(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
29 March 2001 (29.03.2001)

PCT

(10) International Publication Number
WO 01/21038 A2

(51) International Patent Classification[7]: A47B

(21) International Application Number: PCT/US00/26293

(22) International Filing Date:
21 September 2000 (21.09.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/405,546 24 September 1999 (24.09.1999) US

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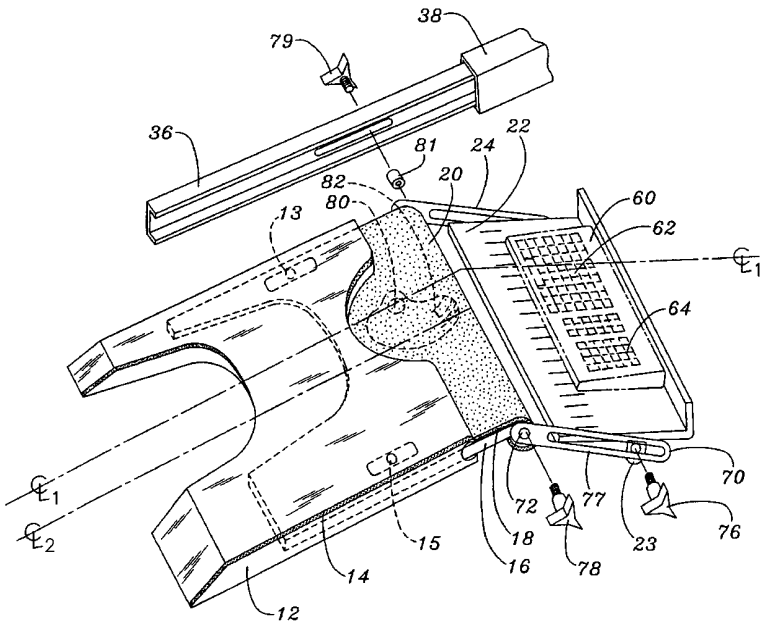
(81) Designated States *(national)*: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *Without international search report and to be republished upon receipt of that report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: STRESS-FREE UNIVERSAL WORKSTATION MODULE



(57) Abstract: A stress-free, ergonomically designed, computer workstation module (10) universally adaptable to most keyboards and mice comprises a shaped cutout extending toward the operator providing comfortable support to forearms and wrists. A telescoping sub-tray extending from under an upper planar member cooperates hingingly and slidingly with an adjustable slope tray for supporting a keyboard. The device provides a bio-mechanically sound position for centrally locating a computer mouse. The invention provides a proven efficient, and economical approach to the problems associated with carpal tunnel syndrome and ulnar deviation.

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TITLE OF THE INVENTION

STRESS-FREE UNIVERSAL WORKSTATION MODULE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a typing workstation module ergonomically designed to prevent the incidence of carpal tunnel syndrome and more particularly to improved adjustable reverse slope keyboard trays cooperating with a telescoping platform having U-shaped cutout for forearm and wrist support and a bio-mechanically sound position for a centrally located mouse close to the user's torso,

2. Prior Art

Continuing development of electronic information systems coupled with the rapid growth of service-related industries and universal implementation of computers in a broad spectrum of occupations and professions has witnessed and created demand for expertise in computer usage and data entries. The widespread full-time use of computers and related keyboard controls has spawned an alarming incidence of repetitive strain injuries (RSI's).

RSI's occur as a result of continual repetition of a particular motion over the course of a prolonged work period. Telephone directory operators, secretaries, airline reservation agents, home-based businesses, children at home and at school and newspaper/publishing employees--generally anyone involved in data entry or word processing--repeat certain physically-identical motions literally thousands of times per day.

Prominent among recognized RSI's is carpal tunnel syndrome (CTS). CTS is most closely-associated with keyboard use and invariably caused by use of the hands too often, too forcefully, or in the wrong position. Typically, improper chair or desk height and poor posture force individuals to type or otherwise use a keyboard in such a way as to require that their hands are extended at the wrist. Constant repetition of flexion and extension or lateral bending in this position can and often does cause inflammation of the carpal ligaments at the base of the wrist. Subsequent compression and/or irritation of the median nerve and tendons can

cause numbness, tingling or loss of sensation in the fingers, loss of muscle control or strength in the hands and fingers, as well as pain in the fingers, wrist, and into the shoulders. The symptoms and severity may vary from person to person.

Repetitive Motion Injuries (RMI), particularly Carpal Tunnel Syndrome (CTS), now strike an estimated 185,000 U.S. offices and factories each year. These cases amount for more than half of the nation's occupational illnesses. It is estimated that nearly $1 billion is lost each year in U.S. industries from all forms of RMI claims and the resulting loss of productivity. According to a Bureau of Labor Statistics study, 62% of all carpal tunnel syndrome incidents result in lost workdays of 21 days or more, and 31% of all carpal tunnel cases are keyboard related.

Conservative estimates place the average cost of treating a CTS patient as high as $15,000-$20,000, including the cost of medical treatment, ergonomic equipment, training, legal expenses and loss of productivity, as well as higher insurance premiums and higher costs for related employee benefits.

Because of the increasing costs associated with CTS, the search for an efficient, effective means by which to prevent such injuries has been ongoing concern in the art. Several approaches have been applied, each with certain limited success. One approach involves use of a wrist support systems positioned between the user and a keyboard. Such systems are available in a variety of configurations and with varying degrees of cushioned support. Another well-known approach incorporates the same support system in the context of an apparatus secured between the keyboard and the desk top on which it is placed.

A recent, innovative approach is the development of an alternative keyboard apparatus which utilizes a pair of adjacent hand placement configurations which immobilize the user's hands and wrists, and involves activating key controls solely through finger movement.

However, the prior art has associated with it a number of significant problems and deficiencies. Most are related to the fact improper wrist angle is induced during keyboard use, as a result of the designs and configurations of the apparatus currently used. (Improper wrist angle is largely associated with the incidence of CTS along with repetitive wrist flexion and extension. Conversely, to avoid CTS, proper neutral wrist angle may be defined as that when the user's wrists are either substantially unbent, or slightly bent downward, or where the the wrist is motionless and fingers are only

involved in typing without the repetitive involvement of the wrist.

In the design of alphanumeric keyboards for use in typewriters, computers, typesetters, and certain scientific and technical instruments, it has been generally assumed that the keyboard must be tilted upward, that is, the front or operator edge of the keyboard surface must be lower than the rear edge of the keyboard surface. It will be recognized that the word keyboard in this patent application will generally be used to apply to the above types of keyboards as opposed to the keyboards found in musical instruments.

Although all of the above hand/wrist supports include different mechanical features, but none of them are designed in accordance with the current ergonomic standards.

The inventors of the present invention, a Chiropractor doctor with long experience in treating patients afflicted with RSI ailments in collaboration with an experienced design engineer have discovered, that the best position for the hands of a typist is to have little to no motion at the wrist while typing; this implies keeping the wrist in neutral or in a stationary flexed position resting on a negatively sloped keyboard. Additionally, the hands, the wrists and the forearms should be supported to hold the typists' hands in position. The inventors of the present invention believe that wrists supports of the type heretofore known have provided for support of the wrists or heel of the hand and not the forearms which is the focus of this art.

Discussion within the present section is drawn in substantial part from the Dec. 1, 1991, study report 'An experimental test of a design prototype of the Protex.TM. system' by Alan Hedge and James R. Powers of the Human Factors Research Laboratory, Department of Design and Environmental Analysis, Cornell University, Ithaca, N.Y. 14853.

An anticipated increase in white-collar productivity through widespread computerization has failed to materialize. Part of the reason for this may be because (a) of eye strain and fatigue associated with extended monitor viewing (b) the ergonomically mal-positioned keyboard and mouse placement which when combined could become a source of physical stress and even injury. Stress diminishes productivity. Employee aversion to computers, even if subconscious, ultimately diminishes the effectiveness of the computers in the work place, and erodes business profitability through losses in employee productivity. Computer-induced injuries can result in absenteeism, and increases in health care costs.

The two features of (i) keyboard layout and (ii) keyboard

spatial attitudinal position that were once essential for the design of the mechanical typewriter now appear to play a significant negative role in the growing epidemic of musculo-skeletal problems among computer keyboard users. Foremost among these musculo-skeletal problems is carpal tunnel syndrome.

Although CTS can be treated with surgery, studies from Australia show that over half of the affected workers will suffer repeat occurrences of CTS within 1-2 years of returning to their job if nothing else is changed. Understanding the causes of CTS and redesigning the job to minimize or eliminate these causes is the best means of preventing and resolving CTS problems.

As the hand deviates from normal either (i) horizontally towards the thumb (radial deviation) or towards the little finger (ulnar deviation), or (ii) vertically up or down, the pressure on the carpal tunnel increases. Vertical deviations (extension/flexion) create significant increases in carpal tunnel pressure. Reference Armstrong, T., Castelli, W. A., Evans, F. G. & Perez, R. D. (1984) Some histological changes in carpal tunnel contents and their bio-mechanical implications, Journal of Occupational Medicine, 26 (3), 197-201.

With occupational overuse of the fingers, minor trauma to the tendons and the sheaths may accumulate and eventually produce CTS. Repetitive movements with the hands in a deviated posture accelerate the onset of CTS. Reference Chaffin, D. B. & Anderson, G. (1984) Occupational Biomechanics, (New York: John Wiley & Sons).

As the tendons or their sheaths become irritated and inflamed, the resulting swelling increases the pressure on the median nerve, which initially causes tingling, then numbness, and eventually disabling pain when the fingers are moved. Computer users are particularly at risk because of the large number of finger movements which the fingers may make in a short time. For example, a data entry worker who averages 13,000 key strokes per hour will make over half-a-million finger movements per week. In short, the three major risk factors for CTS are poor posture, pressure in the carpal tunnel, and lack of pauses to allow time for tissue repair.

The use of QWERTY keyboard layout, which can cause some ulnar and radial deviation of both hands, and a positive keyboard angle which places the hands in an extended posture, combine to increase the risks of CTS. Over time these factors accelerate the accumulation of trauma to the hands/wrists, and this cumulative trauma is now appearing as the epidemic of CTS cases. Also, QWERTY keyboards usually are asymmetrical (i.e., the numeric keyboard is to

the right of the QWERTY keys) and users tend to center the keyboard on their screen rather than centering QWERTY on the screen.

This can result in users sitting in, twisted/torqued postures which increase the risks of back, shoulder and neck problems. This problem is exacerbated by the fact that positioning the mouse on the right hand of the keyboard for right handed users causes further push of the keyboard to the left thus increasing the twisted posture.

Accordingly, and in recapitulation, the major contributing factors to the occurrence of CTS are believed to fall primarily within the categories of (i) poor sitting posture, (ii) insufficient or no pauses during typing thus impairing tissue repair, and (iii) the repetitive movement of the hands in a deviated position.

Because of the significance of the CTS problem, a number of previous products have attempted to reduce CTS risks.

First, the introduction of new age keyboards to minimize radial or ulnar deviation attempted to reduce CTS risk. However the problem of vertical deviation (extension) still remains with such keyboards. More importantly, postural risks from using other input devices (e.g., mouse) are obviously unaffected by modification to keyboard layout.

Second, introduction of wrist supports to decrease wrist extension, even though on short term it proved usefull, further studies have proven otherwise. Reference Parsons, C. A. (1991) , "Use of wrist rest by data input VDU operators" appearing in Contemporary Ergonomics 1991--Proceedings of the Ergonomics Society's 1991 Annual Conference, (London, Taylor & Francis) pp. 319-321. Parsons tested nine different wrist rests on forty full time data input VDU operators. None of the operators found them useful, and 10% commented that discomfort increased when using a wrist rest with a traditional keyboard.

