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Patented Oct. 30, 1900.

J. E. KELLY.

MANUAL TRAINING AND INDUSTRIAL APPARATUS.

(Application filed May 10, 1900.)

(No Model.)

4 Sheets—Sheet 1

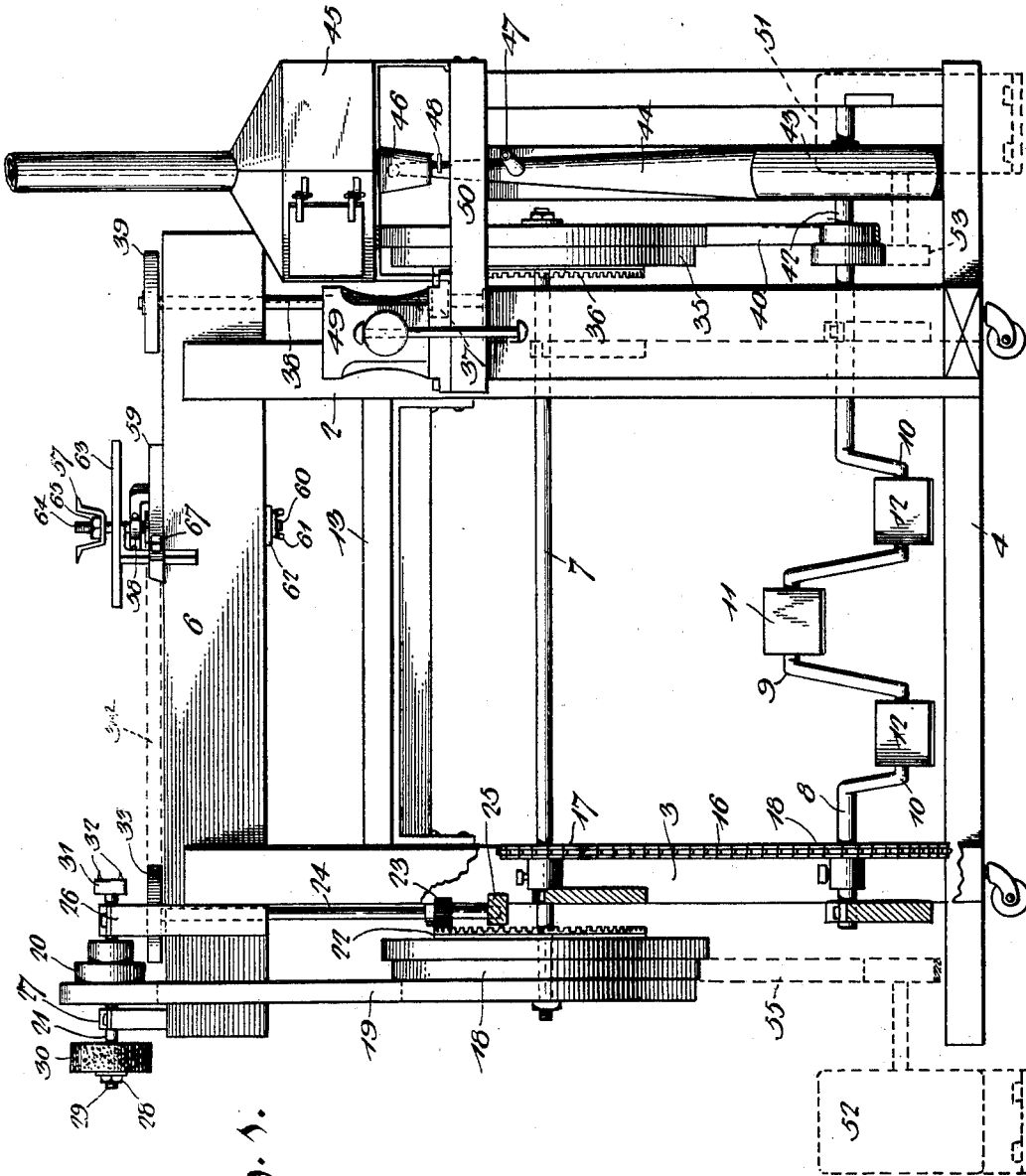


Fig. 1.

Witnesses

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4 Sheets—Sheet 2.

