United States Patent

Kessler

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[54] TOOL STORAGE DEVICE

[72] Inventor: **Lester A. Kessler**, c/o Metcraft Inc., 1203 Main St., Grandview, Mo. 64030

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[52] **U.S. Cl.** **211/1.5**, 211/164

[51] **Int. Cl.** **A47f 3/08**

[58] **Field of Search** 211/1.5, 164; 312/266, 135; 29/568

[56] **References Cited**

UNITED STATES PATENTS

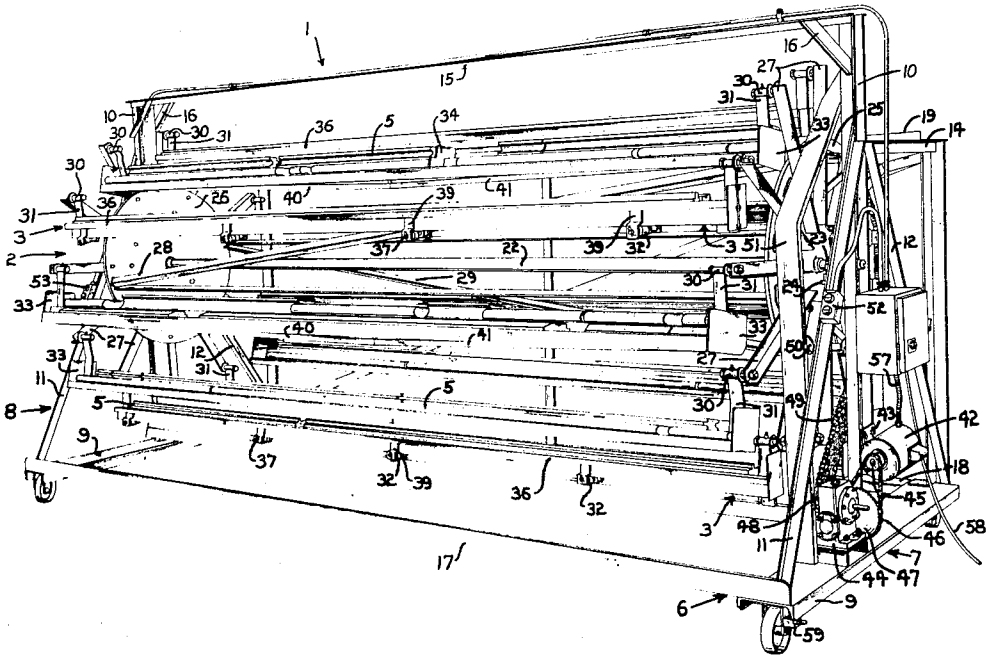
937,366	10/1909	Friedman	211/164 X
1,731,603	10/1929	Wolf	211/1.5
1,487,540	3/1924	Coker	211/164 X
1,968,013	7/1934	Brownson	221/34
1,830,373	11/1931	Schmidt	211/164

Primary Examiner—Nile O. Byers, Jr.
Attorney—Fishburn, Gold and Litman

[57] **ABSTRACT**

A tool storage device for storing and dispensing elongated heavy tools, such as forming dies, blades or the like, for metal working machines, includes a mobile supporting frame having a pair of spaced end frames with an axle extending therebetween and a reel mounted on the axle for supporting a plurality of circumferentially spaced tool supporting trays, holders or the like. Power means are operatively connected to the reel for rotating same to move the trays or holders through a generally circular path in a clockwise or counterclockwise direction to accurately position any selected one of the trays or holders in alignment with a tool receiving portion of a tool using machine.