Third, full motion forearm supports have been provided. These products provide full motion forearm support for the worker. Each arm is rested in a mobile support which takes the arm weight for all horizontal movements. However, as with wrist rests, problems of flexion/extension and ulnar/radial deviation remain because of the design and angle of the keyboard, and in a short-term test the use of full motion forearm supports resulted in a slight slowing of typing speed. Reference Powers, J. R. (1991), "Effects of full-motion forearm supports on keyboard operator hand-wrist posture, keyboarding performance, and keyboarding accuracy", Master's Thesis, Dept. Design & Environmental Analysis, Cornell University.

Fourth, the Protex.TM. System available from Proformix, Inc. Whitehouse Station, New Jersey. (Protex.TM. is a trademark of Proformix, Inc.), unlike keyboards which are angled on a positive incline, the Protex.TM. System supports and presents the keyboard at a negative incline. This re-orienting of the keyboard, combined with the use of a broad wrist-support to reduce muscular activity associated with unsupported forearms, is intended to significantly reduce the risk of RSI. Indeed, in Australian field tests of this type of design, Stack (1987, 1988) reports that slanting the keyboard away from the operator was a major factor in solving the problems of RSI in the Tasmanian public service. Reference Stack, B. (1987), Keyboard RSI: the practical solution, Meuden Press, Hobart. Reference also Stack, B. (1988) papers in press cited by Patkin, M. in "Neck and arm pain in office workers: causes and management", appearing in Sauter, S. L., Dainoff, M. J. & Smith, M. J. (eds.) Promoting health and productivity in the computerized office: models of successful ergonomic interventions, Chap. 13, (Taylor & Francis, New York), pp. 207-231, 1990.

Experiments at Cornell University with the Protex.TM. System have reportedly shown that a negative slope keyboard significantly reduces wrist extension and places the hand in a vertically wrist neutral position. Reference "An experimental test of a design prototype of the Protex.TM. system" by Alan Hedge and James R. Powers of the Human Factors Research Laboratory, Department of Design and Environmental Analysis, Cornell University, Ithaca, N.Y. 14853. This finding is in agreement with that of the Australian research. Reference Stack (1987, 1988), op cit. Subjects using the negatively sloped keyboard support sat 11 cm farther from the VDT screen, but the viewing distance remained within the preferred range of distances 61-93 cm. Reference Grandjean, E. (1988) Fitting the Task to the Man, 4th ed., (New York: Taylor & Francis).

Several additional products are commercially available that can place a keyboard at a negative angle, such as the Details.TM. keyboard support (Details.TM. is a trademark of Steelcase, Inc.) and the Flex-Rest.TM. keyboard support (Flex-Rest.TM. is a trademark of Flex-Rest, Inc.). However, these products are more difficult to adjust, do not provide comparable wrist neutral support, do not support mouse work or pen-based work. Additionally, products are metal framed and they do not necessarily reduce risks from electromagnetic fields (EMF).

The present invention will be seen to accommodate the realities of existing office furniture, and the existing organization of

keyboarding stations. First, a great deal of existing office furniture exist on the market for supporting a keyboard at or near the ergonomic standard height (for Americans, circa 1993) of twenty-eight and one-half inches (28.5")--which cannot reasonably nor economically be discarded. Moreover, second existing computer keyboards make no accommodation to being oriented at a negative angle. The challenge to overcome is how can one utilize the existing computer devices without an enormous capital re-investment to correct the carpal tunnel syndrome risks facing so many people in the workplace, in homes and at schools.

The present invention will be seen to be directed to doing the best that can reasonably be done towards ergonomically accommodating individuals of considerably different sizes (ranging from a 5th percentile female to a 95th percentile male) in their use of an existing computer keyboard and an existing mouse placed upon or under an existing surface (which surface is typically not adjustable in height).

In so doing, and so accommodating, a first challenge to ergonomic design is the considerably different angles of approach to a keyboard surface resting upon an ergonomic standard twenty-eight and one-half inches (28.5") high desk made by the fingers and forearms of a 5th percentile female versus a 95th percentile male. When seated upon a standard chair, a 95th percentile male typically enjoys an ergonomically-correct straight wrist-hand angle in the placement of his fingers atop a keyboard surface that rests upon an ergonomic standard twenty-eight and one-half inches (28.5") high desk. However, when seated upon the same standard chair, a 5th percentile female's forearms will approach the keyboard from an extreme, twenty-five degree (25.degree.), down angle, and she must bend her wrists and fingers in considerable flexion. Most keyboard typists in the American work force circa 1993 are female. Curiously, and nonetheless, the American office furniture that is most commonly used by females is better ergonomically designed--at least in its support of computer keyboards--for use by males!

According to this first ergonomic challenge, it would be useful if some improvement--consistent with existing conditions of the office work place environment--could be made so as to permit a better angle of approach of the wrists and hands of variously sized or variously seated typists to a pre-existing computer keyboard.

Another ergonomic challenge is stress relief, and fatigue avoidance. Again, any realistic solution is likely to be constrained by the existing conditions of the office work place environment.

However, it would be useful if an ergonomic device could make some flexible, and realistic, accommodation to relieving strain on a typist's forearms, wrists and/or hands by improving support of the typist's wrists. Reference Parsons (1991) and Powers (1991), op cit.

While the present invention covers all the advantages of the Protex TM, of Details TM and of Flex-Rest TM keyboard supports without their drawbacks, it is noticed that these devices do not provide provision for forearm rest, no feature for adjusting the apparatus to the length of the user's arm and fingers and they require unnecessary stress on the arm to grab the mouse away from QWERTY center, to name but few of their limitations.

One of the problem associated with free-standing supports, is that their mechanisms are often costly, complex, and subject to mechanical or design failure. Position adjustment with respect to a particular keyboard may be achievable, but not without increased costs of manufacture and repair.

More affordable free-standing support apparatus are often characterized as being too soft or not providing the proper degree and angle of support. Furthermore, these systems are plagued by the fact that the supports move about when placed on a waxed or glass-covered desk top, such that readjustment of the support position is continually required during use.

While some success has recently been claimed through use of the hand placement keyboard, any benefits derived therefrom are offset by the necessity of learning a new and entirely different typing/input methodology. Furthermore, the excessive cost and incompatibility of such devices with current word and date processing systems renders them impractical and unavailable for all but a very few of those seeking relief from CTS symptoms.

In summary, a considerable number of drawbacks and problems exist in the art relating to typing workstation modules and particularly to incorrectly positioned keyboards and mice lacking proper forearm and wrist support systems. There is a need for an improved apparatus, the use of which will prevent carpal tunnel syndrome and alleviate the costs associated therewith.

OBJECTS OF THE INVENTION

It is an object of this invention to provide a universally adaptable typing workstation module that provides a proper forearm and wrist support, incorporates a bio-mechanically appropriate position for a mouse, an adjustable slope tray for supporting a

keyboard, the ability to align QWERTY keys of asymetrical keyboards, and that provides a novel document reader; an overall system which overcomes some of the problems and shortcomings of devices of the prior art geared to boost performance on the job.

The prime object of this invention is to reduce the incidence of carpal tunnel syndrome (CTS) and alleviate the symptoms associated therewith.

Another object of this invention is to provide an improved typing workstation module that incorporates simultaneously an anti-CTS position for hands, forearms, wrist and fingers during typing as well as an anti- CTS position to operate a mouse during mouse-held data input.

Another object of this invention is to provide a typing workstation module that universally adapts itself to the majority of keyboards and mice types known to the skilled in the art.

Another object of this invention is to provide an improved typing workstation module that incorporates a natural bio-mechanically sound location, a position from which to operate a detached mouse and avoid a postural risk; in such a new location, the working forearm rotates comfortably and only inwardly over the resting elbow and folds in a natural "embracing" move to operate the mouse eliminating the need to lift the entire arm in order to reach a mouse that is often positioned in an awkward and inconvenient location as common in prior art; thus this invention alleviates the incidence of extended arm discomfort and "mouse shoulder".

Another object of this invention is to provide an improved typing workstation module wherein the mouse is located on a lower plane than the wrist, thus providing generally an apparatus and a method requiring the least extension of wrists and less muscular effort to operate a mouse.

Another object of this invention is to provide an improved typing workstation module which is cost-effective, easily manufactured and assembled, and immune to mechanical failure while accommodating advantages gained in existing prior art.

Another object of this invention is to provide an improved typing workstation module which is telescopingly adjustable to the length of a typist forearms, palms and fingers, and when fully extended becomes a working platform to browse the web, play games, and/or for positioning data input and output devices such as, but not restricted to, digital, analog and fiber optic devices, cameras, screens, joysticks, computer games, or other devices that may benefit from such a premium location over the workstation module in

front of the user's eyes and bio-mechanically comfortable for the hands.

Another object of this invention is to provide an improved typing workstation module that provides the possibility to perform any and all writing, reading, drawing imputing and computer operations from a common central position.

Another object of this invention is to provide an improved typing workstation module that provides an adjustable wrist support angulation varying from neutral up to 25° of flexion for metacarpal.

Another object of this invention is to provide an improved typing workstation module having an adjustable slope keyboard tray wherein the distance separating the typist's wrist to keyboard proximal-edge is infinitely adjustable from a neutral position to 3 inches below the telescoping sub-tray, and wherein the tilt angle of the slope tray is infinitely adjustable between 30° upwards to 30° downwards in relation to the telescoping sub-tray surface.

Another object of this invention is to provide an improved typing workstation that provides room for a lateral adjustment to existing asymetrical QWERTY keyboards which are causing ulnar and radial deviation in user's wrists; keyboard positioning in prior art is pressing users to center a keyboard on their screen rather than centering QWERTY on the screen, this deviation being caused by the introduction of numeric keys to the right side of keyboards.

Another object of this invention is to provide an improved typing workstation module that is operable transfer in relation to a working surface, said surface selected from one or a combination of surfaces from the group, but not limited to, a table, a desk, a bench, a counter, a pole, a wall, a chair, a bed, human laps or torso, or any surfaces.

Another object of this invention is to provide an improved typing workstation module that can be optionally positioned on top of a working surface or slide under a working surface.

Another object of this invention is to provide an improved typing workstation module that incorporates plural optional locations for positioning a document holder in a spatial position in relation to the workstation module without interfering with any and all of the user's input or output computer operations;

Another object of this invention is to provide an improved typing workstation module that incorporates a document holder that is hingingly elevated from the bottom front-end of the keyboard slope tray to a position below the line of sight looking at the monitor.

Another object of this invention is to provide two optional locations outside the workstation module for positioning a document holder in front of a user's eyes without interfering with any and all of his input or output computer operations; in a first such location the document holder's frame is clamped articulately to the working surface holding the monitor or the workstation module used by the operator such that the user's view is not obstructed; in a second position the document holder's frame is mounted articulately to the monitor such that the user's view is not obstructed.

Another object of this invention is to provide a workstation module that optionally incorporates a document holder frame that is mounted hingingly, slidingly, snap-on way or by similar means to the workstation module or to the peripherial equipment relating to the workstation module to allow the document holder to assume various positions and tilt angles.

Another object of this invention is to provide an improved typing workstation module that causes less strain in the eyes of the user by allowing him to stay away from the monitor screen providing easier focus of eye sight, better eye-hand coordination and less negative effects from monitor's radiation, all resulting in less mental and emotional stress.

Another object of this invention is to provide an improved typing workstation module, while keeping him away from the monitor, positions him closer to the workstation module and to the mouse so that stoop position is reduced or eliminated . The prior art was inducing a wrong bio-mechanical positioning of the spine, thus increasing the stress and load placed upon the shoulders and the lumbar spine.

