring means adapted to coact so as to reinforce one another and oppose one another at appropriate points in the excursion of the bi-part, articulated cover whereby to provide the above-mentioned "intermediate equilibrium" together with a slight opening and a slight closing bias. The closing-bias is conveniently sufficient to provide a latching action against accidental opening of the cover by vibration.

An angular guide means is so formed and so mounted between the cover-apron and the sides of the printer that it provides a "self-locking" action holding the cover open safely. This also provides a safety check against accidental dislodgment by requiring a prescribed "unlocking manipulation" to unlock the latched cover. Moreover, the invention combines the features of a side cover portion, or apron, together with a novel angular guide therefor which acts to lock the cover open, supporting it for added safety and stability. This guiding support means also serves to guide the apron portion during movement of the cover so as to maintain it at a prescribed safe attitude, kept trimmed against the top, while being guided to clear machine walls and to seat properly. This guide also serves to prevent this apron portion from flying outwardly to annoy, and perhaps injure, a nearby operator during cover movement.

The foregoing object and novel features of the invention are provided in a preferred embodiment of the invention which includes an articulated bi-part corner cover means including a top portion and a side, or apron, portion; plus spring-urged suspending and positioning means coupled thereto and apron guide means which also serves to "lock" the cover open.

The foregoing and other characteristic objects and features of novelty are pointed out with particularity in the following claims and form a part of the present specification. For a better understanding of the invention, its advantages and specific objects attained with its use, reference should be had to the accompanying drawings and descriptive matter wherein is illustrated and described a preferred embodiment of the invention.

Referring to the drawings, wherein like reference numerals denote like parts:

FIGURE 1 shows, in perspective view, a preferred embodiment of the invention as employed for providing a removable corner cover for a High Speed Printer apparatus;

FIGURE 2 is an enlarged side elevation of one suspension arrangement for the embodiment of FIGURE 1;

FIGURE 3 is a top enlarged fragmentary view of the coupling arrangement between the two suspension means in FIGURE 2; and

FIGURE 4 is a side elevation of the cover arrangement of FIGURE 1, slightly enlarged and shifted somewhat in attitude, i.e. "fully-open."

Referring now to the figures, and especially to FIGURE 1, there is shown a preferred embodiment of the invention as employed in High Speed Printing apparatus **1**, such as used in connection with data processing systems. Functionally, this embodiment represents an arrangement for transporting continuous paper forms (not shown) through a print head **4** positioned within, and enclosed by the printer chassis, or frame portion **2** of printer **1**. Frame or chassis **2** includes a pair of side walls **2'**, **2'**, and a rear wall **2''**, rigidly inter-connected to form a rigid, box-like enclosure for containing the print head **4**. It will be understood that the top of printer **1**, should be open at times for accessibility during operation and maintenance thereof. Similarly, for the machine front section, i.e. Section F, between sides **2'**, which provides unique accessibility to some parts, such as machine control Knob C. Thus, a removable cover means **3** provides a closure for the top and front portions of chassis **2** being pivotally attached, by hinge means **12**, to the top of wall **2''**. Cover **3** is shown partly-open in FIGURE 1 as is commonly desirable, such as when an operator wants to manipulate control C without troubling to extend the cover fully open and lock it.

A feature of the invention is that cover **3** comprises a bi-part, articulated arrangement comprising a lateral, or front closure, portion (or apron) **5**, in addition to the more usual top cover portion **6**. As explained below, apron **5** is pivotably connected to the front of top **6** by hinge **53** so as to be rotatable about an edge thereof as indicated by the arrows in FIGURE 1. Thus, apron **5** is arranged to seat coveringly across the front lateral portion (F) of machine **1** when cover **3** is closed (indicated in FIGURE 2); while being suspended to swing inwardly and compactly against the bottom of top **6** as it approaches the extreme open position (dotted-line in FIGURE 4). Top **6** include, a window arrangement **6''** for observing the condition of printer **4** when the top is closed. Top **6** also includes a base portion **6'** for attaching the cover suspension means as indicated below. A pair of angular guides **7**, **7'** cause apron **5** to so follow top **6**, as seen below.

Adjacent the rear of base **6'** there are coupled a pair of resilient suspension means **8**, **8'** (one on each side) such as by attachment to a pair of brackets **61**, **61'** (the latter not shown). Suspension **8**, **8'** effectively join cover **3** to chassis **2** in a somewhat pivotable manner for the convenient manipulation thereof. According to a feature of the invention, suspensions **8**, **8'** additionally provide a "two position-seeking cover suspension" as hereafter indicated. Thus, as indicated best in FIGURES 2 and 4, suspension arrangement **8** (suspension arrangement **8'** is identical) comprises a pair of resilient supports, namely a vertical support **90** and an oblique (or horizontal) support **80**. Horizontal support **80** is mounted from one side wall **2'** by attachment to bracket **21** projecting therefrom, and vertical support **90** is mounted from rear wall **2''** by attachment to bracket **23**, projecting therefrom. The construction and operation of supports **80**, **90** are somewhat similar, as seen below.