9 Claims, 6 Drawing Figures



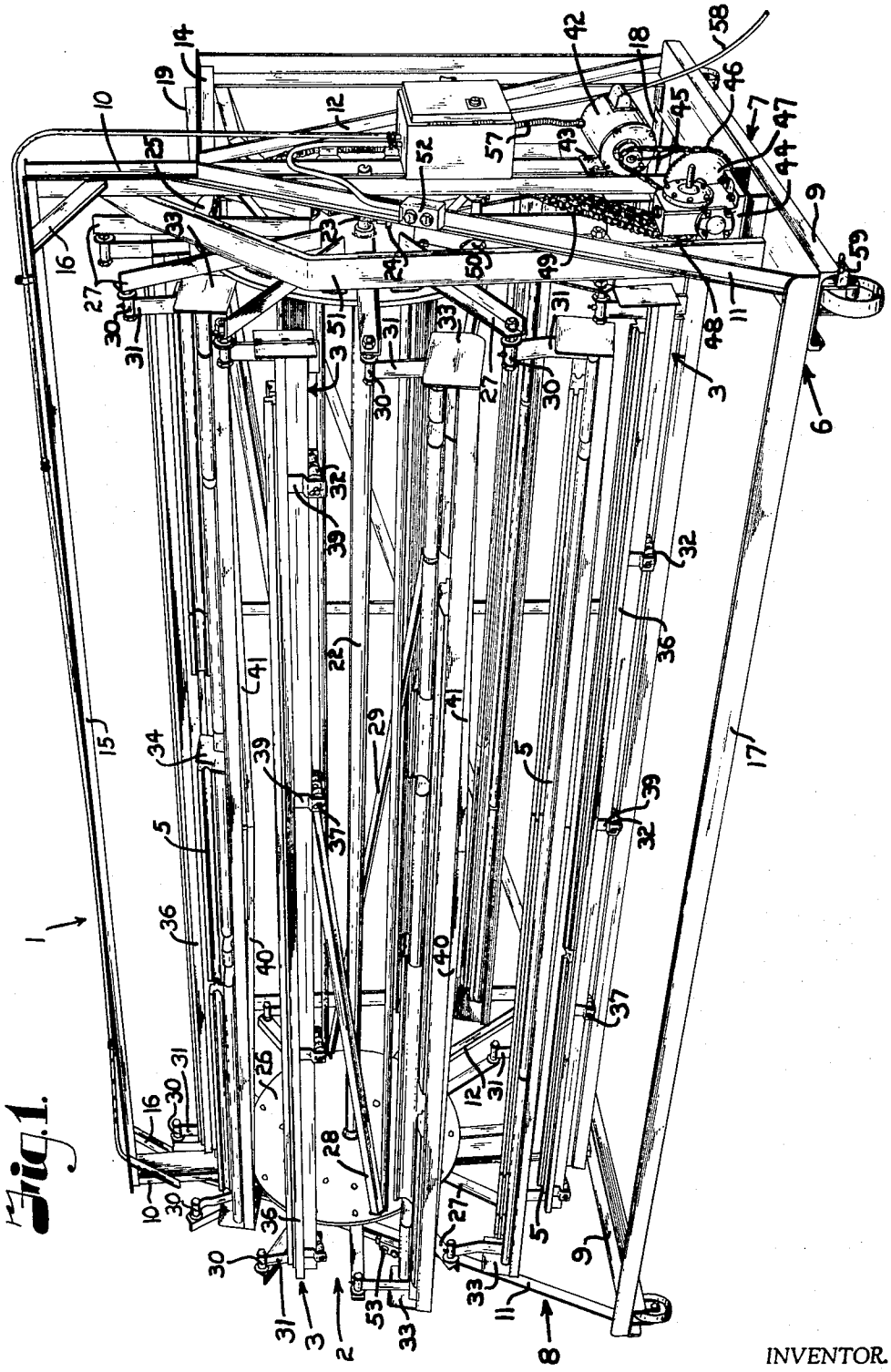


Fig. 1.

INVENTOR.
Lester A. Kessler
BY
Frishauf, Holtz & Litman
ATTORNEYS

Fig. 2.

