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ARM FOR WOODWORKING MACHINES

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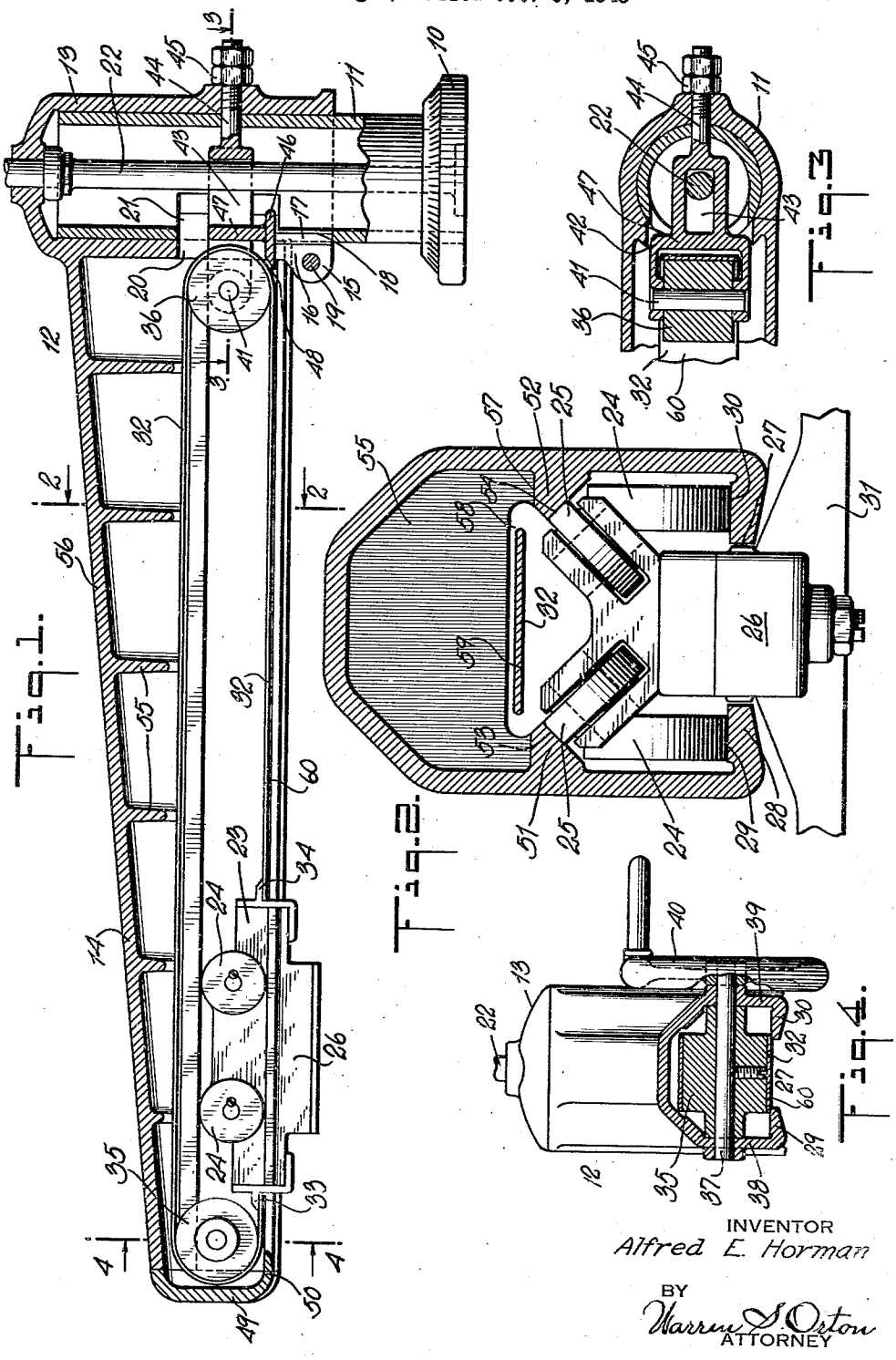


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

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ARM FOR WOODWORKING MACHINES

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12 Claims. (Cl. 143—6)

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The invention relates in general to a woodworking machine in which a carriage for supporting a cutting tool, with or without an associated driving motor, is mounted for adjustable longitudinal movement while housed within and supported by a cantilever arm disposed to overhang the work operated upon by the tool. The invention specifically relates to a system for reinforcing the cantilever arm and to a sawdust including closure for the arm.