Horizontal support **80** thus comprises a rigid, longitudinal, cylindrical shaft **81**, having a threaded portion **81'** at one end thereof on which is threadably mounted a forked coupling **87** together with an associated positioning nut **85**. Shaft **81** is inserted through an oversized (for pivoting) bore at its other end in bracket **21**. A helical coil compression spring **83** is arranged to surround shaft **81** intermediate the ends thereof, being compressed

against bracket **21** by nut/washer coupling **89** threadably mounted on threaded shaft-end **81'**. Coupling **87** is provided with a pair of registering bores in the forked portions **87'**, **87'** thereof (FIGURE 3), these bores being adapted to journably receive axle **63** therein for rotatably coupling support **80** to a fixed bracket **61** attached to cover base **6'**.

Somewhat similarly, a vertical support **90** comprises a longitudinal, relatively cylindrical shaft **82** having a threaded portion **82'** along a reduced end **88** thereof, end **88** being reduced cross-sectionally to fit between the forked portions **87'** of coupling **87**, as indicated in FIGURE 3, and being apertured to journably receive axle **63** for rotatably coupling support **90** to bracket **61**. Opposite end **88**, shaft **82** is inserted into a registering bore through a portion of a bracket **23** (affixed to wall **2''**) for sliding positioning therein. A suitable helical coil compression spring **84** is positioned to surround the intermediate portion of shaft **82** being compressed against bracket **23** by nut/washer coupling **86** which is screwed along threaded shaft-length **82'**.

It is a feature of the invention that suspension springs **83**, **84** may comprise standard spring structures without need for special working or design thereof. As seen below vertical spring **84** is preferably selected so that with a moderate bias thereon (from compressing nut **86**), it will barely support cover **3** when fully opened (dotted-line position, FIGURE 4) and will not tend to open it when closed (FIGURE 2). A "die" type spring of rectangular spring steel stock, having almost 4 turns/in. and a spring constant of about 41 lb./in. has been found suitable.

Horizontal spring **83** is adapted to coact with vertical spring **84** in several ways. Spring **83** assists spring **84** to gently urge cover **3** fully-open only when it closely approaches this position; otherwise holding it balanced for "intermediate equilibrium" thereof. Spring **83** is also arranged to oppose spring **84** adjacent the "closed" position of cover **3**, overriding it to gently urge the cover closed and hold it so. Preferably, spring **83** is biased by compressing nut **89** to exert little or no force at "fully-open" position and to contribute an increasing vertical component (according to angle *a* between shafts **81**, **82**), to resist the upward movement of cover **3**. With an angle *a* of about 70 degrees, a spring **83** of rectangular spring steel having about 4 turns/in. and a spring constant of about 82 lb./in. (as adjusted for bias), has been found suitable for use with the above-specified exemplary vertical spring **84**. A similar set of supports **80'**, **90'** (not shown) comprise the suspension arrangement **8'** at the other side of cover **3**, opposite the above-described suspension **8**.

It has been asserted that, as a feature of the invention, supports **80** coact with supports **90** to maintain cover **3** in "intermediate equilibrium," except adjacent the "fully-open" position where springs **84**, **83** both urge cover **3** open and except adjacent the "closed" position where they are opposed, spring **84** urging cover **3** closed and keeping a latching bias thereon. Horizontal support **80** is maintained in prescribed relation with the pivot axis for cover **3** to effect this "dual homing" action. That is, support **80** is arranged so that spring **83** will exert its thrust along prescribed directions with respect to the join-line between pivot hinge **12** and pivot axle **63** to urge cover **3** in opposite directions at opposite excursion extremes thereof. More particularly, support **80** is arranged and disposed relative to the join between axes **12** and **63** as shown in FIGURE 4, so as to urge cover **3** in such a direction as to rotate it counter-clockwise in its open position and in most other positions, except adjacent its closed position. Contrariwise, then cover **3** is depressed to a point close to its "closed position" (FIGURE 2), axle **63** drops so that its line of join with hinge **12** throws the thrust from support **80** oppositely. That is,

in closed position support **80** tends to rotate cover **3** clockwise, urging it closed.