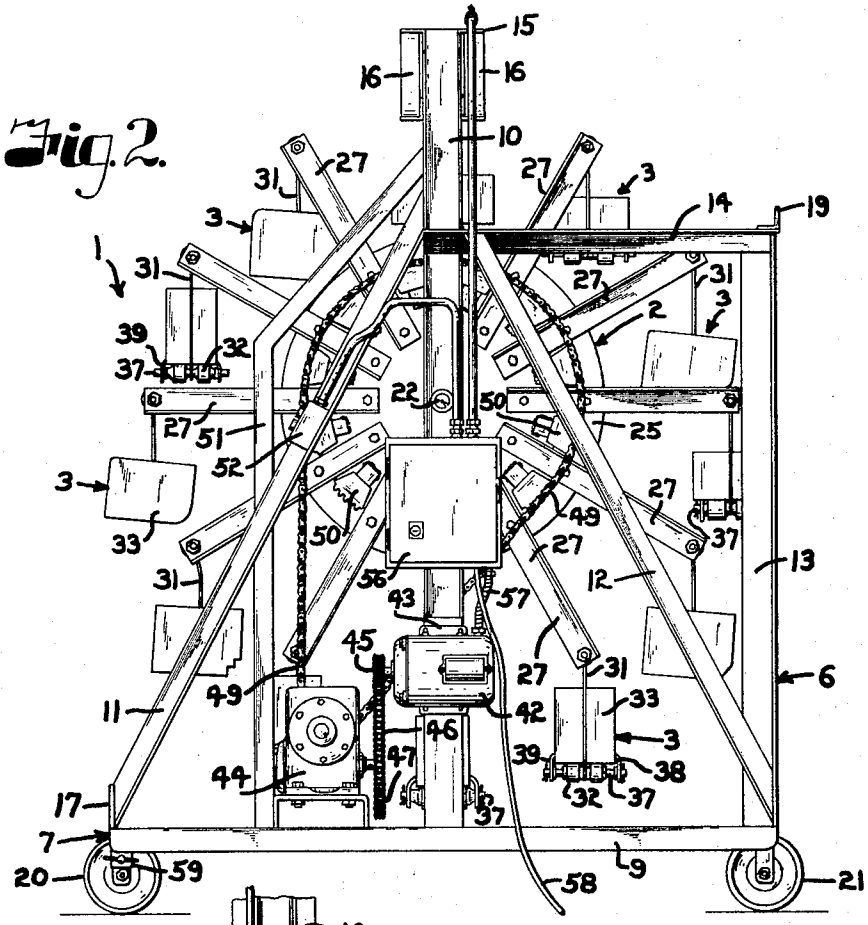
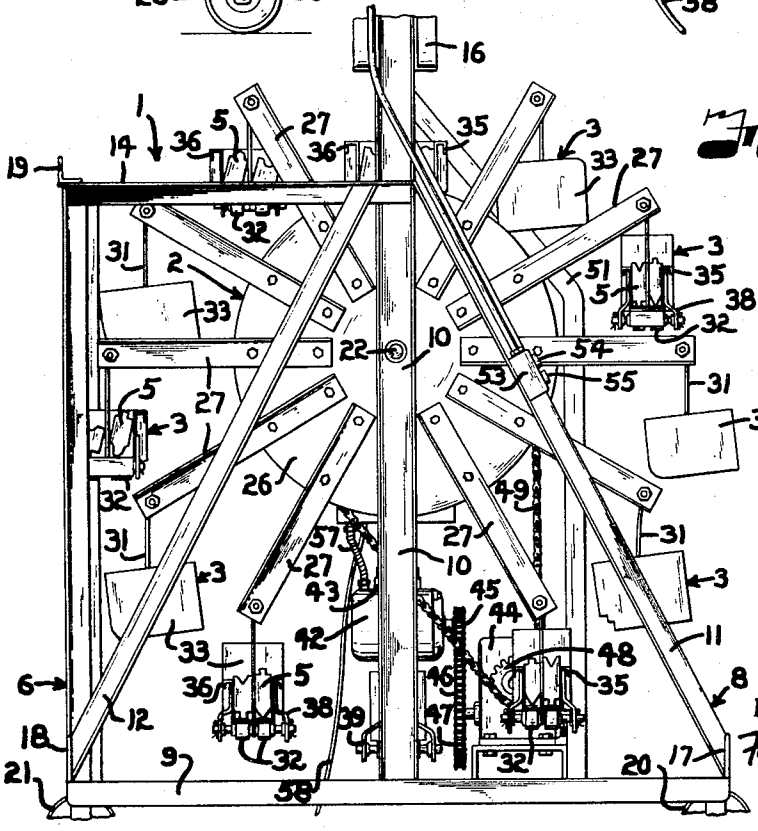


Fig. 3.



INVENTOR.
Lester A. Kessler
BY
Frishberg, Stoll & Lehman
ATTORNEYS

Fig. 4.