Another object of this invention is to provide an improved typing workstation module that uses the frame of a document holder optionally mounted to the workstation module to place a magnifier for better viewing of keyboard keys or of the monitor.

Another object of this invention is to provide an improved typing workstation module that uses the document holder frame to position a lighting device for better display of keyboard keys or/and of a document or/and of the monitor.

Another object of this invention is to provide an improved typing workstation module that uses the frame of a document holder optionally mounted to the workstation module to view an object such as but not limited to, an LCD type screen, a video game display, a fiber optic display, a camera, a microphone, for web browsing, or any input and/or output devices of the like.

Another object of this invention is to provide an improved typing workstation module incorporating a forearm and wrist support, a telescoping sub-tray and an adjustable slope tray of an appropriate size for operating a laptop computer or any hand-held type computing device having a keyboard.

It is yet an object of this invention to provide a universally adaptable typing workstation module that is portable and attachable by straps to the operator's body, whether the operator is in a seated, sleeping or in a standing position, with said workstation module providing a proper support for forearms and wrists incorporating a bio-mechanically appropriate position for a mouse, a telescoping sub-tray, an adjustable slope tray for supporting a keyboard of the group comprising a PC computer, a laptop or that of a musical instrument or any keyboards of the like.

It is yet an object of this invention to provide a universally adaptable typing workstation module that is partly inflatable, portable and that is attachable by straps to the operator's body, whether the operator is in a seated, sleeping or in a standing position, with said workstation module .providing a proper support for forearms and wrists incorporating a bio-mechanically appropriate position for a mouse, a telescoping sub-tray, an adjustable slope tray for supporting a keyboard of the group comprising a PC computer, a laptop or that of a musical instrument or any keyboards of the like.

It is an object of this invention to provide a universally adaptable typing workstation module providing that is mountable to the laps of a seated operator with the workstation module having a proper support for forearms and wrists and which incorporates a bio-mechanically appropriate position for a mouse, a telescoping sub-tray, an adjustable slope tray for supporting a keyboard of the group comprising a PC computer, a laptop or that of a musical instrument.

Another object of this invention is to provide an optional document reader apparatus mountable into a workstation module which is loadable and which displays document content automatically and continuously, one document or a portion thereof at a time; the forward motion of the document is intentionally actuated by a manual sweep of the forearm, similar to the operation of an old type writer, so as to break the repetitive motion imposed by data input which contributes to the incidence of CTS.

Another object of this invention is to provide an optional document reader apparatus mountable into or over a working surface

or is attachable to a monitor, the document holder is loadable with a stack of documents and displays their content automatically and successively, one portion of a document at a time.

Another object of this invention is to provide an optional document reader apparatus mountable into a workstation module which is loadable and which displays their content automatically and successively, one portion of a document at a time; the forward motion of the document is achieved my electrical means.

These and other important objects will be apparent from the following descriptions and from the drawings.

SUMMARY OF THE INVENTION

Applicant's device is an easily manufactured and operated universal typing workstation module accommodating various keyboards and mice comprising a generally box-type housing planar member with shaped portion extending substantially toward the operator to allow the torso of the user to be moveable within the cutout while providing comfortable support to the forearms of the user, a telescoping sub-tray extendable forward from under said planar member cooperates hingingly with an adjustable slope tray for supporting the keyboard.

The device also provides a bio-mechanically appropriate location for a mouse to operate close to the torso eliminating the need to extend the arm as in prior art; the slope tray provides also room for a lateral centering of QWERTY keys to wrist positions; an optional document holder mounted above said workstation module allows to locate and view input or output devices from a central position.

The preferred configuration of the best current embodiments of the invention feature three primary cooperating members and an optional fourth member; a first member comprising a box-type housing having shaped forearm and wrist support, a second member comprising a telescoping sliding sub-tray, a third member comprising an adjustable slope tray and a fourth optional member comprising a document holder.

The first member comprises a box-type housing planar member with shaped portion extending substantially toward the operator to allow the torso of the user to be moveable within the cutout while providing comfortable support to the forearms of the user, said member molded from conventional plastic or other materials used in most computer keyboard trays. The box-type housing planar member

has a centrally located arc-shape cutout for positioning, close to the torso, various types of detached mice; this box-type housing member is cushioned with a resilient material and incorporates underneath its upper planar surface structural means for a cooperating sub-tray to slide and extend telescopingly the working surface of the workstation module. In the preferred embodiments, the box-type housing having structural means is achieved by juxtaposing under said upper planar member, a lower planar member of substantially similar shape and assembling them together via a spacer wherein said two cooperating planar members become substantially of similar configuration than a box-type housing or a sandwich-type assembly having an empty space between them for positioning a sliding telescoping sub-tray between. This is also achieved by molding a box-type housing that has only a front opening for sliding a sub-tray into it.

In other embodiments, the structural means is achieved by molding the upper member in such a manner that it incorporates underneath it, two C-type sliding tracks, one at each side, to accommodate room for a sliding sub-tray.

The second member comprises a telescoping sliding sub-tray member sliding fore and aft from said upper planar member in two distal sides-tracks of the first upper planar member. The telescoping sub-tray extends the working surface of the workstation module to accomplish three main functions; a first function for supporting and operating either a detached or an incorporated mouse at a bio-mechanically correct position, a second function is to extend more space for fitting said workstation module to the user's forearm length and a third function is to serve as a support for positioning any input and/or output type device(s) over said telescoping sub-tray; said second member is molded from conventional plastic or other materials used in most computer keyboard trays and is cushioned with a resilient material; this member has also a rounded shape at its distal-end where the user's wrist leans against this second member and cooperates hingingly and slidingly with a third member.

The third member comprises a keyboard tray having hinging means located at its bottom sides, said hinges located along a longitudinal axis passing through substantially the center of gravity of the keyboard tray when loaded with a keyboard. At each side, the tray height and the tilt angle of said keyboard tray adjustable and lockable by means of a holding means engageable inside a slotted track means, said holding means providing slidable

and angularly adjustment within a pivotable arm assembly pivoting at the front-end of the telescoping sub-tray; In this arrangement, the keyboard tray can slide inside the engageable track means and lock in position; the keyboard tray may also articulate slidingly,up and down, fore and aft and angularly in the slotted track, changing its relative position to the telescoping sub-tray as desired; this third member is also molded from conventional plastic or other materials used in most computer keyboard trays.

The fourth optional member comprises a document holder having two levels of horizontal planar trays connected together via a semi-cylindrical transparent window, the overall housing resembling a U-shaped body in a sleeping position; a batch of documents to-be-read are piled horizontally, in the lower horizontal tray, face upside-down, starting with the first document, up the pile; a roller concentrically located relative to the semi-cylindrical window, having brush-type tentacles, said roller held in position by two side walls,is manually rotated inside the semi-cylindrical window and frictionally engages one document at a time, slides it face down against the semi-cylindrical transparent front display window and exposes its content as it moved upward; the document is exited through a tangential opening in the mid-point of the semi-cylindrical window. A transparent cover, obliquely disposed vis-à-vis the horizontal trays and angularly adjustable having box-type side track means receives the input documents and keeps it in display covering a maximum distance within the track means before the document collapses under its own weight and slips out of the cover side tracks into the discharge tray.

A manually operated ratcheted lever rotates the roller, which in turn entrains frictionally the document to be displayed, forwarding it one or several lines at a time; this action replicates the mechanism existing in traditional manual typewriters that showed no incidence of CTS. This fourth optional member is molded from conventional transparent plastic or other materials used in most computer keyboard trays, printers and scanners.

In use by an amateur or a professional operator, the user can achieve heretofore an achievable successful results by using the present typing workstation module which provides a proven efficient, and economical approach to the problems associated with carpal tunnel syndrome (CTS). Such an ability is especially helpful for the professionals who need to use continuously keyboards or for amateurs that have no experience on how to position their hands to avoid the problems associated with CTS.

The person desiring to use the workstation module, selects one of the types of mounting arm mechanisms that will best fit the working surface that will receive the workstation module, as a conversion kit or as integral part of a manufactured furniture. The desired arm mechanism will be selected from the group comprising arm mechanisms that will position the workstation module to a position over a working surface, a position under a working surface, a position in front of a working surface, a position besides a working surface, including a pole or a position wherein the user straps the workstation module to his shoulders, letting it lean against his belt line or finally a position wherein the user positions the workstation module over his laps. The working surface may vary but is not limited to, a desktop, a table, a standing counter, a self-standing pole, to a moveable seat, to a moveable bed, to a moveable wheelchair, against a human body, over the laps of a human body or to any other parts or devices of the like.

In the preferred embodiments, the workstation module is slidingly mounted under a desk, sliding in two side-rails affixed to a desk member designed for that purpose. A conversion kit is provided for desks that have a priorly installed sliding underdesk drawer.

In other embodiments of the workstation module where no provision is made to install side-rails under a working surface, a mounting assembly is provided by clamping means gripping to the front of the working surface and holding said side-rails in position for the workstation module to slide properly.

In another embodiment the workstation module is moveable hingingly by means of a mounting assembly clamped to the working surface, moving the workstation module from a first position from over the working surface or from the side of the working surface, to a second position selected from one or a combination of the positions such as slightly under the working surface, adjacent to the working surface or besides the front-end of the working surface.

In the preferred embodiments, the operator seats and adjusts his chair at the right height with forearms at a position substantially close to 90 angle relative to his arms, slides out the workstation module in the desired working position and positions his torso in the cut-out portion of the workstation module by further adjusting his chair; once properly seated, the operator places the keyboard (of any model type) over the reverse keyboard tray, centers laterally the QWERTY keyboard keys and positions the keyboard between his two wrists, places the mouse close to his torso just

above the space bar key, adjusts the length of the telescoping sub-tray to fit his arms length, adjusts the height of the proximal-end of the keyboard to fit his palm flexion length and adjusts the tilt angle of the keyboard by moving the distal-end of the keyboard so that his finger tips can easily reach the function keys. The operator may optionally mount and adjust a document reader into a holding means provided in the workstation module.

The document holder is a U-shaped device wherein a batch of documents to be read are put on a lower input tray. An elongated roller type device, similar to the roller of a traditional type writer, with brush-type tentacles, engages frictionally the top document, slides it against a semi-cylindrical front window disposed in the prolongation of the input tray to expose the document content. Said window is prolongated by a transparent box type cover, angularly adjustable that has side tracks guides and that keeps the document in an oblique position for maximum viewing. When the document reaches a certain height, it collapses under its own weight and slips out of the side tracks into a discharge tray. The forward movement of the document holder is preferably manually activated by a ratchet mechanism with a lever system. The device is intentionally operated by hand to break the repetitiveness of the input motion of the operator's fingers to reduce the incidence of the carpal tunnel syndrome (CTS). In another embodiment, the document holder is activated by an electrical motor.

After the workstation module is properly adjusted to fit the operator's ergonomic dimensions, the operator is ready to type in a relaxed manner, without fear of being in a postural risk or being affected by the carpal tunnel syndrome. During the typing operation, the operator's hands, forearms, wrists and palms are fully supported avoiding tensions transmitted to the operator's neck and back, his wrists are resting at the edge of the telescoping sub-tray letting his fingers drop and actuate naturally over the QWERTY keys; his dominant arm moves swiftly from typing the keyboard keys to operating the mouse. The mouse is positioned next to his torso, which he grabs in a natural bio-mechanical "embracing" movement that requires from him only to rotate slightly his dominant forearms over his elbow, thus avoiding the need to lift his entire hand to grab the mouse causing a postural risk, as common in prior art.