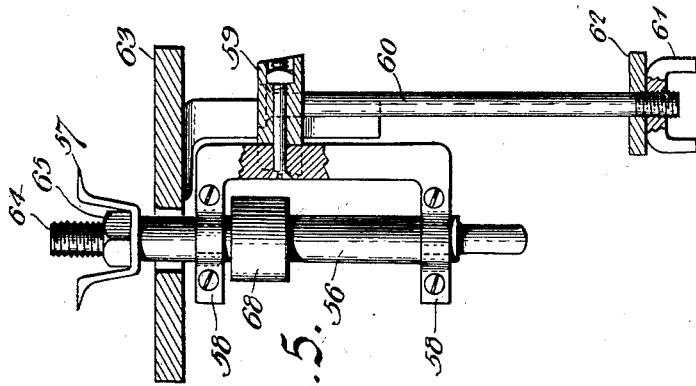


Fig. 5.

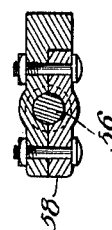


Fig. 6.

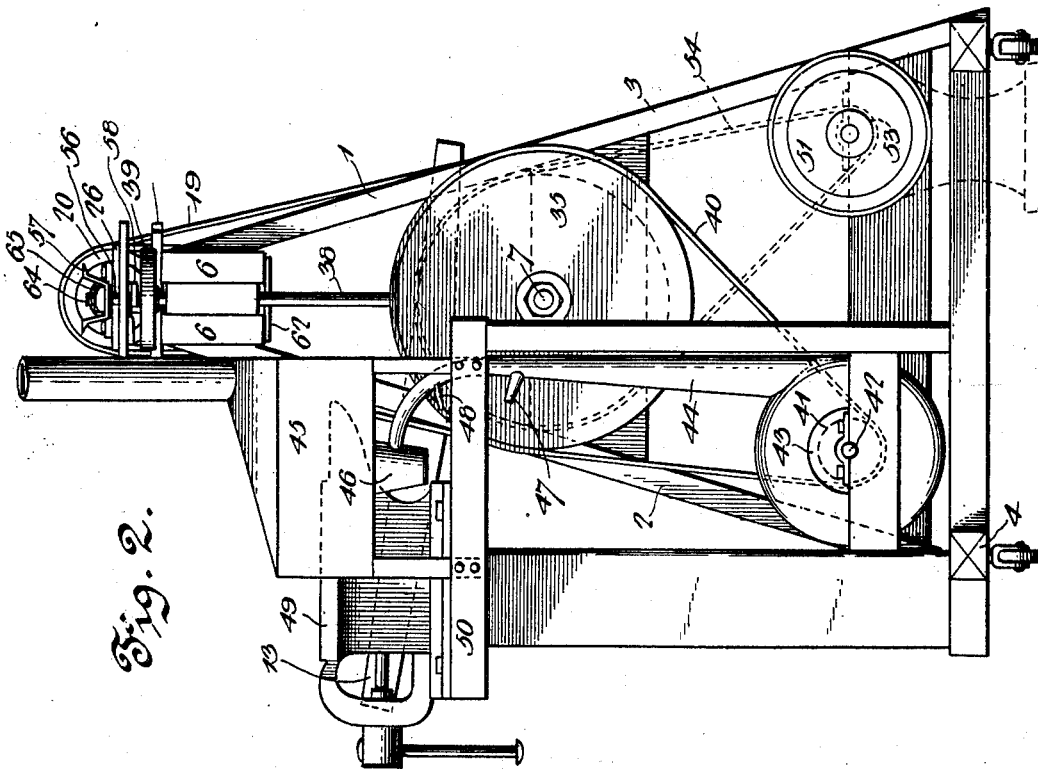


Fig. 2.