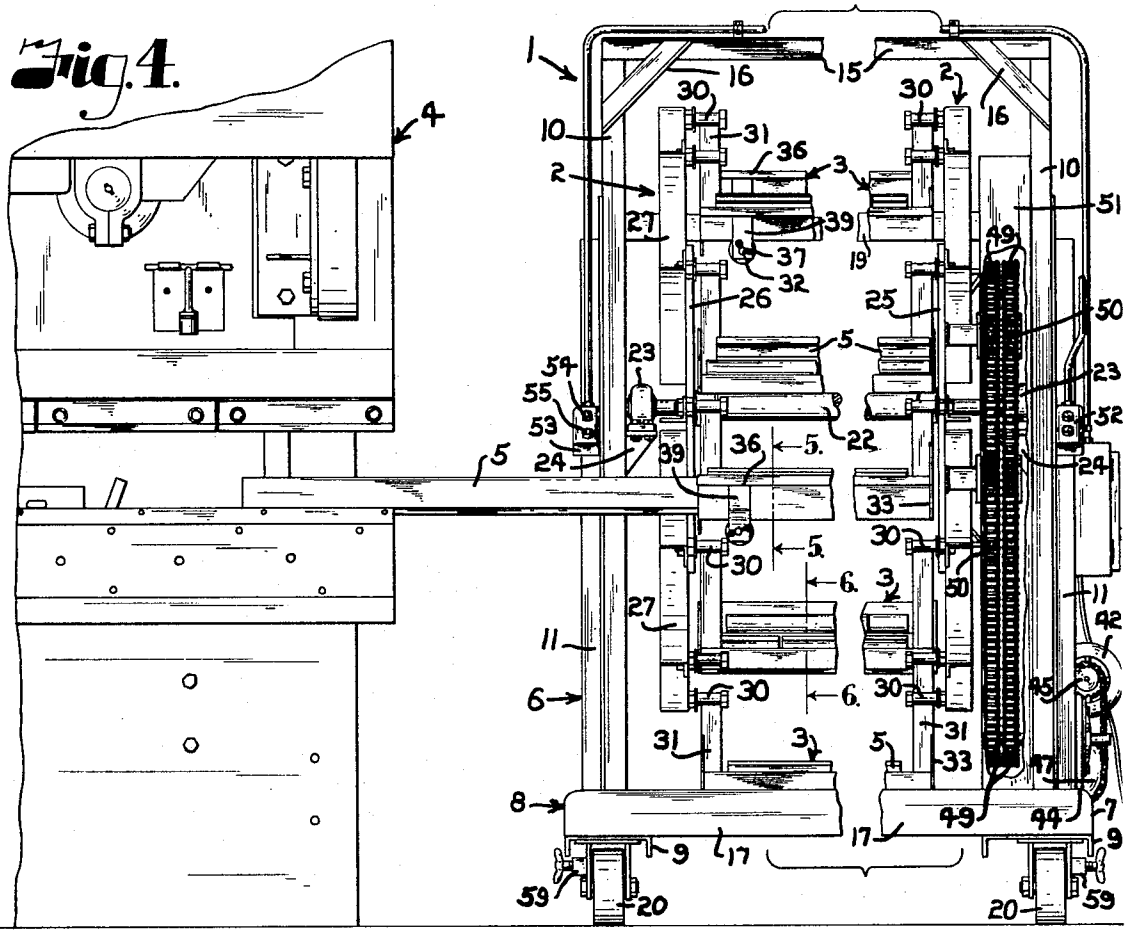


Fig. 5.

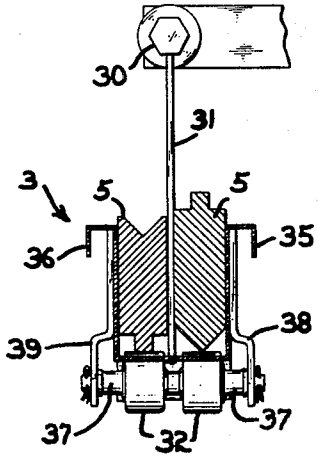
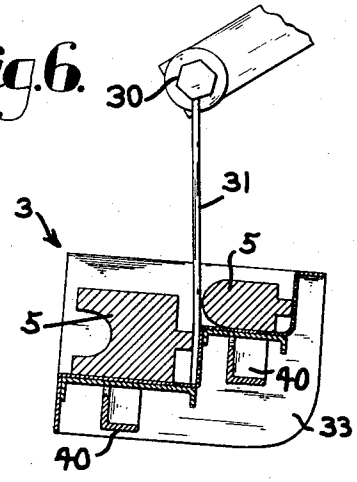


Fig. 6.



INVENTOR.
Lester A. Kessler
BY
Fishburn, Gold & Litman
ATTORNEYS

TOOL STORAGE DEVICE

The present invention relates to tool storage devices and more particularly to a mobile tool storage device adapted to accurately position any selected one of a plurality of tool holders for removal of forming dies, blades or like tools, for metal working machines.