In machines of this character it has been known to mount the carriage for travel along tracks formed by the inturned ledges forming the bottom of the hollow casing which comprises the cantilever arm and which ledges form between them an open slot through which depend a lower part of the carriage. Sawdust and other foreign matter floats into the interior of the arm through this open slot with the result that the accumulation of this dirt interferes with the desired freedom of smooth shifting movement of the carriage.

Accordingly one of the objects of the invention is to provide a form of hollow cantilever arm of the type outlined and which will be closed to the infiltration of dirt and dust in all positions of the carriage and which will thus insure an easy manipulation of the carriage and its associated tool.

Broadly this object is attained by mounting in the arm a flexible belt having opposite ends secured to the carriage and disposed so that its lower reach together with the carriage forms a closure for the slot in the bottom wall of the arm.

In woodworking and similar machines of the type above outlined, it is vitally necessary that the tool supported by the carriage be held to its intended direction of cutting movement with an accuracy approaching mathematic exactness. These tools are usually driven at high speeds and when the tools, as indicated, are hung from a cantilever arm and especially when moved away from the base supporting the arm, vibration and other distorting forces more or less are set up in the arm with resulting vibratory effect on the tool.

Accordingly another object of the invention is to provide a simple form of tool supporting head structure for woodworking machines and the like, which will be sufficiently rugged to minimize the development therein of vibratory and other undesired motions and at the same time to form the cantilever arm element of such head structure with the least possible amount of metal.

Incidental to the desire to economize in cost

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of material and labor in the product of such heads, it is further desired to maintain the cantilever arm of such light weight that the head structure as a whole can be readily elevated without binding, and the arm can be easily shifted about manually while guiding the tool during the operation of the machine.

Broadly, these aspects of the invention are attained by providing a long vertical, rugged, sleeve-like cap to form the supporting base of the cantilever arm and to form the arm itself as a long, thin-walled hollow shell, integral at one end with the cap, and internally braced by an inter-connected system of internal reinforcements which provide longitudinal ribs connected by a set of spaced apart transverse gusset plates.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawings and in part will be more fully set forth in the particular description of one form of woodworking machine part embodying the invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the accompanying drawings:

Fig. 1 is a view partly in vertical section of a cantilever arm and associated supporting column constituting a preferred embodiment of the invention;

Fig. 2 is a vertical transverse sectional view taken on the line 2—2 and looking in the direction indicated by the arrow;

Fig. 3 is a detailed horizontal sectional view taken on the plane indicated by the line 3—3 of Fig. 1 looking downwardly; and

Fig. 4 is a transverse sectional view taken through the outer portion of arm on the plane indicated by the line 4—4 of Fig. 1 and looking in the direction indicated by the arrows.

In the drawings and referring first to Fig. 1 there is disclosed an upstanding rugged hollow base 10 in which is intruded the lower end of a hollow column 11 mounted in the base for both vertical and rotary movement. Carried by the column is a head structure 12 comprising an upstanding cap 13 and a long outstanding cantilever arm 14 projecting horizontally from the cap. The cap 13 telescopes and closes the upper open end of the supporting column and provides a long rugged snugly fitting bearing engaging the upper portion of the column for a material distance. For the purpose of preventing relative rotary movement between the cap and the column, the lower inner portion of the cap is split in the por-

tion thereof beneath the arm and the split outlined by a pair of outstanding parallel ears, one of which is shown at 15. A block 16 forms a combined spacer and key and is fitted between the ears. A key forming inward extension 17 from the block is projected into a vertical slot 18 formed in the column. A bolt 19 passing through the ears 15 secures the key 17 fixedly in position.

Just above the spacer 16 the cap 13 is provided with an opening 20 and the column is provided with an opening 21, the openings 20 and 21 being in registry and providing communication between the interior of the column and the interior of the arm. The column and with it the head structure is adjusted vertically by elevating screw means indicated symbolically by the rod 22 which extends vertically and axially through the column. The elevating means is operated by a hand wheel (not shown) at the upper end of the rod 22.

Slidably mounted within the arm 14 is a tool supporting carriage 23, more particularly described in application entitled "Woodworking machine carriage," Serial No. 505,106, filed October 6, 1943, issued August 21, 1945, as Patent No. 2,383,195. As disclosed in that application, the carriage includes a pair of load bearing wheels 24 at each end of the carriage and a pair of guide rollers 25 at each end of the carriage. There is also disclosed in the companion application a block-like element 26 depending from the body portion of the carriage and fitted in a slot 27 formed in the lower wall 28 of the arm which lower wall forms tracks 29 and 30 on which the carriage rolls. Opposite sides of the element 25 are provided at the portion fitted in the slot with outwardly projecting rib-like wear pieces 60 as shown in Figs. 1 and 2. The different forms of motor driven and other tools are suspended from the element 26, one of which tools is shown symbolically at 31.