It is thus a feature of the invention that the cover suspension means **8, 8'** comprises a pair of cooperating horizontal and vertical resilient supports **80–90, 80'–90'** respectively, which coact to provide a dynamically varying spring force for maintaining cover **3** in "intermediate equilibrium." Another feature of this arrangement is that spring suspensions **8, 8'** are thus able to provide a plurality of delicately balanced spring rates without delicate adjustments for each change in load and without using costly, specially-prescribed springs; using instead an arrangement that allows the provision of standard type springs. It is further preferred to use a pair of springs in each spring suspension arrangement since although a single spring might be employed to provide opening and closing forces at different points along the cover's excursion, the dual spring arrangement more simply and conveniently provides the above-mentioned "intermediate equilibrium." When a single spring is used it will be understood that it should be arranged to provide vertical and oblique thrust components, to be biased by the closing motion of cover **3** as indicated above; the oblique (or horizontal) component being preferably adapted to aid the vertical component except adjacent "closed" position where it shifts to oppose it and instead help the cover weight, urging it downward. Of course other resilient suspension means may be used to perform this function. In some cases tension springs, torsion bars or the like may be employed as understood by those skilled in the art. Use of two springs, advantageously isolates some of the counter-balancing spring action from the lock-down spring action, eliminating the need for complex design requirements necessary to incorporate these in a single spring and for fussy adjustments to adapt a single spring to various loads, such as different weight covers.

As noted above, apron **5**, besides being pivotably hinged from cover-top **6**, is coupled in prescribed spaced relation to sides **2', 2'** by a pair of similar angular guide means **7, 7'** (the latter not shown). As best indicated in FIGURE 4, guide **7** is pivotably mounted atop the intermediate section side **2'** at bracket **25**, affixed thereon. Similarly, guide **7** is pivotably journaled on a bracket **51** fixed dependingly from apron portion **5** at a prescribed location thereon. It will be apparent that the structure and arrangement of guides **7, 7'** act to closingly seat apron **5** adjacent the front (Zone F) of chassis **2** and also to maintain apron **5** in prescribed compact relation to cover-top **6** as cover **3** is raised. Guides **7, 7'** thus prevent any erratic free-swinging of apron **5** and keep it somewhat compactly folded into follow top **6** providing greater visibility of, and access to, print head **4** as well as reducing hazards for the operator. It will be apparent that guide **7** (guide **7'** is substantially identical) is angularly conformed so as to cause apron **5** to be driven radially outwardly during the downward (closing) exursion of cover **3** so as to "clear" the front portion of sides **2'** and also to require no guiding action by the operator. Thus, the length and angular conformation of guide **7** will be dictated by the size of cover **3** in relation to sidewalls **2', 2'** and by the desired angular position at which cover **3** is to be locked open.

According to another feature of the invention, the structure of guides **7, 7'** also facilitates the use thereof as a locking means for cover **3** in its extreme "open" position (FIGURE 4, dotted line). As shown in dotted-line, guide **7** is adapted to conformingly engage base **6'**, fitting smoothly there against, to support cover **3**. That is, guide **7** is pivotably coupled to apron **5** and to associated sidewall **2'** on pivot axles **16, 14**, respectively, to have a prescribed angular relation to the join-line between hinge **53** (piovt axis of apron **5**) and sidewall pivot axle **14** (stationary pivot for guide **7**). More particularly, guide **7** is disposed so that the join (i.e. straight line) between pivot axles **16, 14** coincides with that between axle **14** and hinge **53** at a prescribed "near-open" cover position, adjacent the "fully open" position thereof. This "near-open" position is indicated in FIGURE 4, the guide-cover arrangement is approaching this position of coincidence of pivot-joins. At this cover position, if any of the cover elements such as top **6**, apron **5** or guide **7** is moved slightly to rotate cover **3** counter-clockwise about hinge **12**, the cover will tend to assume a "locked open" attitude, as indicated by the dotted line position of guide **7** and apron **5**. Cover **3** will then be "locked open" against accidental impact, jostling, or like forces tending to urge it clockwise and downward (closed). That is, cover **3** is kept from being accidentally dislodged and falling upon the machinery and adjacent attendant, by the action of guide **7** which will tend to resist (with guiding apron **5**), clockwise forces upon top **6**. It is a safety feature that the unlocking of cover **3** from its "locked open" position, requires that an operator first pull apron **5** outwardly before the cover can be dropped. That is, as soon as the join between pivot axle **16, 14** passes beyond the join between axle **14** and hinge **53** so that clockwise thrusts on top **6** throw guide **7** clockwise, not counterclockwise, the cover may then be depressed toward its closed position under complete safe control. The top angular portion **70** of guide **7**, is thus formed to provide an extended flat surface against which top **6** may rest, providing extra resistance to accidental dislodgement and falling of cover **3** without positive unlocking manipulations. It will be understood that top **6** may rotate clockwise somewhat when guide **7** is moved from the full-line to the dotted-line position in FIGURE 4.