Metal working machines, such as brakes, which bend metal by forcing the metal to conform to the configuration of a pair of forming dies require a large number of cooperating upper and lower forming dies to form the many shapes desired. Forming dies must resist substantial stresses during the forming of metal therebetween, therefore, the forming dies are particularly heavy and durable members. Heretofore, forming dies were stored on the floor adjacent a metal working machine or on fixed shelves at distances therefrom and due to the weight of the forming dies it was necessary to employ expensive machinery or several men to move the dies from the storage area and install same within the metal working machine, all contributing to high equipment and labor costs and excessive down time during changing forming dies.

Metal working machines are also adapted to form metal having dimensions varying substantially the full length of the respective machine to relatively short dimensions, such as two to four feet, thereby requiring forming dies of a plurality of lengths. The combination of the large number of shapes or patterns and the plurality of sizes of metal to be worked, therefore, requires that many forming dies must be stored and available to permit full utilization of the metal working machine or a plurality of such machines.

The principal objects of the present invention are: to provide a tool storage device providing convenient storage for the forming dies, blades or like tools for metal working machines; to provide such a tool storage device adapted to store a greater number of tools in the same floor area previously used for floor or shelf storage; to provide such a tool storage device wherein the tools are easily placed in the storage device and easily removed therefrom; to provide such a tool storage device which is maneuverable and which will accurately position a selected one of a plurality of trays or holders in alignment with a tool receiving portion of a tool using machine; to provide such a tool storage device particularly adapted to receive, store, and dispense heavy elongated tools, such as forming dies, blades, tools and the like, for metal working machines; and to provide such a tool storage device which is durable in construction, positive in operation, easily operated by a single operator, and which is particularly adapted for the proposed use.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings wherein are set forth by way of illustration and example, certain embodiments of this invention.

FIG. 1 is a perspective view of a tool storage device embodying features of the present invention.

FIG. 2 is an end elevational view of one end of the tool storage device showing tray or tool holder moving means.

FIG. 3 is an end elevational view of the other end of the tool stroage device.

FIG. 4 is a front elevational view of the tool storage device in position adjacent a tool using machine.

FIG. 5 is a transverse sectional view taken on line 5—5, FIG. 4, showing the construction of one group of tool holders or trays, particularly adapted for storing and dispensing elongated forming dies.

FIG. 6 is a transverse sectional view taken on line 6—6, FIG. 4, showing the construction of a second group of tool holders or trays, particularly adapted for storing a plurality of shorter forming dies.

Referring more in detail to the drawings:

The reference numeral 1 generally designates a tool storage device having a rotatably mounted reel 2 supporting a plurality of circumferentially spaced tool supporting trays or holders 3 which may be moved into alignment with a tool receiving portion of a tool using machine, such as a metal working machine 4 whereby tools, such as forming dies 5 and the like, may be easily removed from the tool storage device 1 and installed in the respective tool using machine 4.

The tool storage device 1 includes a mobile supporting frame 6 having a pair of spaced upstanding end frames 7 and 8 with connecting members extending therebetween to form a rigid frame, as later described, having the reel 2 extending longitudinally between and rotatably mounted on the end frames 7 and 8. The frame 6 is open at the front to provide easy access for placing tools in the tool storage device 1 and removing same therefrom. The end frames 7 and 8 have sufficient open area to permit movement of forming dies therethrough from a tool holder 3 on the reel 2 to facilitate positioning the selected tool in the metal working machine 4.

In the illustrated structure, each end frame has a base member 9 and a standard 10 extending upwardly therefrom with the standard 10 preferably being centered longitudinally of the respective base member 9. Front and rear bracing members 11 and 12 respectively extend upwardly from adjacent opposite ends of the base member 9 and are suitably secured to the respective standard 10 adjacent an upper end thereof, as by welding.

Each of the end frames 7 and 8 have an upstanding member 13 extending upwardly from a rear end of the base member 9. An upper bracing member 14 extends between and is suitably connected to an upper end of the upstanding member 13 and to the standard 10 adjacent the point of connection of the bracing members 11 and 12 to thereby form a plurality of triangles in each end frame which provides a substantially rigid structure for each end frame.