Thus even an inexperienced typist can type over the workstation module without having fear of the CTS syndrome.
In addition, the improved positioning of the workstation module, while bringing the operator's forearms and the keyboard closer to

his torso, allows him to take distance from the monitor screen, resulting in reduced eye strain and an easier focus of eye sight. Also, a better eye-hand coordination is achieved with less negative effects from the monitor's radiation. As a consequence, a more comfortable positioning of the operator in a workstation that avoids the incidence of CTS provides the mental and emotional wellbeing, will promote a better and more productive work environment.

In summary, the present invention is an improvement over devices now in use and known in prior art. It is novel and satisfies a long unmet need for an easily and inexpensively manufactured universal typing workstation module which can be used by amateur or professional operator alike, a device that integrates existing keyboards and mice, that requires a minimum of dexterity and skill to use, that is adjustable to the ergonomic dimensions of the user, avoids the acute problems associated with carpal tunnel syndrome and the postural risk of operating awkwardly positioned mice, and finally a device that offers an optional document reader that not only improves the efficiency of data input but also contributes to the reduction of the incidence of CTS.

The improvement comprising the combination of all above means to extend substantially horizontally forearm and wrist supports toward the operator to a sufficient extent that it maintains proper forearm and wrist angle during keyboard use, an improvement in the telescoping means for adjustment the length of the workstation module to fit the length of the operator's foreams, the adjustment of the height and slope angle of the keyboard tray, the natural bio-mechanical position of the mouse and the prime location of the document holder.

In preferred embodiments, the typing workstation assembly is held in position relative to a working surface, such as a desk, by an articulated arm arrangement which slidingly moves said workstation module from a storage position under a desk to a working position, in front of the operator's torso.

In other preferred embodiments, the typing workstation assembly moves from a first position to a second position, said positions selected from the group of positions wherein the workstation is located besides a working surface, is rotating around a pole-type arrangement, is located below or above a working surface.

In other embodiments, the typing workstation assembly is attached to the body of a standing user, by one or plural means comprising straps to the shoulders and or to the belt.

In other embodiments, the typing workstation assembly is

positioned over the laps of a seated user.

In another preferred embodiment, the typing workstation assembly is held in position relative to a working surface by an articulated arm arrangement which moves said workstation module from a lower storage position from under said working surface to an upper adjustable working position around the torso of a user.

In yet another preferred embodiment, a typing workstation assembly is held in working position by means of an elongated U-shaped engageable clamp that holds said typing workstation assembly in place in relation to a working surface for a seated operator or a standing operator, and optionally positions the workstation module in one of the selected positions from the group comprising a position over said working surface, at the same planar level, beside the working surface or below said working surface.

In the preferred embodiments, the upper planar surface of the typing workstation module as well as the lower telescoping sub-tray are covered with resilient material.

In one embodiment, the typing workstation module comprises a magnifying glass attachment for easy reading of keys of keyboards.

In another embodiment, the typing workstation module comprises a set of mirrors and prisms positioned to improve the viewing of either the input or of the output operations or a combination of both input and output of said workstation module.

In the preferred embodiments, the typing workstation module has a centrally located cut-out in its upper planar member to position a detached mouse. In such embodiments the bottom-surface of said mouse is laying over the telescoping sub-tray level, in a "ready-for-embracing" position in relation to the torso. In such a generally central position for the mouse, the device annuls repeated postural risks associated with the need to lift one's entire arm to operate a mouse, a common problem in prior art. A short rotational move of the forearm over the elbow is sufficient to pass from the position of the keys to the position of the mouse. Preferably, said mouse location is centrally located allowing to use the same workstation module for both right-handed and left-handed operators.

In the preferred embodiments, the centrally positioned cut-out arrangement provided for the mouse places the mouse in the lower plane of the telescoping sub-tray with the forearm and the wrist being supported at a higher plane, thus reducing stress in the tendons of the fingers.

In other embodiments, one or a combination of the novel elements constituting the workstation module are incorporated into

devices from the group comprising of, but not limited to, control panel keyboards in general such as for air traffic control keyboards, switchboards, cash registers, fast food menu registers, steno keyboards, calculators, computer desktops, furniture desks, typing tutors, typewriters and musical instrument keyboards, piano and the like, electronic control boards and communication panels for paraplegic patients, in bed or in wheelchair, having fixed or portable keyboards, may be fitted or re-fitted to incorporate one or a combination of the forearm resting device, the reverse slope tray arrangement, the relative central positioning of the mouse and of he document holder as taught by the present invention.

In other embodiments, the typing workstation module is a one-piece manufactured platform having a fixed standard length section for supporting forearms and wrists and incorporating a mouse positioned at a central position substantially close to the torso, said platform prolongation becoming a standard reverse slope tray, wherein the keyboard positioning is pre-set at a proper height and at a proper tilt angle; said workstation module has engageable means to be held in position below a desk; said platform has also a holder means for positioning a document holder.

In another embodiment of the invention, the configuration provided by the typing workstation module creates a premium location over the planar platform and over the telescoping sub-tray for web browsing or to place directly over it reading material to be inputted, in the form of text or of drawing, in front of the typist's eyes, in a natural 'embracing' position between his two arms.

In the preferred embodiments of the invention, the typing material to be read may be optionally placed into a document holder. Two types of document holders may be optionally selected to operate with the workstation. A first U-shaped model, that operates like a manual scanner with an angularly adjustable oblique cover, and a second flat type traditional frame. Depending on the type of support system provided to each document holder, the flat type document holder may assume two separate position relative to the workstation while the U-shaped document holder assumes one single prefered location, while it is designed to be angularly adjustable.

The single position assumed by the U-shaped document holder for viewing a batch of document is an elevated spatial location near the torso over the workstation module, wherein the bottom part of the document holder frame is kept higher than the line of sight of the operator when viewing the keyboard and the top part is kept below

the line of sight when viewing the monitor.

The two positions assumed for the flat type document holder frame to be placed over the typing workstation module comprises one location closer and the other slightly away from the operator. For the closer position, the document holder has a mounting similar to the U-shaped document holder. For the document holder positioned slightly away, the mounting is incorporated a part of a frame starting slightly above the bottom-front of the keyboard tray to a line of sight slightly below the monitor.

In one embodiment the document holder flat type frame is tiltable angularly to clear views to the keyboard keys and to the monitor and adjust to the position of the user.

In yet another embodiment the U-shaped document holder is clamped to the front of a working surface, between the workstation module and the monitor.

In yet another embodiment of the typing workstation module, a mouse of the group comprising a thumb operated mouse or a finger operated mouse, a track-ball mouse, a touch-sensitive mouse, or any mouse of the like with its respective pad, is incorporated into said station, as integral part of either the upper planar member or of the lower telescoping sub-tray assembly with its function buttons either positioned around the mouse assembly or at the front edge of the telescoping sub-tray, close to the mouse.

In the preferred embodiments, the general lateral positioning of the forearm support cutout and that of the mouse cutout in relation to the workstation module is preferably off-centered toward the left side (for right-handed operators). This arrangement provides more room for centering QWERTY keyboards to wrist positions to avoid the incidence of ulnar and radial deviation (the keyboard calculator causing this ulnar deviation and forcing operators to seat sideways). The cutout provided for the mouse operating over the telescoping sub-tray is large enough for adjustment to the length of the forearm while keeping the position of the elbow almost unchanged.

In another embodiment said telescoping sub-tray is used as an extendable planar surface for placing various devices in front of the user's eyes, devices such as computer input and output devices, joysticks, computer games, 3D digitizers, video cameras or the like that in prior art required the removal or displacement of the keyboard. Said telescoping sub-tray provides also the possibility to perform any and all writing, reading, drawing imputing and computer operations from a common central position.

In other preferred embodiments, the typing workstation telescoping sub-tray incorporates one or a combination of a thumb operated mouse, an electronic notepad, a flip-on video screen, or any other electronic components and games that may enhance the use of such a premium location in front of a computer screen.

As already noted, a typing workstation module having a forearm and a wrist support, a telescoping tray and an adjustable slope keyboard tray with space for a natural bio-mechanical positioning of the mouse and a prime location for a copy holder has certain advantages. This invention allows those advantages to be more fully realized. In addition, with a keyboard tray support or apparatus designed to provide the proper angle and degree of support required to substantially lessen the incidence of CTS and room for lateral centering of QWERTY keyboards, concerns over compatibility among the large variety of keyboard products and of mouses is alleviated with introduction of this invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a full perspective view of a preferred improved typing workstation module in accordance with the invention showing the three major elements of the workstation module. In the background is the arm mechanism that holds the workstation module in position relative to a working surface.

FIG. 2 is a side-perspective view of the preferred embodiment of the workstation module clamped in position under a working surface with the operator's forearm and wrist in a typing position.

FIG. 3 is a side view of a seated operator typing over the workstation module and showing that the positioning of the document reader of the invention does not obstruct lines of sight to the keyboard or to an underdesk located monitor.

FIG. 4 is a side-perspective view of a seated operator typing over a workstation module clamped to a desk.

FIG. 5 is a side-perspective view of a standing operator typing over a portable workstation module that is strapped to his shoulders.

FIG. 6 shows a flat-type arm linkage that holds the adjustable slope keyboard tray to the telescoping sub-tray and a lockable slidable holding means.

FIG. 7 shows a tubular-type arm linkage that holds the adjustable slope keyboard tray to the telescoping sub-tray and a lockable slidable holding means.

FIG. 8 is a side-perspective view of a standing pole holding a workstation module that is moveable sideways.

FIG. 9 is the side-perspective view of a document reader.

FIG. 10 is a back-perspective view of a manually operated document reader.

FIG. 11 is a full-perspective view of a manually operated document reader having an angularly adjustable support means.

FIG. 12 is a schematic view of **a** sliding-type arm mechanism, roller mounted, holding the workstation module in position relative to a working surface.

FIG. 13 is a perspective-cut view of the railing mechanism of **FIG. 12**.

FIG. 14 is a schematic view of another sliding-type arm mechanism, pin mounted, holding the workstation module in position relative to a working surface.

FIG. 15 is a perspective-cut view of the railing mechanism of **FIG. 14**.

FIG. 16 shows a workstation module that swings and assumes two different working positions.

FIG. 17 is a perspective-cut view of the railing mechanism of **FIG. 16**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The drawing **FIG. 1** best illustrates the preferred embodiments of a typing workstation module **10** comprised of a generally planar elongated box-type housing **12** cushioned by a resilient material **14** and two holes **13** and **15** for holding a document reader. The workstation housing **12** may be made using a variety of materials. Preferred materials include rigid plastics with high-impact strength whereas the resilient material **14** may be polyurethane.

A shaped portion extends substantially toward the operator to allow the torso of the user to be moveable within a first cutout **17** while providing comfortable support to the forearms **102** of the user. The device provides a second cutout space **19** for positioning, in close proximity to the user's torso, an input device such as a mouse **80** in a bio-mechanically 'embracing' position that alleviates the incidence of extended arm discomfort and 'mouse shoulder' common in prior art.

The two shaped cutouts **17** and **19** are generally off-centered

relative to the housing **12** to compensate with the asymetrical position of the QWERTY keys **62** caused by the asymetrical position of the calculator **64** in a standard keyboard **60**, said asymetrical positions causing ulnar and radial deviation when hands are not positioned properly. A telescoping sub-tray **16** cushioned by a resilient material **18** is slidably moveable from inside the box-type housing **12** and allows to adjust the length of the workstation module 10 to the forearms length of an operator **102**. Said telescoping sub-tray's front-end terminated with a rounded curve 20 that supports the palm **104** of the operator.