The operation of spring suspension means **8, 8'** and guides **7, 7'** will be somewhat apparent from the foregoing description, but will be summarized as follows: In the "Closed" (or "Down") position (FIGURE 2) of cover **3**, horizontal spring support **80** has assumed one of two opposite cover-biasing states, i.e. the "close-cover state," tending to resist upward forces urging cover **3** upward. Thus, if the cover is opened only very slightly from the position shown in FIGURE 2 (e.g. accidentally nudged), the "cover-torquing" component of force from spring **83** will (overriding spring **84**) coact, with the weight of the cover, to gently but firmly urge it back to a closed position. However, this "closed-cover" force is experienced only during a very minor portion of the cover excursion. At other times, spring **80** assumes a gradation of (decreasing) "open-cover" bias states and is thus arranged to balance the cover weight and bias of vertical spring **84** for equilibrium during the major portion of the opening excursion of cover **3**. Thus, cover **3** may be opened only partially, such as indicated in FIGURE 1 and will remain in equilibrium, safely stable in whatever semi-open attitude the operator leaves it.

Where spring support **80** is bi-directional, however, spring **90** is unidirectional, though both are position-based (compression increases as cover drops). As best seen in FIGURE 4, vertical spring **84** will resist any closing forces (urging cover **3** downward) and be effective to hold the cover open until it has been moved through a prescribed minor excursion distance, whereupon the cover weight and the vertical component of horizontal spring **83** will cooperate to exactly balance spring **84**. Thus, if the operator moves apron **5** to unlock cover **3** and then depresses cover-top **6** only spring **84** will gently urge it back to the extreme-open position (indicated in FIGURE 4). However, as in the case of horizontal springs **83 (83')**, springs **90 (90')** cannot effect this cover-translation except at an extreme excursion position, i.e., close to "fully-open."

While the invention has been particularly shown and described with reference to the preferred embodiment indicated above, it will be understood by those skilled in the art that changes in form and details, in materials and dimensions and the like may be made, with certain features substituted for or deleted, without departing from

the spirt and scope of the invention, as indicated in the appended claims.

What is claimed is:

1. In a data processing machine having a frame including three sides defining an operating opening, the combination therewith of an articulated bi-part closure for said opening and comprising:

a top, a side apron, and pivot means suspending said apron pivotably from said top; hinge means pivotably mounting said top from one of said sides; resilient counter balancing suspension means coupling said top to at least one of said other sides so as to adapt said closure for intermediate equilibrium at all excursion points thereof except adjacent the excursion extremes; and guide means coupling said apron to at least one of said other sides pivotably so as to seat closingly against a portion thereof so as to be guided to follow said top completely during movement thereof.

2. The combination recited in claim 1 wherein said suspension means is arranged to provide bi-directional resilient torque components arranged to balance the weight of said closure during most of the moving excursion thereof, except adjacent the "closed-down" position, whereat a resilient closing-thrust is invoked.

3. The combination recited in claim 2 wherein said suspension means is arranged to provide an "opening" torque and an intermittent closing torque said closing torque being arranged to provide said closing action.

4. The combination recited in claim 1 wherein said side cover comprises an apron arranged to be closingly seated relative orthogonal to the closed attitude of said top cover; and wherein said guide means is arranged to thrust said apron away from said top cover to clear portions of said frame and to be so closingly seated; said guide means also being pivotally coupled to said apron and to said frame and disposed so as to thrust said apron oppositely, toward said top cover, when it approaches a "fully-open position" to thereby lock it open.

5. A two part cover arrangement comprising:

a frame, a top cover hinged to said frame; a side cover hinged to said top cover; a bi-directional suspension means resiliently coupling said top cover to said frame so as to provide counterbalancing action and bi-directional locking action therefor; and guide means arranged to couple said side cover to said frame so as to be thrust in one direction for guiding said side cover relative said top cover and said frame and so as to be thrust oppositely for resisting the depression of said top cover.

6. The combination recited in claim 5 wherein said guide means comprises a pair of angular arms pivotally coupled to said apron and to one side of said frame so as to pivot said apron relatively away from said top cover when it is lowered, except adjacent the "fully open" position whereat it thrusts said apron relatively toward said top cover lockingly; a portion of said arms being configured and disposed so as to supportingly engage said top cover for providing the "lock open" action.