The standards 10 each extend above the reel 2 and a connecting member 15 extends between and has opposite ends thereof suitably connected to upper ends of the standard 10 in the end frames 7 and 8 respectively, as by welding. Suitable gussets or stiffening members 16 extend between the connecting member 15 and each of the standards 10 to increase the rigidity of the frame 6. Front and rear connecting members 17 and 18 respectively extend between the front ends of the base members 9 and between the rear ends of the base members 9 respectively and are suitably secured to the respective ends of the base members 9, as by welding. An upper tie member 19 extends between the upper end of the upstanding member 10 in the end frames 7 and 8 and is positioned to be cleared by the trays 3 during rotation of the reel 2 and the tie member 19 is suitably connected thereto, as by welding, thereby forming a particularly rigid structure.

It is desirable to move the tool storage device 1 from a storage area to a position adjacent the metal working machine 4 or between a pair of spaced metal working machines for dispensing the desired forming dies 5 and then return to the storage area or to be moved adjacent another metal working machine, therefore, the base member 9 of each of the end frames 7 and 8 have suitable rotatably mounted surface engaging elements, such as front and rear rollers or casters 20 and 21 respectively.

The reel 2 includes an elongated shaft or axle 22 which extends between the end frames 7 and 8 and has opposite ends rotatably mounted thereon,as in suitable bearings 23 supported on a bracket 24 on each of the standards 10. The reel 2 is mounted on the shaft or axle 22 and is rotatable therewith and in the illustrated structure, the reel 2 has a pair of spaced end members 25 and 26 mounted on the axle of shaft 22 in spaced relation inwardly of the end frames 7 and 8 respectively, whereby the reel 2 is mounted for rotation within the frame 6. The end members 25 and 26 are illustrated as annular discs each having a like plurality of circumferentially spaced radially extending arms 27 mounted thereon for supporting the trays or tool holders 3, as later described. Suitable bracing members 28 and 29 extend between the end members 25 and 26 to increase the rigidity of the reel 2.

The tool holders 3 each extend between the end members 25 and 26 of the reel 2 and rotate therewith. The tool holders 3 each are pivotally mounted on a respective arm 27 of each

of the end members 25 and 26 whereby the tool holders 3 each remain substantially level to retain the respective tools therein during rotation of the reel 2.

The pivotal mounting of the holders 3 on the reel 2 includes a pin or trunnion 30 which is mounted adjacent a free end of each of the arms 27 and extends outwardly therefrom to pivotally support a hanger 31. The hangers 31 are illustrated as wide straps each having one end pivotally mounted on the respective pin 30 and the other end thereof connected to one end of one of the tool holders 3 whereby the tool holders 3 each have opposite ends thereof pivotally mounted for adjustment during removal of the forming dies 5 therefrom.

The tool holders 3 may be formed in any desired shape to retain the selected tools therein. Certain forming tools, blades or the like, may extend the full length of the respective machine 4 and particularly for metal working machines forming dies are available in sections of substantial length, such as 10 feet to 20 feet with suitable increments therebetween, whereby the forming dies are heavy and would require substantial manpower to remove the forming dies 5 from the tool holders 3 and install same in the respective metal working machines, therefore, a selected group of the tool holders 3 has a plurality of longitudinally spaced rollers 32 mounted therein for movably supporting elongated tools therein. The rollers 32 permit a single operator to move long forming dies 5 from a selected tool holder 3 after same has been aligned with a tool receiving portion of the metal working machine 4 by rotation of the reel 2, as later described.

Forming dies are also available in relatively short sections, such as 4 to 8 feet and suitable increments therebetween, and such short sections may be manually moved from a selected tool holder 3 and installed in the metal working machine 4, therefore, a second group of the tool holders 3 has end partitions 33 mounted on opposite ends of the respective tool holders 3 and a plurality of laterally spaced intermediate partitions 34 mounted in the second group of tool holders for forming a plurality of tool supporting compartments therein.

The group of tool holders 3 having the rollers 32 mounted therein are constructed and shaped to be substantially rigid members as by having side portions 35 and 36 positioned to be engaged by and support the forming dies 5 therein. The rollers 32 are each supported on an axle 37 having opposite ends thereof supported by hangers 38 and 39 which have a portion thereof suitably secured to the side portions 35 and 36 respectively, as by welding, thereby substantially stiffening the group of tool holders 3 having the rollers 32 mounted therein.

It is preferred to construct the group of tool holders 3 having the partitions 33 and 34 to permit easy removal of the forming dies 5 therefrom as by moving same outwardly through a front side thereof which requires that at least a front side member be omitted, therefore, it is necessary to provide suitable bracing members 40 and 41 connected to and extending between the end partitions 33 to form a truss-like structure below the respective trays thereby providing a substantially rigid structure.