Two eye-type pivotable holding means **23** and **25** affixed to the bottom sides of the adjustable slope keyboard tray **22**, one at each side, serve to hold in position the keyboard **60** in relation to the telescoping sub-tray **16**. Said holding means **23** and **25** are positioned on the longest axis passing through the center of gravity of the keyboard tray **22** when loaded with a keyboard **60**. A pair of elongated pivotable arm assembly **70**, identical for each side, with numbering of parts only identified for the right side of the workstation module **10**. Said arm assembly comprised of two arm linkages **74** Each pivotable at the front-end of the rounded-shape **20** of the telescoping sub-tray **16** round hole **72**, said arm assembly **70** comprised of arm linkage **74**, said arm linkage **74** extending longitudinally to hold in position the keyboard tray **22** at holding means **23** and **25**, with said arm linkage **74** lockable by bolting means **76** and **79**. Said arm assembly **70** establishing the general positioning of the adjustable slope tray **22** in relation to the surface of the telescoping tray **18**. The pivotable arm linkage **74** has inside track means **77** engaging pivotably and slidingly via a lockable means **78** and a spacer **81**, the holding means **23** affixed at each side of the bottom center of said adjustable slope tray **22**.

The three cooperating elements comprising the pivotably slidably lockable means **79**, the holding means **23** and the linking arm **74** are lockable together in position by the bolt **76**, while the other lockable part of the samearm linkage **74** locks together with the holding means **21** affixed to the rounded-shaped **20** of the telescoping sub-tray **16**, by bolting means **78** and a spacer **81**. This general arm assembly **70** provides infinitely adjustable lockable tilt angles and height positioning to said adjustable slope tray **22**, with the preferred position being in a reverse slope while operating with the keyboard **23**.

In other preferred embodiments, the typing workstation module **10** is a one-piece manufactured platform **16** having a fixed standard length section for supporting forearms and wrists and incorporating a mouse **80** positioned at a central position **19** substantially close to the torso, said platform prolongation becoming a standard reverse slope tray **24**, wherein the keyboard positioning **60** is pre-set at a proper height and at a proper tilt angle; said workstation module has engageable means **40** to be held in position below a desk; said platform has also a holder means **13** and **15** for positioning a document holder **200**.

In highly preferred embodiments, the typing workstation module **10** has an adjustable slope tray member **24** that provides enough space for lateral adjustment of the keyboard **60** so as to able the user to center the asymetrical QWERTY keys **62** between the user's forearms and wrists to prevent the incidence of ulnar and radial deviation.

The telescoping sub-tray **16** is usable as an extendable planar surface for web browsing, for placing various devices in front of the user's eyes, devices such as computer input and output devices, joysticks, computer games, 3D digitizers, video cameras or the like. Said telescoping sub-tray provides also the possibility to perform any and all writing, reading, drawing imputing and computer operations from a common central position.

In other preferred embodiments, the telescoping sub-tray **16** incorporates one or a combination of a thumb operated mouse **80** having function buttons **82** at its front-end, an electronic notepad, a flip-on video screen, or other electronic components and games that enhance the use of such a premium location in front of a computer screen.

The drawing FIG. **2** best illustrates the preferred embodiment of the holding lever mechanism **40** that holds and moves the workstation module **10** from a storage position under a desk **50** to a working position close to the torso of a user.

A working surfaces may be selected from the group, but not limited to, a desktop **50**, a table **50**, a standing counter **52**, a self-standing pole **54**, a moveable seat, a moveable bed, a moveable wheelchair, against a human body 100, over the laps of a human body or any surface of the like.

In highly preferred embodiments, as best shown in **FIG. 2** the lever mechanism **40** is generally comprised of a pair of arms, an upper part clamped to the front side of a working surface, and a lower part extending from under that working surface to the box-type

housing **12** that holds generally the workstation module **10** in place. To best describe the lever mechanism **40**, only one side of the arm lever system will be described, the other side having identical mirror components. The preferred embodiment for the lever mechanism **40** is comprised of an elongated L-shaped horizontal telescoping U-beam composed of **3** parts, a first elongated U-beam arrangement **36** holding the box-type housing **12**, said U-beam **36** sliding inside a second elongated beam-type arrangement **38** and a short arm **42** perpendicular to the beam **38** terminating with a first rolling means **43** rollable against reverse bottom side of working surface **50**. To counterweight the weight of the workstation module **10** and the weight of the arms **100**, a leverage system **40** held in position by a C-type clamp arrangement **39** is provided. Said arm mechanism arrangement 40 is rapidly deployable. The C-type clamp **39** tightened by the bolt system **48** is clamped to the front of the working surface **50**, said clamp system holding a short lever **46** affixed to a rolling means **44**.

The beam-type arrangement **38** rolls over the roller **44**, said roller affixed to the clamped arm **46**, while said mechanism arrangement **40** is counter-balanced by the rolling means **43** against the bottom surface of the working surface **50**. Said lever mechanism providing a rapid deployable means for attaching a sliding workstation module **10** to a working surface **50**.

In other embodiments, an arm mechanism **40** holding the workstation module **10** in a relative position to a working surface **50**, have roller mounted **43** and **44** sliding beams **47** and **49** cooperating together as shown in **FIG. 7** and **FIG. 8**. In said embodiments the track means **49** is mounted by screw means **56** on a vertical element **54** of a working surface.

In still other embodiments of an arm mechanism **40** holding the workstation module **10** in a relative position to a working surface **50**, the arms have pin and roller mounted means **51** and **52** sliding inside track means of the type shown in **FIG. 9** and **FIG. 10**. In these embodiments, the track means **54** is mounted under the working surface 50 by screw means **56**.

In yet other embodiments of an arm mechanism holding the workstation module **10** in a relative position to a working surface **50**, the arm mechanism **40** swings from a lower working position to a higher working position as shown in **FIG. 11** and **FIG. 12**. The arm mechanism **40** is clamped to the working surface **50** by clamping means and is rapidly deployable. The weight of the workstation module **10**

and of the arms **100** of the operator is counterbalanced by the lever system **58** which contacts the bottom of the working surface 50 by self adjustable contact means **59**.

In the preferred embodiments, the workstation module **10** is attached to a working surface to be used in a seated position as shown in **FIG. 4**. In other preferred embodiments, the workstation module **10** is attached to a working surface, such as a standing counter, to be used in a standing position. In other embodiments, the workstation module **10** is strapped to the body **100** of a user by strap means **106** and said workstation is used in a standing position as shown in **FIG. 5**. In yet other embodiments, the workstation module **10** is used in a sleeping position.

In the preferred embodiments of the invention, the workstation module **10** has mounting means **13** and **15** for mounting a document reader **200**. The document reader **200** comprises a U-shaped housing having a horizontal lower input tray **202**, a generally horizontal upper discharge tray **204**, a semi-cylindrical transparent window **206** connecting said input tray **202** to said discharge tray **204**. An elongated opening **208** is provided at mid-section of said window to let exit documents onto said discharging tray. An elongated rotatable roller **210**, concentrically positioned within said semi-cylindrical window **206** has means to engage frictionally such as by tentacle means **220** a document **212** picked in the lower input tray **202** and slidingly display it against the window **206** and the cover **216**. An angularly variable transparent dis-mountable cover **216** having side track means **218** positioned under said cover **216** provides support means to hold for a longer distance in display a desired document before said document falls under its gravity weight into the discharge tray **204**. The rotational movement of the roller **210** that frictionally slides the document **212** forward against the back of the semi-cylindrical front window **206** and the cover **216** is intentionally actuated by manual means using the manual lever **222**, similar to the operation of an old type writer, so as to break the repetitive motion imposed by data input contributing to the incidence of the carpal tunnel syndrome (CTS).

In other preferred embodiments, The rotational movement of the roller **210** that frictionally slides the document **212** forward against the back of the semi-cylindrical front window **206** and the cover **216** is done by electrical means.

In the preferred embodiments, the document reader **200** is able

to display a batch of plural documents **212** on a continuous feeding basis at a speed controlled by the user, using the manual lever **222** or a hand or foot operated switch. Such a feature is useful to people requiring minimal physical input such as for, but not restricted to, computer programmers, paraplegic persons, surgeons during operations or people of the like.

In yet other embodiments of the invention, the document reader **200** has support holding means **224** for mounting said document reader to a surface selected from the group comprising a typing workstation module **10**, a working surface **50** or a monitor **104**, said document reader having angularly and height adjustable supporting means **226** to not obstruct views to the keyboard **10** and to the monitor **104**.

Acceptable material choices for these embodiments, as well as for the various components thereof, will be apparent to those skilled in the art who are made aware of this invention.

While the principles of this invention have been described in connection with specific embodiments, it should be understood clearly that these descriptions are made only by way of example and are not intended to limit the scope of the invention. For example, both the housing and overlay embodiments of this invention may include cushioning, padding, or the like on those portions thereof directly in contact with the user's forearms and wrists. Likewise, it is contemplated that the principles of this invention may be applied to a wide variety of computer, typewriter, and keyboard accessories, including but not limited to portable lap top and notebook personal computers and mouse components.

CLAIMS:

1.A typing workstation module (10) comprising
a generally box-type upper planar member with shaped portion extending substantially toward the operator to allow the torso of a user (100) to be moveable within the cutout;
a telescoping sub-tray member (16) cooperating with said planar member;
a slidingly and angularly adjustable slope tray member (24) having means to cooperate with said telescoping sub-tray member (16) and
a bio-mechanically sound position for positioning an input device close to the user's torso.

2.A typing workstation module (10) according to claim 1 wherein the workstation module (10) prevents the incidence of ulnar and radial deviation by off-centering asymetrically the shaped cutout portion extending substantially toward the operator to a distance varying substantially between 0.1 inch to 4 inches towards the opposite direction of the dominant hand.

3.A typing workstation module (10) comprising a generally box-type planar member with shaped portion extending substantially toward an operator according to claim 1 wherein the length of the forearm support may vary substantially between 8 inches to 14 inches.

4.A typing workstation module (10) comprising a generally box-type planar member with shaped portion extending substantially toward an operator according to claim 1 wherein the length of the forearm support may vary substantially between 10 inches to 12 inches.

5.A typing workstation module (10) comprising a generally upper planar member according to claim 1 wherein a centrally located arc-shaped cutout is provided in said upper planar member at an opposite distal-end to the torso of the user (100) for providing space for positioning an input device.

6.A bio-mechanically sound position for positioning an input device according to claim 5 wherein an input device selected from the group, but not restricted to, a mouse, a touch pad, a joystick or the like, is resting on the lower plane of the telescoping sub-tray.

7.A typing workstation module (10) comprising a generally box-type planar member according to claim 1 wherein holding means are provided in said workstation module (10) to hold one or a combination of input or output devices, such as, but not restricted to, a document reader, a display screen, a video game, a camera, a digital or analog device, a fiber optical device, joysticks or devices of the like.

8.The device of claim 1 wherein the upper planar member of the box-

type planar member and the telescoping sub-tray member (16) are cushioned with resilient means.

9.The device of claim 1 wherein the upper planar member of the box-type planar member and the telescoping sub-tray member (16) are cushioned with polyurethane.

10. A typing workstation module (10) comprising a generally box-type planar member according to claim 1 wherein holding means are provided to the workstation module (10) for moving said workstation module (10) in relation to a working surface from a first position to a second position, with one or a combination of said positions selected from the group, but not restricted to, a storage position, a working position on top of a working surface, a working position in front, a working position behind a working surface, a working position under a working surface, a working position besides a working surface.