7. In a High-Speed Printer having a frame including two sidewalls and a rear wall defining a top corner-cavity enclosing printing mechanisms accessible from the front, the combination therewith of a bi-part articulated cover means therefor, said cover means comprising: a top pivotably hinged to said rear wall and an apron pivotably hinged to said top adjacent the pivoting edge thereof; overcentering spring means coupling said top to said sidewalls so as to counter-balance said top at all positions except where said top comes closely adjacent said sidewalls closingly, whereat said spring means urges it closed; and guide means coupling said apron to said sidewalls so as to follow said top compactly, to close the front of said printer and to overcenter when said top comes adjacent the extreme open condition for locking said top open.

8. An articulated corner cover arrangement for providing a closure for an operating zone defined by the frame portions of a business machine, said closure being counterbalanced and suspended so as to be selectively either resiliently urged closed, locked open or kept counterbalanced intermediate the closed and open positions, said closure comprising:

a top portion and a side portion; said side portion comprising an apron arranged to be closingly seated relatively orthogonal to the closed attitude of said top portion; guide means pivotably coupled between said apron and certain of said frame portions and arranged to normally and gradually thrust said apron away from said top portion to clear parts of said frame portions and to be closingly seated; said guide means also being disposed so as to thrust said apron oppositely, toward said top portion, when said top portion approaches a "fully-open position" to thereby lock it open; a pair of bracket means, one being attached dependingly from each side of said top portion; hinge means pivotably coupling a segment of said frame portions to one end of said top portion; bi-directional, resilient, counterbalancing suspension means resiliently coupling said top portion to said frame portions so as to provide counterbalancing and bi-directional locking thereof, said suspension means including a pair of vertical spring means arranged for urging said closure open and a pair of oblique spring means for urging said closure open except adjacent the closed position thereof whereat they urge said closure closed, said spring means each including pairs of support shafts arranged to be pivotally coupled in common to one of said brackets and also including helical springs arranged to be compressed along an associated one of said shafts, each support shaft being pivotally attached to one of said bracket means at one end thereof and being slidingly seated in a bracket portion of said frame portions adjacent the other end thereof, said oblique spring means being disposed relative said hinge means and associated bracket means so as to resist closure depression except adjacent the "closed" position, at which point it is constructed and disposed so as to overcenter and aid closure depression.

9. In a data processing machine having a corner aperture defined by three side walls, the combination therewith of a bi-part articulated closure means therefor including a top hinged to a first side wall and an apron, pivotally mounted from said top and arranged to seat closingly relatively orthogonal thereto; resilient suspension means coupling said top to certain of the others of said side walls, said suspension means being arranged to be resiliently biased as said closure means is depressed for counter-balancing thereof in equilibrium except adjacent excursion extremes and being further arranged to otherwise maintain said closure fully-open and fully-closed through opposed locking actions; and guide means pivotally coupled to said apron and to certain of the others of said side walls and said guide means being extended sufficiently to controllably pivot said apron away from said top during depression of said closure means except adjacent the "fully-open" position thereof at which point said guide means is arranged to thrust said apron towards said top lockingly.

10. The combination recited in claim 9 wherein said suspension means comprises first spring means for thrusting said top in a first open direction and second overcentering spring means for aiding said first spring means except adjacent the fully-closed position where it overcenters to reverse its thrust direction.

11. The combination recited in claim 9 wherein said guide means comprises a pair of angular arms arranged to overcenter so as to lock said closure open.

12. An articulated corner cover arrangement for providing a closure for an operating zone defined by the

frame portions of a business machine, this closure being counterbalanced and suspended by suspension means for resiliently urging it "closed" as well as locking it "open" in certain respective positions, while otherwise maintaining it stably counterbalanced, said closure comprising a top portion, a side portion and pivot means pivoting coupling said portions, said top portion including a pair of bracket means, one attached dependingly from each side thereof and hinge means pivotably coupling said top portion to said frame portions at one end of said closure, said suspension means comprising:

resilient counterbalancing means including vertical spring means coupling said closure to said frame portions so as to normally urge it "open"; oblique spring means coupling said closure to said frame portions so as to normally urge it "open," except adjacent the closed position thereof whereat it urges said closure closed; and two pairs of support means, each pair comprising a vertical and an oblique support

means, both pivotally coupled in common to a respective one of said bracket means, each said support means comprising a longitudinal shaft pivotally attached at one end to said associated bracket means and, adjacent its other end, slidingly seated in a seating portion of said frame portions, said oblique support means being adapted to resist closure depression except adjacent said "closed" position where it assists this depression.

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