The reel 2 is rotated to position any selected tool holder in alignment with a tool receiving portion of the metal working machine 4 and in the illustrated structure, the reel 2 is rotated by a drive motor 42 suitably mounted on one of the end frames as, for example end frame 7, by a bracket 43 mounted on the standard 10 of the respective end frames. The drive motor is operative to rotate a driven shaft having an operative connection with a speed reduction unit 44 also supported on the end frame 7, as by being mounted on the base member 9 thereof.

In the illustrated structure, the motor 42 rotates a driven shaft and sprocket 45 mounted thereon. A chain 46 is operative to transmit power from the sprocket 45 to a sprocket 47 on the speed reduction unit 44 whereby rotation of the sprocket 47 is operative by means of suitable gears (not shown) within the speed reduction unit 44 to effect rotation of a sprocket 48 on a shaft extending from the speed reduction unit 44. The rotation of the sprocket 48 is at a speed to permit precise alignment of any selected tray 3 with the die receiving portion of the metal working machine 4.

The illustrated drive means for rotating the reel 2 includes a pair of chains 49 engaging the sprocket 48 and a plurality of circumferentially spaced sprocket portions 50 mounted on the end member 25 of the reel 2 whereby operation of the drive motor 42 is operative to rotate the reel 2. In the illustrated structure, the sprocket portions 50 are mounted on an exterior surface of the end member 25 and are positioned between the fixed ends of the arms 27 mounted on the end member 25.

The chains 49 are preferably covered to protect an operator of the tool storage device 1 during rotation of the reel 2 and during removal of the tools from the holders 3, therefore, a guard 51 is mounted on the end frame in covering relation with the chains 49 and extends between and has opposite ends connected to the base member 9 and the standard 10 thereof with a lower end of the guard 51 being inwardly of the front bracing member 11 and an upper end of the guard 51 being inwardly of the standard 10. The guard 51 is effective in increasing the rigidity of the frame 6 particularly at the driving end thereof.

It is desirable to control the operation of the drive motor 42 for selectively positioning any of the trays, therefore, control units 52 and 53 are mounted on the end frames 7 and 8 respectively. Each of the control units 52 and 53 have a pair of push button switches 54 and 55 operative to effect clockwise and counterclockwise rotation of the reel 2 respectively. The control units 52 and 53 are electrically connected to a control box 56 having suitable circuits (not shown) electrically connected to the drive motor 42 by means of a conduit 57 and to a suitable source of power by means of a conductor 58.

Preventing damage to the drive motor 42, the frame 6, and forming dies 5 is important in the event that one or more forming dies extend beyond the respective end of the trays 3 to a position engageable with the end frames 7 or 8 during rotation of the reel 2, therefore, torque responsive means are operatively connected to the reel rotating means to stop the reel 2 in response to restriction of free rotation of the reel 2. The torque responsive means are in the form of a suitable overload, such as a circuit breaker, provided in the control box 56 to stop the drive motor 42 in the event that the tool is moved into engagement with the frame 6.

In operation of a tool storage device 1 constructed as illustrated and described, the device is manually maneuvered into a position adjacent a metal working machine 4 or between a pair of spaced metal working machines 4 and the tool storage device 1 is suitably held in position as by a locking device 59 which is engageable with the front and rear rollers or casters 20 and 21. When a selected tool is to be removed from the storage device 1, one of the push button switches 54 and 55 is operated to rotate the reel 2 thereby moving any selected tool holder 3 to a position for removing the tools, such as a cooperating pair of forming dies 5. If a long forming die is to be removed from the tool holders having the rollers 32 therein, the respective tool holder 3 is maneuvered into precise alignment with the tool receiving portion of the metal working machine 4 and the blade or die is moved longitudinally from the tool holder by means of the rollers 32. The selected tool holder 3 may be adjusted in position as by being swung about the pins or trunnions 30 extending from the respective arms 27 for the precise positioning of the tool or forming die within the metal working machine.

It is to be understood that while I have illustrated and described one form of my invention, it is not to be limited to the specific form or arrangement of parts herein described and shown.

What I claim and desire to secure by Letters Patent is:

1. A tool storage device for use with a metal forming machine comprising:

a. a supporting frame having a pair of longitudinally spaced upstanding end frames;

b. a reel between said end frames and rotatably mounted thereon;

c. a plurality of circumferentially spaced tool holders mounted on said reel, each of said tool holders having portions therein supporting tools for use in a metal forming machine;

d. means operatively connected to said reel for selectively rotating same to position a selected tool holder for removal of tools therefrom to a location in the machine; and

e. certain of said tool holders having a plurality of longitudinally spaced rollers mounted therein for supporting tools for movement longitudinally of said certain tool holders into a tool receiving portion of the metal forming machine.