11. A typing workstation module (10) according to claim 1 wherein the workstation module (10) is used in one or a combination of positions selected from the group, but not restricted to, a seated position, a standing position or a sleeping position.

12. The workstation module (10) holding means attached to the planar member for moving a typing workstation module (10) from a first position to a second position according to **claim 8** wherein said holding means provide motion means to said workstation module (10) by means of one or a combination of motions selected from the group comprising sliding motion, pivoting motion, rotating motion, swinging motion or motions of the like.

13. A typing workstation module (10) comprising a telescoping sub-tray member (16) cooperating with first upper planar member according to claim 1 wherein said telescoping sub-tray moves slidingly from under said upper planar member fore and aft.

14. A workstation module (10) holding lever mechanism comprising

a pair of elongated L-shaped horizontal telescoping U-beam arms providing sliding means to the workstation module (10), said U-beam arms distal-end each terminating with a first rolling means rollable against reverse side of working surface,a pair of short vertical arms, each top proximal-end affixed to a clamping device clamped to the front-end of said working surface and each bottom distal-end affixed rigidly to a rolling means,

weight of said workstation supported by rollers of said clamping device.

Said lever mechanism providing a rapid deployable means for

attaching a sliding workstation module (10) to a working surface.

15. A typing workstation module (10) comprising a telescoping sub-tray member (16) according to claim 1 wherein the telescoping sub-tray provides space for positioning one or plural or a combination of input or output devices selected from the group comprising, but not restricted to, a document reader, a camera, a digital or analog device, a fiber optic device, a screen, joysticks, a video game display, a microphone, or any input and/or output devices of the like.

16. A typing workstation module (10) comprising a telescoping sub-tray member (16) according to claim 1 wherein said workstation module (10) provides the possibility to perform any and all writing, reading, drawing imputing, digital imputing and computer operations from a common central position.

17. A typing workstation module (10) comprising a slidingly and angularly adjustable slope tray member (24) according to claim 1 wherein said tray member (24) is an infinitely adjustable stand for supporting a forwardly-sloping keyboard in a reversely sloped position.

18. A typing workstation module (10) according to claim 1 having an adjustable slope tray for supporting a keyboard of the group comprising a PC computer, a portable computer, a laptop computer, a musical instrument or keyboards of the like.

19. A typing workstation module (10) comprising

a one-piece manufactured platform of standard length for supporting forearms and wrists

an incorporated mouse centrally located in a bio-mechanically sound position

an adjustable pre-set reverse slope tray,

engageable means to hold said module (10) in position in relation to a working surface

holding means to position a document reader.

20. A typing workstation module (10) according to claim 1 having one or plural members that are partially inflatable.

21. A typing workstation module (10) according to claim 1 that is mountable over the laps of a seated operator.

22. A typing workstation module (10) according to claim 1 wherein a keyboard tray is infinitely adjustable by means of an arm assembly comprising two elongated arm linkages, pivoting one at each side of a telescoping sub-tray front-end, said arm linkages having inside track means pivotably and slidingly engaging a holding means affixed to each bottom side, said holding means positioned on the longest

axis passing through the center of gravity of said keyboard tray when loaded with a keyboard

23. A typing workstation module (10) comprising an adjustable slope tray according to claim 1 wherein a keyboard placed in said slope tray is adjustable downwardly in relation to the surface of the telescoping sub-tray within a variable distance varying substantially between a neutral position to a distance of 3 inches below the surface of said telescoping sub-tray.

24. A typing workstation module (10) comprising a adjustable slope tray according to claim 1 wherein a keyboard placed in said slope tray is angularly variable between 30° downward up to 30° upward in relation to the surface of said workstation telescoping sub-tray.

25. A typing workstation module (10) comprising an adjustable slope tray according to claim 1 wherein said workstation module (10) provides an adjustable wrist support angulation varying preferably from neutral up to 25 of flexion for metacarpal.

26. A typing workstation module (10) comprising an adjustable slope tray according to claim 1 wherein a keyboard placed in said adjustable slope tray, while said keyboard assuming any desired tilt angle, is moveable frontwardly away from said workstation telescoping sub-tray substantially 3 inches and moveable backwardly under said workstation telescoping sub-tray substantially 2 inches.

27. A typing workstation module (10) comprising a bio-mechanically sound position for positioning an input device close to the user's torso according to claim 1 wherein input devices are selected from the group of detached input devices, from devices that are built-in into the upper planar member of said workstation module (10) or from devices built-in into the lower telescoping sub-tray.

28. A typing workstation module (10) comprising an adjustable slope tray member (24) according to claim 1 wherein a keyboard positioned over said reverse tray is laterally adjustable so as to able the user (100) to center the QWERTY keyboard keys between said user's forearms and wrists.

29. A typing workstation module (10) according to claim 1 wherein said workstation module (10) stands alone by its own support means over a working surface.

30. A typing workstation module (10) according to claim 1 wherein said apparatus and method of use reduces the incidence of carpal tunnel syndrome (CTS) and alleviates the carpal tunnel compression.

31. A typing workstation module (10) comprising a generally upper planar member having a centrally located arc-shaped cutout in said upper planar member for positioning an input device according to

claim 3 wherein the combination of said cutout in said workstation module (10) provides a bio-mechanically advantageous apparatus and method for alleviating the incidence of extended arm discomfort and 'mouse shoulder'.

32. A typing workstation module (10) according to claim 1 causing reduced amount of strain in the eyes of the user (100) by positioning said user (100) away from the monitor screen and by providing easier focus of eye sight, better eye-hand coordination.

33. A typing workstation module (10) according to claim 1 that positions the user (100) closer to the keyboard and to the mouse eliminating stoop position and reducing load placed upon shoulders and the lumbar spine.

34. A typing workstation module (10) according to claim 1 that uses the frame of a document holder mounted to said workstation module (10) to place a magnifier or a lighting device for best viewing of keyboard keys.

35. A typing workstation module (10) according to claim 1 having an adjustable slope keyboard tray that has an appropriate dimension for operating a hand-held type computing device over said keyboard tray.

36. A typing workstation module (10) according to claim 1 wherein said workstation module (10) is portable and attachable by straps to the operator's body, with said operator operating over said workstation module (10) in one or a combination of positions selected from the group of seated, sleeping or standing positions.

37. A typing workstation module (10) according to claim 1 which is cost-effective, easily manufactured and assembled, and immune to mechanical failure.

38. A document reader comprising:

a U-shaped housing having a horizontal lower input tray,

a generally horizontal upper discharge tray,

a semi-cylindrical transparent window cooperating between said input tray to said discharge tray,

an elongated opening at mid section of said window to let exit documents

an elongated rotatable roller, concentrically positioned within said semi-cylindrical window having means to engage frictionally said documents

means for a mechanism to move forward documents

means to support said document reader over a working surface.

39. A document reader according to claim 36 having an angularly variable transparent dismountable cover wherein side track means positioned under said cover provide support means to hold for a

longer distance in display a desired document before said document falls under its gravity weight into a discharge tray.

40. A document reader according to claim 36 wherein the use of said document reader requiring to break the repetitive motion imposed by data input reduces the incidence of CTS.

41. A document reader according to claim 36 that displays a batch of plural documents on a continuous feeding basis at a speed controlled by the user (100).

42. A document reader according to claim 36 that provides continuous display of reading documents to people requiring minimal physical input, said people selected from the group, but not restricted to, computer programmers, paraplegic persons, doctors during operations, mail readers, or people of the like.

43. A document reader according to claim 36 wherein the roller has elongated frictionally engageable brush-type tentacles.

44. A document reader according to claim 36 wherein the roller has a frictionally engageable conveyor system.

45. A document reader according to claim 36 wherein the rotational movement of the roller is achieved by manual means.

46. A document reader according to claim 36 wherein the rotational movement of the roller is achieved by an electrical motor means.

47. A document reader according to claim 36 which has adjustable supporting means for mounting said document reader to a surface selected from the group comprising a typing workstation module (10), a working surface, a monitor or devices of the like.

48. A typing workstation module (10) according to claim 1 which incorporates a planar document holder, said document holder having a frame that is variable in height and in tilt angle.

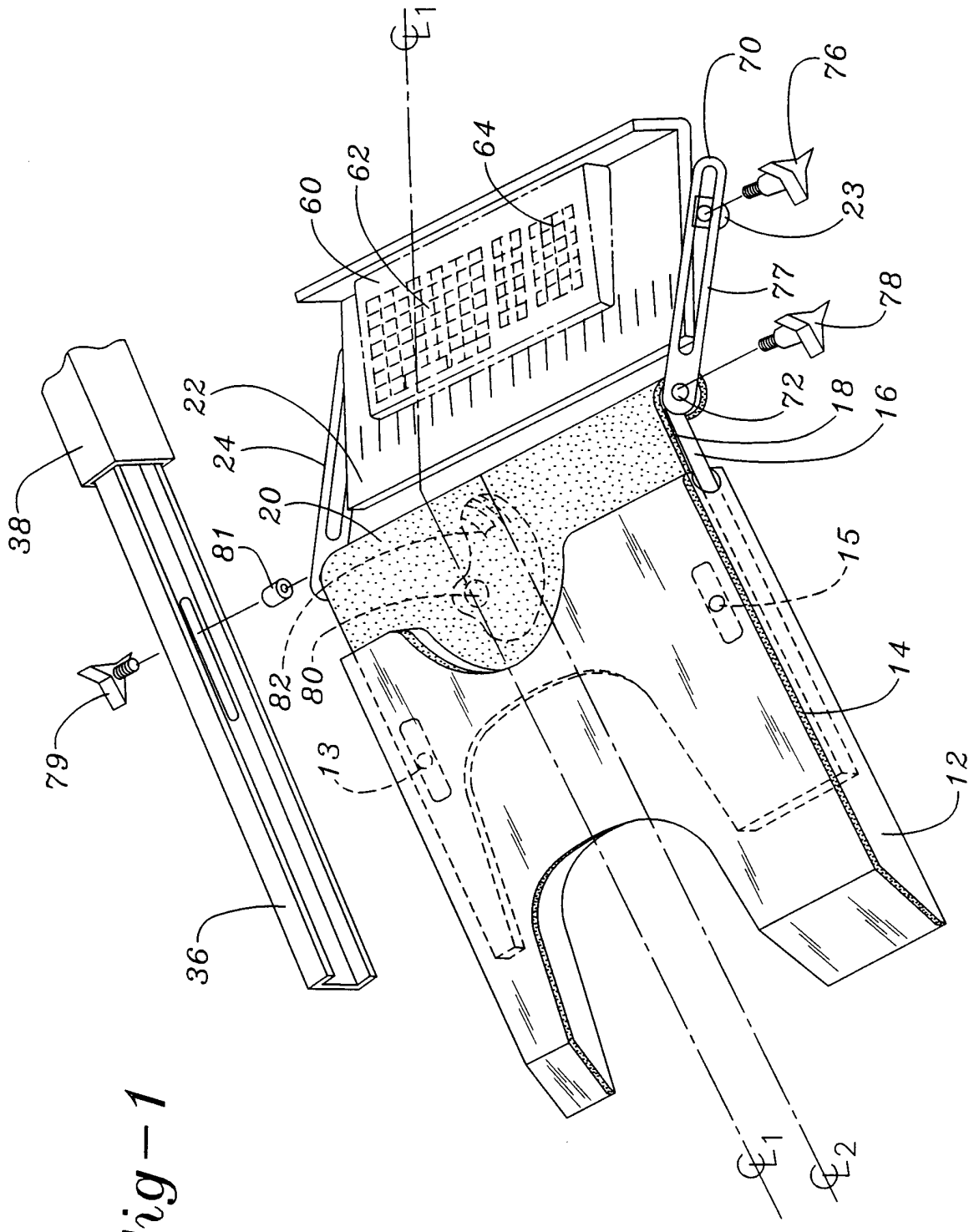
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Fig – 1