This disclosure particularly features the use of a belt 32 which functions not only to draw the carriage and with it the tool supported thereby into any desired position along the length of the arm, but has the additional purpose of forming a closure for the slot 27 in all positions of the carriage. The free ends of the belt are secured by means of flanges 33 and 34 to opposite ends of the carriage. The belt is trained about pulleys 35 and 36 mounted for rotation about horizontal axes at opposite ends of the arm. Pulley 35 at the front end of the arm is mounted on axle 37 (see Fig. 4) journalled in the side walls 38 and 39 of the arm for rotation about a fixed axis. The axle is provided at its right hand end with a hand wheel 40 by means of which the associated pulley and with it the belt is moved to shift the carriage. It is particularly noted from the showing in Fig. 4 that the belt is of sufficient width to cover the slot 27 and to extend for a slight distance therebeyond and overlaps the tracks on opposite sides of the slot. At the opposite end, i. e., the end adjacent the column, the other pulley 36 is journalled loosely on shaft 41 carried by the bifurcated end of a fork 42 which extends through the registered openings 20—21 and diametrically across the column as particularly shown in Figs. 1 and 3. In the portion of the fork which extends across the column, there is provided a slot 43 through which extends the upright rod 22. Means are provided for regulating the tension on the belt which includes a bolt-like extension 44 which extends through the column and cap and is engaged at its outer end by a pair of lock nuts 45. A plate 46 projects from opposite sides of a vertical wall 47 from the crotch of the bifurcation part of the fork. The end of the plate which extends towards the slot 27 has a knife edge 48 which is disposed to underlie the adjacent side of the pulley and the portion of the belt carried thereby. The plate 46 forms a shoe of sufficient length to overlap the end portion of the slot which extends beyond the portion covered by the belt. By this means the shoe coacts with the belt to defeat the possibility of dust and dirt entering into the arm or into the column at the inner or right hand end of the showing in Fig. 1.

The forward end of the arm is closed by an end plate 49, the lower wall 50 of which extends in underlapped relation to the forward pulley 35 and defines the forward end of the slot. This lower wall acts as does the shoe at the opposite end to cover that forward portion of the slot not covered by the belt.

It is the intent of this disclosure to make the cantilever arm as rugged as possible for minimizing in the amount of material used and at the same time to provide a structure in which vibration while in use is reduced to a minimum. With this object in view, the arm is, for the most part, formed of a shell-like tubular structure but internally reinforced to provide the maximum internal bracing.

With these objects in view, the arm includes longitudinally extending bracing means provided in part by thickening the outer marginal portion of the tracks 29 and 30 and by providing mid-height of the side walls rugged guide rails 51 and 52. As featured in the companion application the inclined underfaces 53 and 54 of these reinforcements provide guide surfaces for engagement by the guide rollers 25 on the carriage. The arm is of progressively increased cross-sectional area considered from its outer end inwardly towards the column and cap and is internally braced by transverse mutually disposed wall gussets 55 which are disposed in longitudinally spaced apart relation depending integrally from the top 56 and with outer lower edge portions 57 meeting the tops of the guide rails and formed integral therewith, as shown in Fig. 2. The several gussets in their mid-portions between the guide rails are recessed to form a clearance 58 for receiving the upper reach 59 of the belt.

In operation and assuming that there is requisite tension on the belt to maintain its lower reach 60 stretched taut across all portions of the slot not occupied by the tool carriage, and that by the manipulation of the arm elevating mechanism 22 the tool supported by the carriage is in the proper position relative to the rest of the work to be operated upon, it is understood that by manipulating the hand wheel 40 the carriage may be adjustably positioned any place along the length of the arm permitted by the slot. Irrespective of the position of the carriage, the carriage and that portion of the belt which for the time being forms its lower reach acts to close the arm and thus prevent the infiltration of dust or sawdust both into the arm and into the hollow column.

Even though the tool carried by the carriage be actuated at high speed and under the rough conditions to which such machines are generally subjected, the interbracing of the cantilever arm in its relation to the rugged column as well as the internal reinforcements of the arm, tend to main-

tain the entire tool supporting structure rigid and avoid those vibratory movements which, in devices of this kind, have heretofore interfered with the mathematically exact setting of the tool. It will also be appreciated that the carriage itself, fitting as it does snugly between its track and guide surfaces, adds an element of rigidity to the portion of the arm occupied thereby. Also the internal reinforcements provided by the track and guide ribs acts to transfer strains imposed thereon towards the more bulky structures which form the column and associated parts.