2. A tool storage device for use with a metal forming machine comprising:

a. a supporting frame having a pair of longitudinally spaced upstanding end frames;

b. a reel between said end frames and rotatably mounted thereon;

c. a plurality of circumferentially spaced tool holders mounted on said reel, each of said tool holders having portions therein supporting tools for use in a metal forming machine;

d. means operatively connected to said reel for selectively rotating same to position a selected tool holder for removal of tools therefrom to a location in the machine; and

e. means on said reel supporting said tool holders for swinging same transwersely of said reel to longitudinally align said tool holders with a tool receiving portion of a metal forming machine to permit moving a tool longitudinally of said reel into a tool receiving portion of the metal forming machine.

3. A tool storage device for use with a metal forming machine comprising:

a. a supporting frame having a pair of longitudinally spaced upstanding end frames;

b. a reel between said end frames and rotatably mounted thereon;

c. a plurality of circumferentially spaced tool holders mounted on said reel, each of said tool holders having portions therein supporting tools for use in a metal forming machine;

d. means operatively connected to said reel for selectively rotating same to position a selected tool holder for removal of tools therefrom to a location in the machine;

e. a plurality of longitudinally spaced rollers mounted in certain of said tool holders thereby supporting tools therein for movement longitudinally of said certain tool holders into a tool receiving portion of the metal forming machine; and

f. a plurality of laterally spaced partitions mounted in other tool holders thereby forming a plurality of tool supporting compartments therein.

4. A tool storage device for use with a metal forming machine comprising:

a. a supporting frame having a pair of longitudinally spaced upstanding end frames;

b. a reel between said end frames and rotatably mounted thereon;

c. a plurality of circumferentially spaced tool holders mounted on said reel, each of said tool holders having portions therein supporting tools for use in a metal forming machine, certain of said tool holders having an open end for movement of tools supported on the holder longitudinally therefrom;

e. means mounted on certain of said tool holders for moving a tool substantially in a line longitudinally of said reel through a holder open end and into a tool receiving portion of a metal forming machine.

5. A tool storage device as set forth in claim 4 wherein:

a. said reel has longitudinally spaced end members each having a like plurality of circumferentially spaced radially extending arms mounted thereon;

b. each of said arms has a hanger pivotally mounted adjacent a free end thereof; and

c. said tool holders each extend between said end members and have opposite ends thereof supported by respective hangers whereby said tool holders are mounted for adjustment transversely of said reel during removal of tools therefrom.

6. A tool storage device as set forth in claim 5 including control means operatively connected to said reel rotating means for selectively positioning any of said tool holders in longitudinal alignment with a tool receiving portion of the metal forming machine.

7. A tool storage device as set forth in claim 6 wherein said reel rotating means includes:

a. a drive motor;

b. a speed reduction unit;

c. means operatively connecting said motor and said speed reduction unit; and

d. second means operatively connecting said speed reduction unit and said reel.

8. A tool storage device as set forth in claim 4 including responsive means operatively connected to said reel rotating means to stop same in response to restriction of free rotation of said reel.

9. A tool storage device for use with a metal forming machine comprising:

a. a mobile supporting frame having a pair of longitudinally spaced upstanding end frames and connecting members extending therebetween, said frame being open in a front portion thereof and said end frames each having a substantial open area;

b. an elongated reel between said end frames and having an axle having opposite ends rotatably mounted thereon, said reel being positioned for access thereto through the front of said frame;

c. a plurality of longitudinally extending circumferentially spaced tool holders pivotally mounted on said reel for movement transversely of said reel and having portions therein supporting tools for use in a metal forming machine;

d. means operatively connected to said reel for selectively rotating same to longitudinally align any selected tool holder with a tool receiving portion of a metal forming machine;

e. a plurality of longitudinally spaced rollers mounted in certain of said tool holders thereby supporting tools therein for movement longitudinally of said certain tool holders into a tool receiving portion of the metal forming machine;

f. control means operatively connected to said reel rotating means for selectively positioning any of said tool holders in longitudinally alignment with a tool receiving portion of the metal forming machine; and

g. responsive means operatively connected to said reel rotating means to stop same in response to restriction of free rotation of said reel.

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