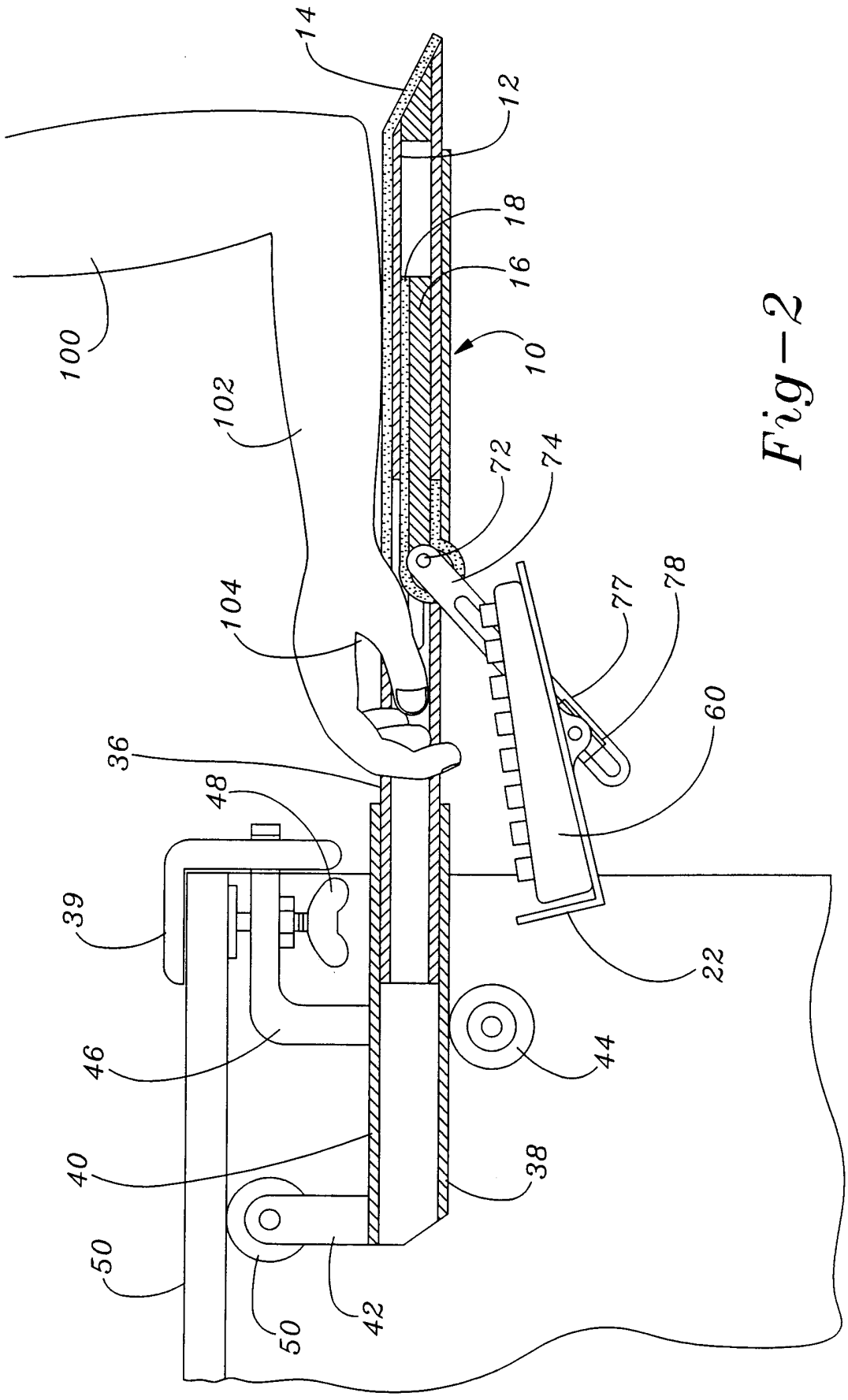
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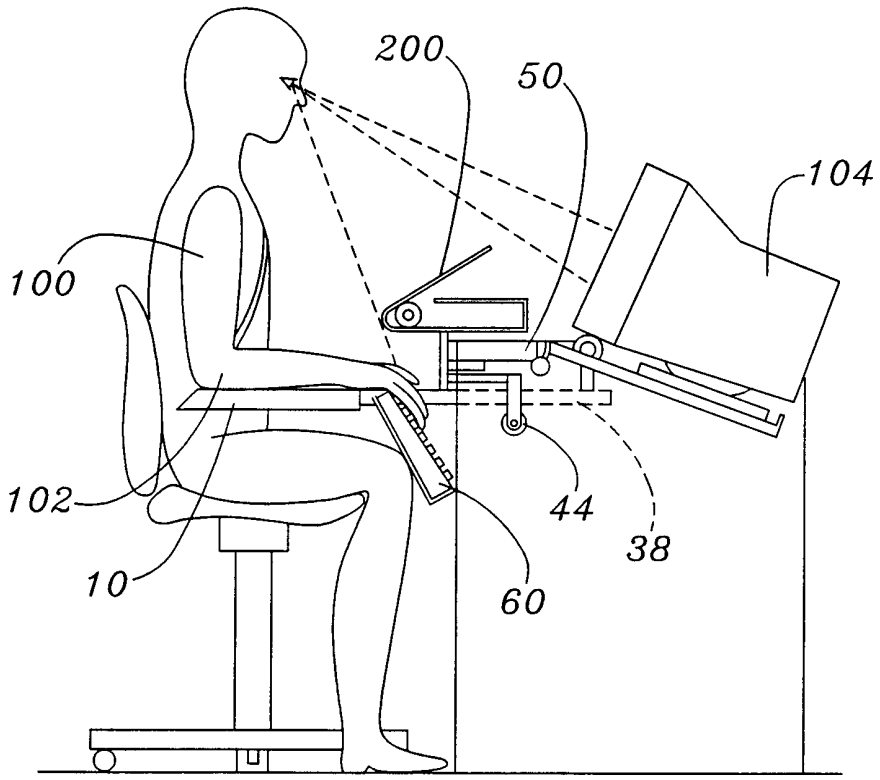
Fig-2