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4 Sheets—Sheet 3

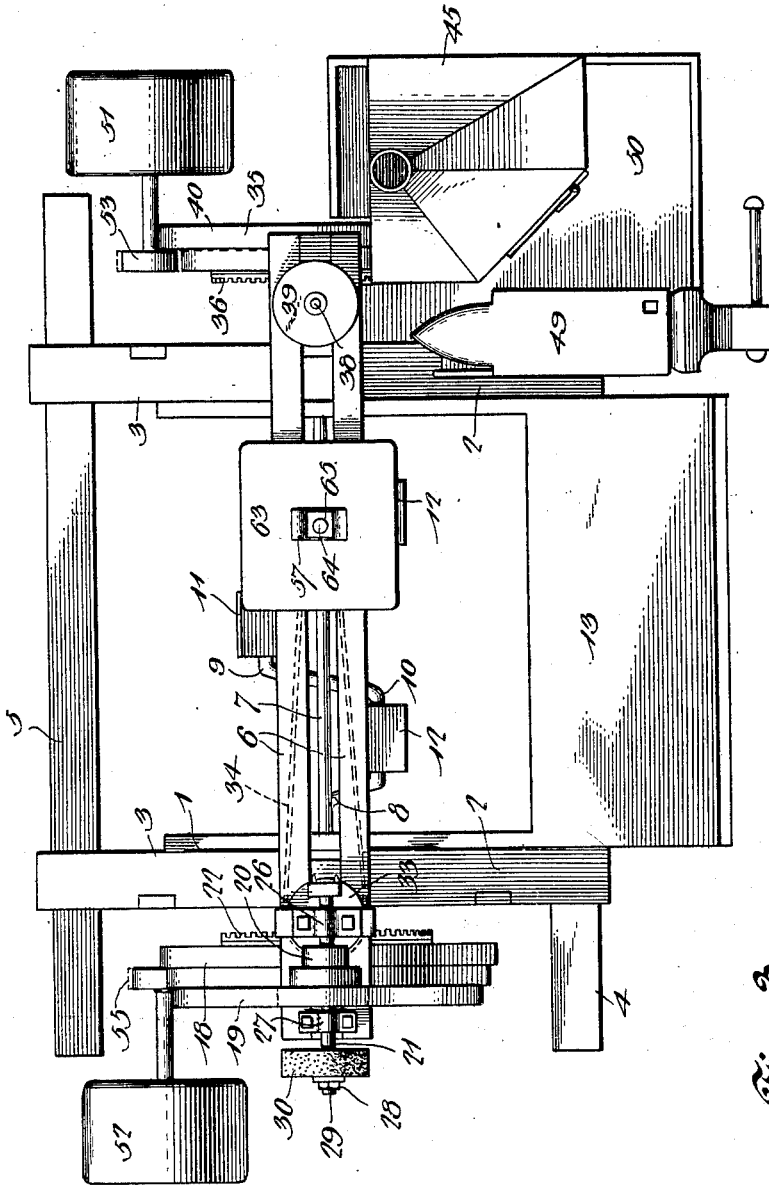


Fig. 3.

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4 Sheets—Sheet 4.

Fig. 7.

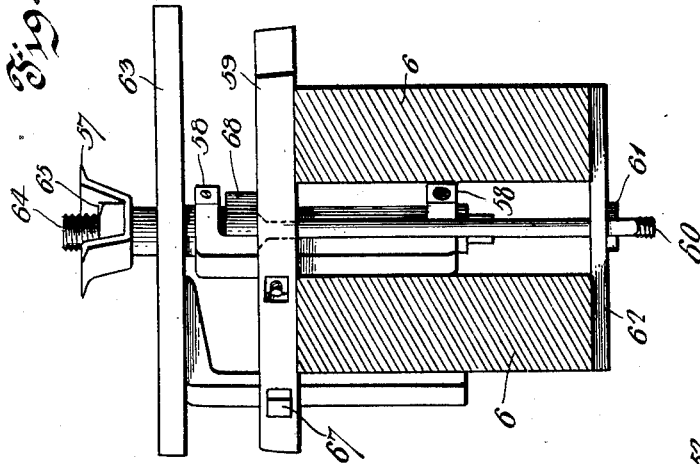
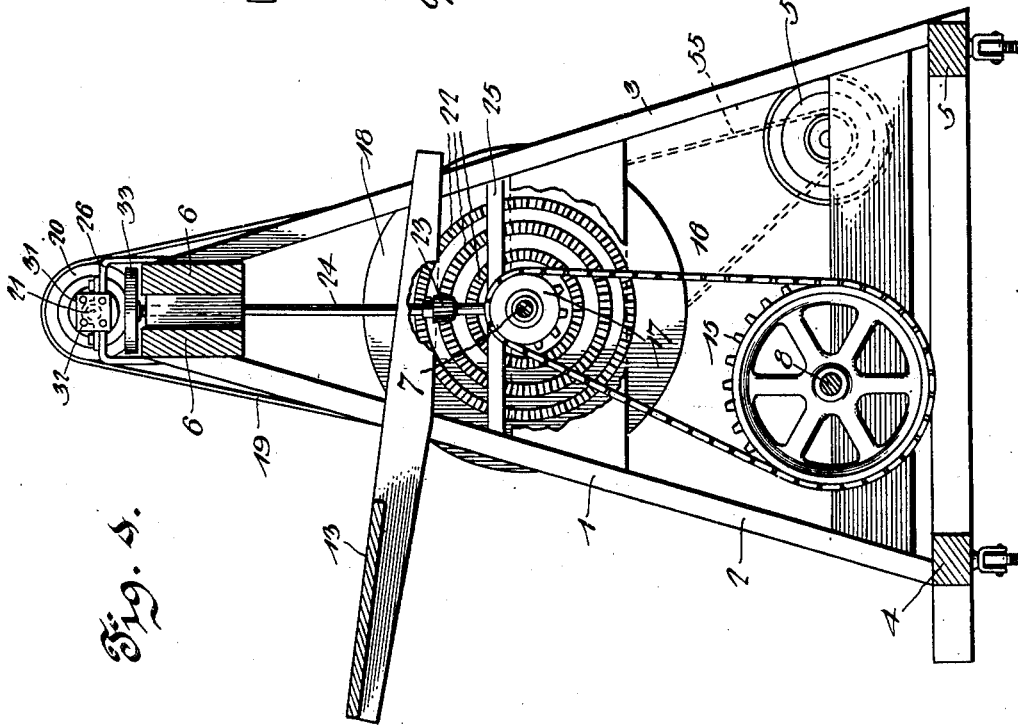