What is claimed is:

1. In a woodworking machine, the combination of a hollow column mounted for vertical and rotary movement about its own axis, means including a rod centered in the column for elevating the same, a head structure including a cantilever arm and a cap at one end thereof telescoping and closing the top of the column and fixedly secured thereto, the cap and the portion of the column telescoped thereby provided with registering openings facing the interior of the arm, the arm being hollow, provided in its underside with a slot and otherwise closed, a pair of pulleys in the arm adjacent opposite ends of the slot and one of said pulleys located at the registering openings, a tool carriage mounted for movement longitudinally in the arm and having an element thereof extending through the slot, a belt trained about the pulleys and having its ends secured to the carriage, said belt and carriage coacting to provide a closure for the slot in all positions of the carriage, a manually actuated control operable from the outside of the head structure for rotating one of the pulleys for shifting the carriage along the length of the slot and means accessible from the exterior of the column for tensioning the belt, said means including a fork extending radially across the column and provided exteriorly of the head structure with lock nuts for securing the same and provided within the column with a clearance through which extends the elevating rods.

2. In a woodworking machine, the combination of a supporting column, a hollow arm carried by the column and projecting horizontally therefrom, the underside of the arm provided with a slot extending lengthwise thereof extending outwardly from the column and opening for substantially the entire length of the arm from the exterior of the arm into the interior thereof, a pair of pulleys housed in the space within the arm at opposite ends of the slot and each rotatable about a horizontal axis, a tool carriage slidably mounted in the arm and having an element thereof depending through the slot to the exterior of the arm, a belt trained about said pulleys and having its ends secured to the carriage, and said belt having a length on its underside less than that of the arm and longer than that of the slot and having a width sufficient to form a closure to the slot in all positions of the carriage as it is shifted along the length of the slot and coacting with the carriage to prevent the infiltration of dirt through the slot to the housed pulleys.

3. In a woodworking machine, the combination of a hollow column slidably mounted for vertical adjustment and for rotary adjustment about its own axis, a head structure including a cap telescoping and closing the upper end of the column, and a hollow cantilever arm integral with the cap, said arm provided with a longitudinally extending slot opening through the bottom of the hollow arm, a carriage movable in the arm lengthwise

thereof and provided with a tool supporting element extending through the slot, and flexible means coacting with the carriage for closing all parts of the slot except where the element extends therethrough, the interiors of said cap, column and arm being interiorly open to each other and otherwise closed to the infiltration of dust into said interiors and having a snug but sliding fit transversely of the slot.

4. In a woodworking machine, the combination of a column, a hollow cantilever arm projecting from the column, said arm constituting a shell-like member, including a top, two side and a bottom wall, said bottom wall provided with a slot narrower than said bottom wall leaving a pair of tracks on opposite sides thereof, a tool carriage shiftable along the tracks within the arm, said side walls each provided with an inwardly projecting rugged guide rail adapted to guide the carriage in its longitudinal movement and acting to provide an internal longitudinally extending rugged line of reinforcement to each side wall, and a plurality of gussets spaced apart longitudinally of the arm, extending parallel to each other transversely across the interior of the arm, depending integrally from the top wall and extending to and connected integrally with the guide rails thereby to provide the arm with a system of interconnected interior reinforcements and said carriage having means engaging said tracks and guide rails.

5. In a device of the class described, the combination of a hollow column, a head structure including a cap telescoping the top of the column to provide a long rugged structure at the top of the column and a hollow arm projecting integrally from the cap, a tool carriage shiftable along the length of the arm, the cap and column provided with registering openings, a pair of pulleys adjacent opposite ends of the interior of the arm, a belt housed within the arm, having its opposite ends secured to the carriage to shift the same, said belt trained about the pulleys, a fork located in said registering openings and guided thereby, one of said pulleys being journalled in said fork and means accessible from the outside of the head structure acting on the fork for tensioning the belt.

6. In a device of the class described, the combination of a column, a head structure including a cap closing the top of the column and having a hollow cantilever arm projecting from the cap, said cap and column provided with registering openings, the bottom of said arm provided with a slot open from end to end, said arm except for said opening and said slot forming otherwise a closed structure, a carriage mounted for movement longitudinally of the arm, the arm having an element depending therefrom through the slot, said slot terminating in spaced relation to the outer end of the arm, a pulley mounted in the outer closed end of the arm above the adjacent termination of the slot, a fork located in said registering openings, a pulley journalled in the fork, a belt having its opposite ends secured to the carriage, trained about said pulleys and projecting beyond opposite ends of the slot, the lower reach of said belt overlapping the slot projecting laterally beyond opposite edges of and closing the same beyond opposite ends of the carriage in all positions of the carriage.