Fig-3



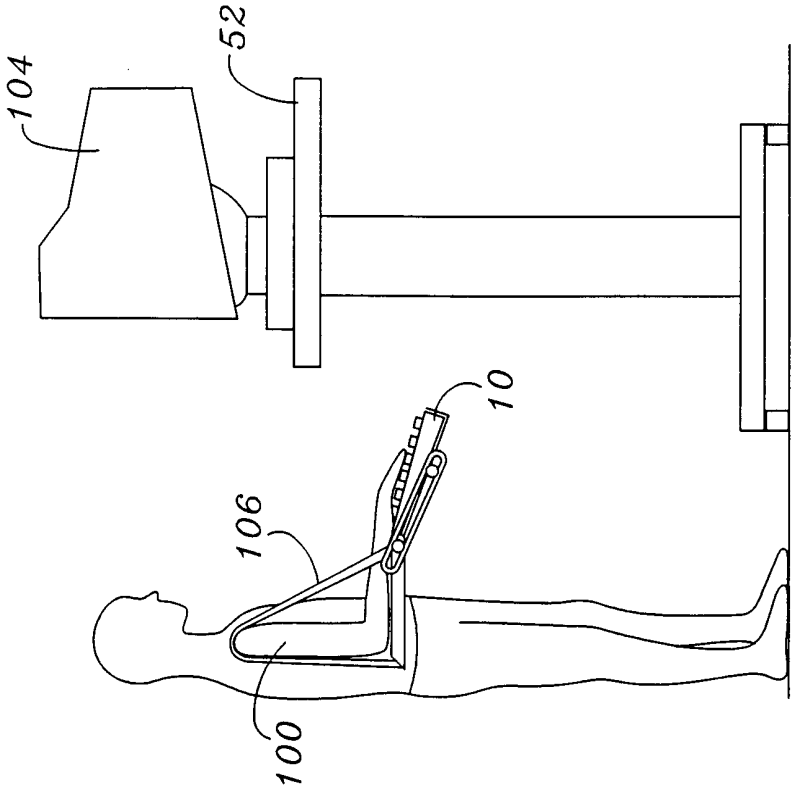


Fig-5

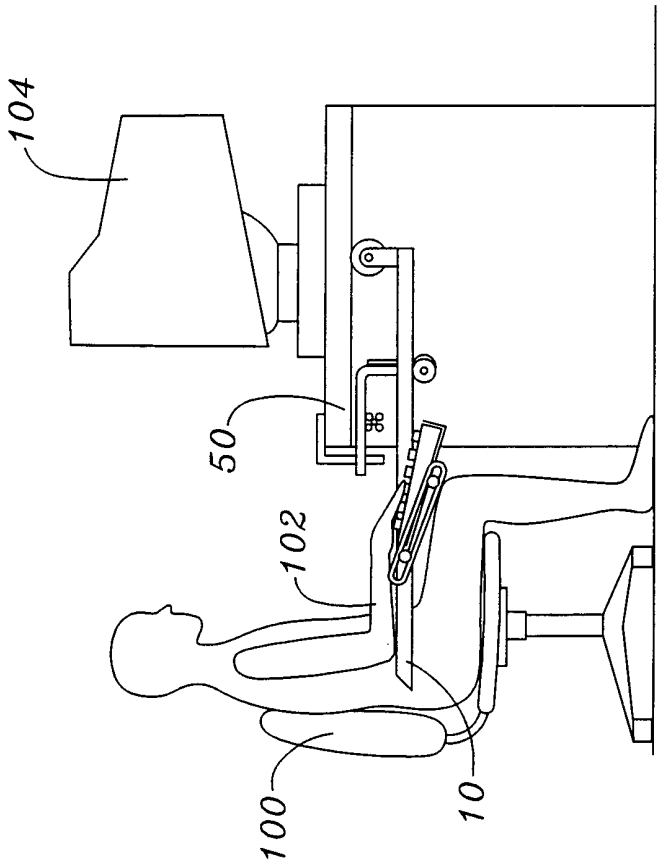


Fig-4

Fig-6

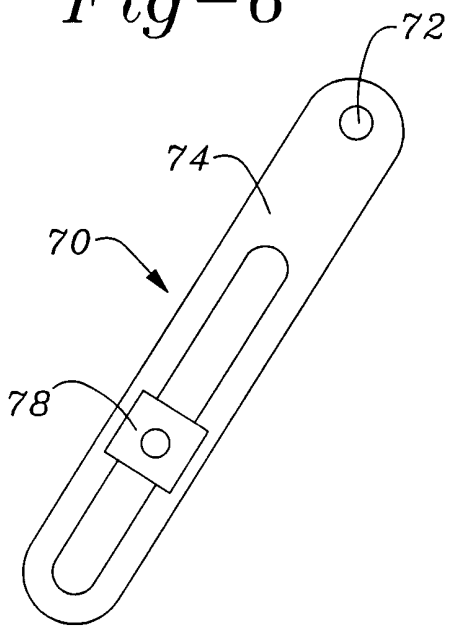


Fig-7

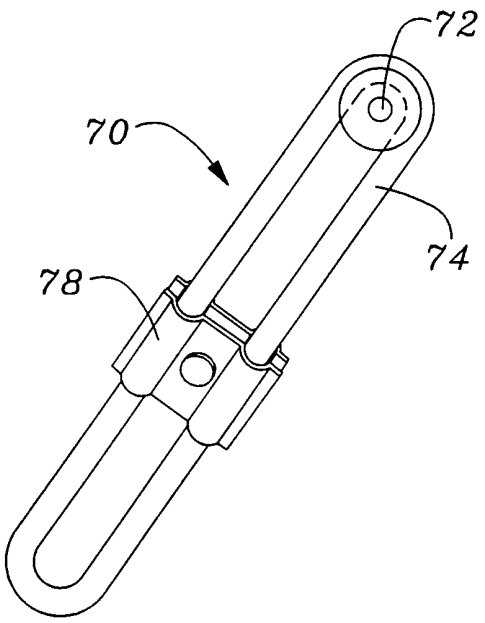


Fig-8

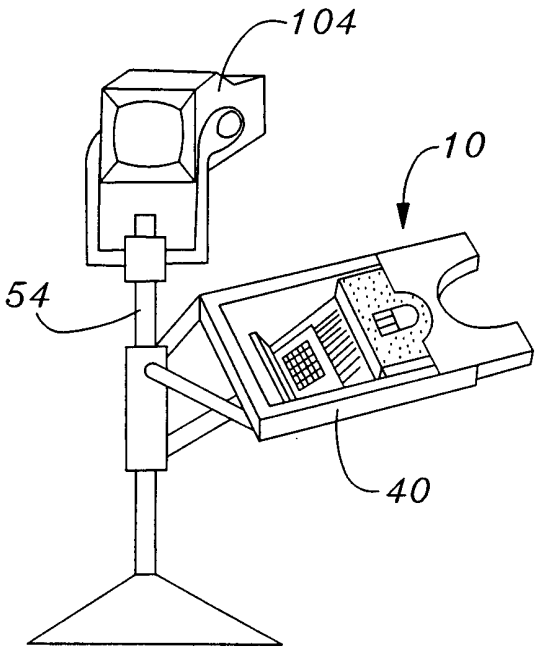


Fig-9

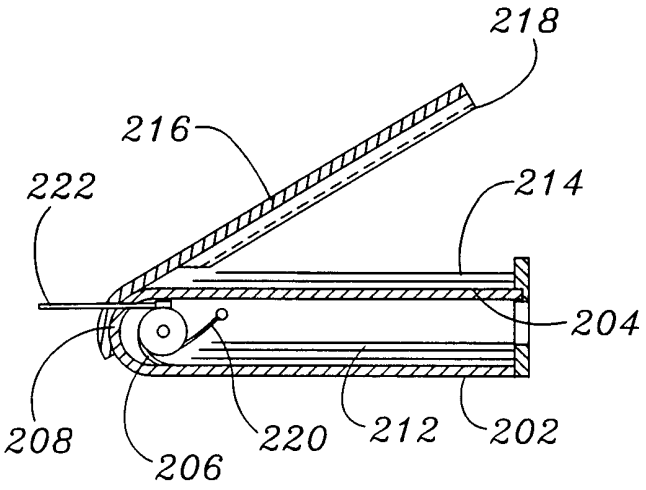


Fig-10

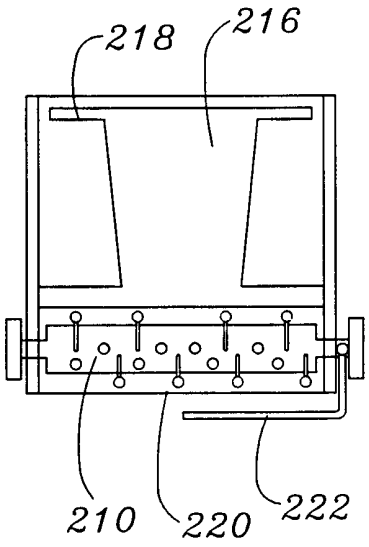


Fig-11

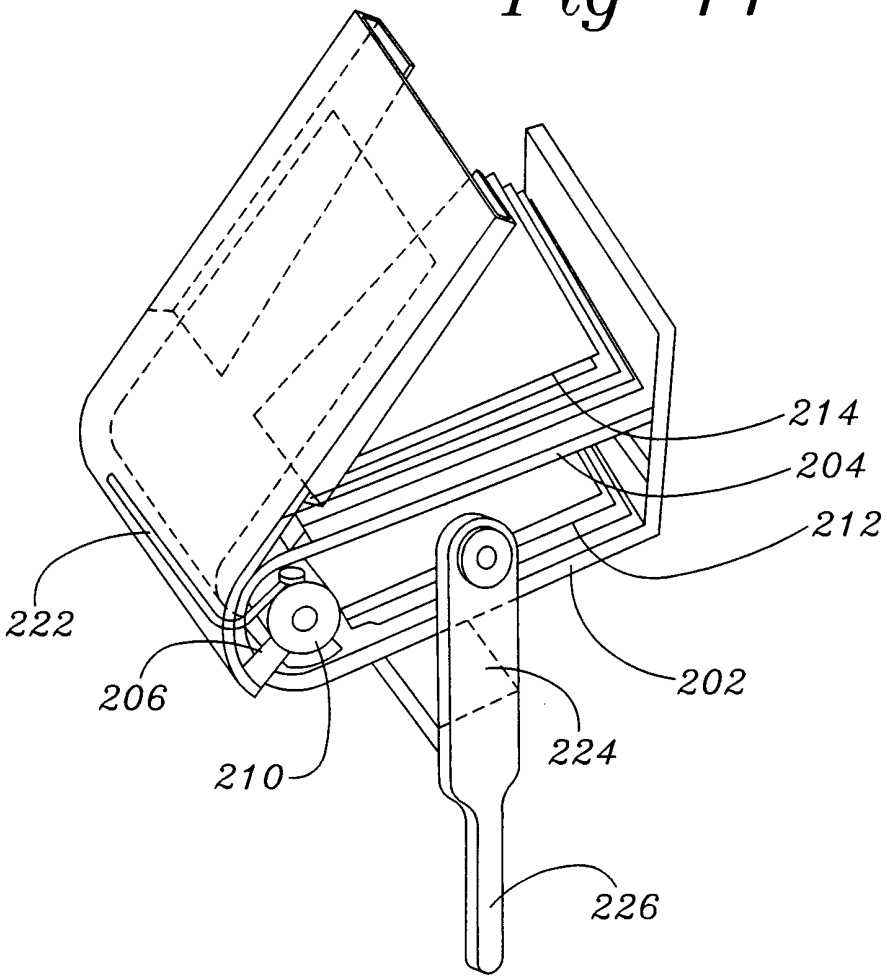


Fig-12

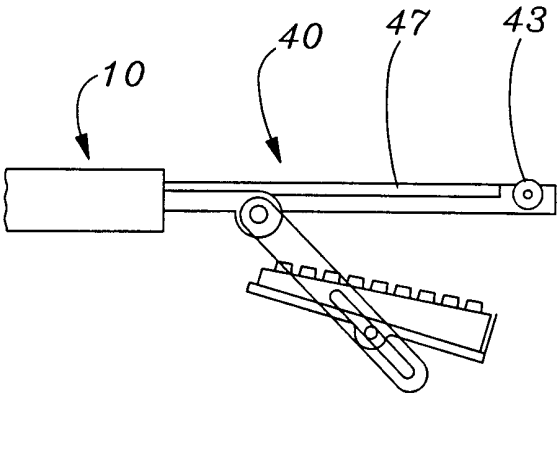


Fig-13

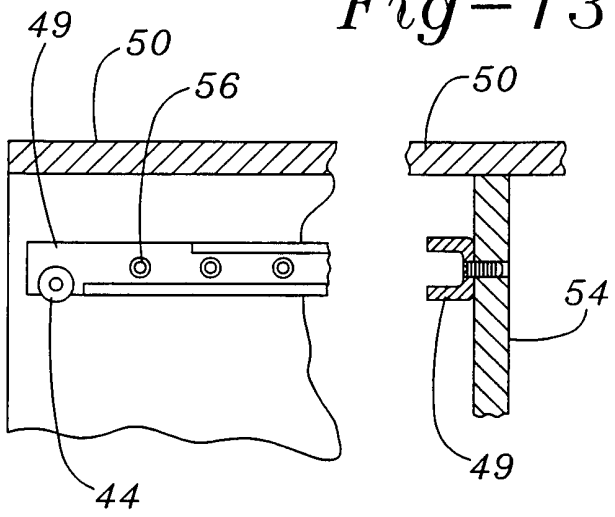


Fig-14

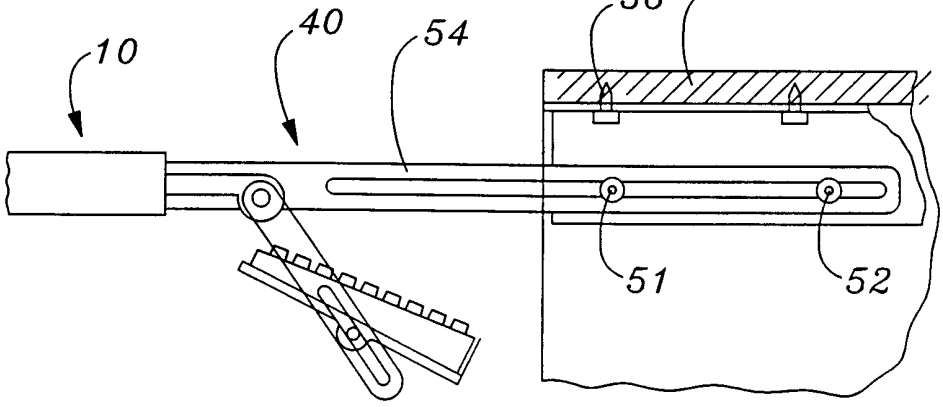


Fig-15

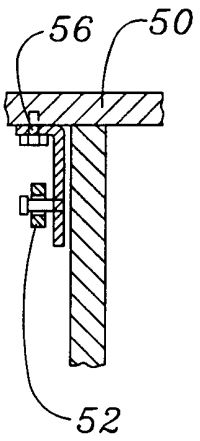


Fig-16

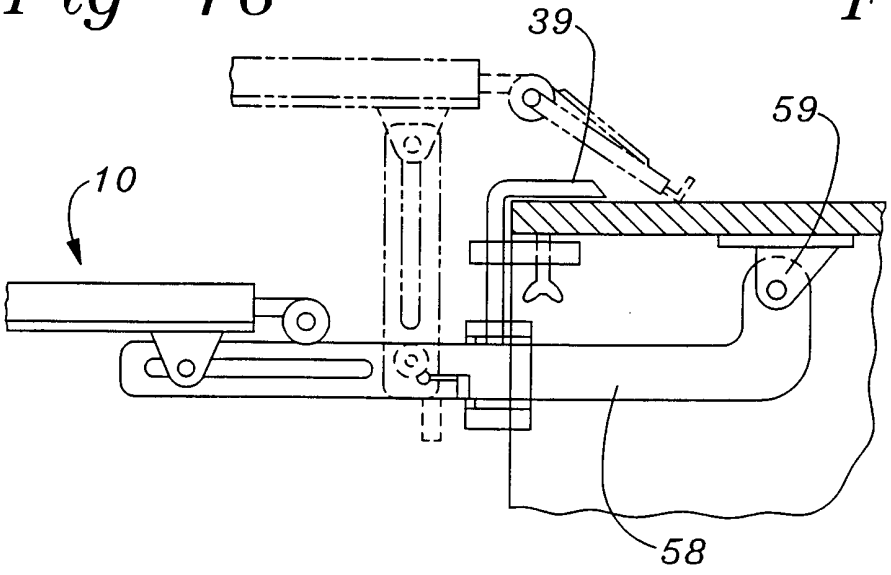


Fig-17