7. In a device of the class described, the combination of a hollow cantilever arm provided in its lower side with a slot, a carriage mounted in the arm and having an extension projecting

downwardly therefrom through the slot, a belt secured to the carriage for shifting the same along the length of the arm, the lower reach of the belt coacting with the carriage for closing the slot in all positions of the carriage, a fork, a pulley journalled therein and about which one end of the belt is trained, said fork provided with a foot underlapping the adjacent side of the pulley and forming a closure for that portion of the slot which underlies said adjacent side of the pulley.

8. In a woodworking machine, the combination of a column, a hollow cantilever arm mounted at one end on the column and extending horizontally therefrom, said arm provided with a slot extending longitudinally through its bottom wall and forming tracks on opposite sides thereof, a tool carriage within the arm riding on said track, and provided with an element depending therefrom through the slot, a pair of pulleys housed within the arm adjacent opposite ends of the slot, a belt having its ends secured to the carriage and trained about said pulleys, the lower reach of the belt overlapping the portions of the slot beyond opposite ends of the carriage in all positions thereof for closing the slot to defeat infiltration of dust therethrough into the interior of the arm, means for shifting the pulley adjacent the column to place tension on the belt, the pulley adjacent the open or outer end of the arm being mounted within the arm for rotation about a fixed axis and fitted between the sides of the arm to resist axial play of the pulley, and a handle exteriorly of the arm at said outer end for rotating the associated pulley to shift the carriage and belt along the arm.

9. In a woodworking machine, the combination of a hollow arm including a bottom side forming a pair of parallel tracks with a slot formed between the tracks and opening into the interior of the arm, a tool carriage mounted within the arm, bridging across the slot and including an element depending therefrom through the slot, said depending element having a sliding fit in the slot to close the portion of the slot occupied thereby and thus tend to prevent the infiltration of dust through said portion, said carriage provided with rollers engaging the tracks, a pair of pulleys contained within the arm, a belt trained about the pulleys, secured to the carriage and having its lower reach overlapping the portion of the slot not occupied by said element, said lower belt reach and element coacting to close the slot from the infiltration of dust into the interior of the arm and opposite ends of said lower reach projecting laterally over the edge portions of the tracks which lie adjacent the slot, the upper sides of both the upper and lower reaches of the belt being at all times protected by the hollow arm from the settling of saw dust thereon.

10. In a woodworking machine, the combination

of a substantially horizontal hollow support having closed ends and provided in its lower wall with a slot opening therethrough, said slot having a length less than said hollow support, tool supporting means adjustable along the length of the slot and having an element thereof extending through the slot and closure means contacting the lower wall at the ends and sides of the slot and movable with said element for closing all parts of the slot not occupied by said element.

11. In a woodworking machine, the combination of a substantially horizontal hollow support with closed ends and with its bottom side forming a pair of parallel tracks with a slot therebetween opening downwardly to the exterior, said slot having a length less than said hollow support, means operable at all times for closing the slot, said means comprising a pair of pulleys carried within the support adjacent opposite ends of the slot, and an endless device trained about the pulleys with its lowermost reach at all times closing the slot to prevent the infiltration of dust therethrough into the hollow support, said device also including an inner part provided with rollers engaging the tracks and with another outer part depending from the inner part and extending therefrom downwardly through the slot to the exterior of the support.

12. In a woodworking machine, the combination of a hollow cantilever arm provided with an elongated opening extending therethrough, a tool carriage contained largely within the arm and movable back and forth along the length of the opening, said carriage having an element thereof extending through the opening to the exterior of the arm and provided with means for securing a tool thereto, closure means coacting with the carriage to close the opening, said means including a pair of pulleys mounted within the outlines of the arm, and a flexible member trained about the pulleys and secured at its free ends to the carriage, and means acting through the belt to shift the carriage along the length of the arm, said flexible member having its lower reach extending across and covering the opening in all positions of the carriage thereby to minimize the possibility of dust entering the arm through the opening.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,895,122	Benedict	Jan. 24, 1933
1,815,037	De Walt	July 21, 1931
2,173,587	Huffman	Sept. 19, 1939
2,185,304	Knapp	Jan. 2, 1940