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN E. KELLY, OF VICTOR, NORTH CAROLINA.

MANUAL-TRAINING AND INDUSTRIAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 660,641, dated October 30, 1900.

Application filed May 10, 1900. Serial No. 16,227. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. KELLY, a citizen of the United States, residing at Victor, in the county of Moore and State of North Carolina, have invented a new and useful Manual-Training and Industrial Apparatus, of which the following is a specification.

The invention relates to improvements in manual-training and industrial apparatus.

The object of the present invention is to provide for manual-training and industrial schools a simple and comparatively inexpensive apparatus designed for enabling pupils of such schools to be instructed in an entire course of such training and adapted to be readily transported and to be conveniently operated in a comparatively small space.

The invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended.

In the drawings, Figure 1 is a front elevation of an apparatus constructed in accordance with this invention. Fig. 2 is an end elevation of the same. Fig. 3 is a plan view. Fig. 4 is a vertical sectional view. Fig. 5 is a detail sectional view illustrating the manner of mounting the vertical spindle or shaft of the former. Fig. 6 is a detail sectional view illustrating the construction of the bearings for the vertical shaft or spindle. Fig. 7 is a vertical sectional view taken at right angles to Fig. 5.

Like numerals of reference designate corresponding parts in all the figures of the drawings.

1 designates a supporting-frame composed of oppositely-inclined end standards 2 and 3, bottom bars 4 and 5, connecting the lower ends of the standards, and parallel top bars 6, forming the bed of a lathe and spaced apart, as clearly illustrated in Fig. 3 of the accompanying drawings. The supporting-frame is provided at its ends with suitable bearings for a horizontal shaft 7, which extends entirely across the supporting-frame from one end to the other and is connected by sprocket-gearing with a drive or crank shaft 8, from which it receives its motion. The drive or crank shaft 8, which is journaled in suitable bearings of the supporting-frame at the bot-

tom thereof, is provided with central and side cranks 9 and 10, and it has suitable pedals 11 and 12 mounted on the same and adapted to be engaged by the feet of the operator, an adjustable seat 13 being provided for the accommodation of the latter. The adjustment of the seat may be effected by any suitable means to enable it to be properly positioned to suit the convenience of the operator and to permit the proper power to be applied to suit the character of the work to be performed. The seat, which may be constructed in any suitable manner, is secured to the outer ends of supporting bars or arms which are mounted on the supporting-frame at the ends thereof. The drive or crank shaft 8 carries a sprocket-wheel 15, which is connected by a sprocket-chain 16 with a pinion 17 of the horizontal central shaft 7, and these sprocket-gears may be keyed or otherwise secured to their respective shafts.

At one end of the horizontal shaft 7 is arranged a large stepped pulley 18, adapted to receive a belt 19 for connecting it with a reversely-arranged small stepped pulley 20 of a horizontal shaft or spindle 21, which is adapted, by means of the said pulleys 18 and 20, to be run at different speeds, as will be readily apparent. The large pulley 18 is provided at its inner face with a series of concentric gears 22, adapted to mesh with a spur-pinion 23 of a vertical shaft 24, and these concentric gears, which may consist of independent rings secured to the inner face of the pulley, can be constructed in any suitable manner and are adapted for driving the vertical shaft 24 at different rates of speed, as will be readily apparent. The spur-pinion 23, which is mounted on the vertical shaft 24, is capable of vertical adjustment to arrange it in mesh with any one of the central gears of the large pulley 18. The vertical shaft 24, which is located at the exterior of the adjacent end of the frame, is journaled in a bearing 25, which is designed to be adjustably and detachably secured to the frame and which consists of a bar extending across the space between the legs or standards 2, as clearly illustrated in Fig. 4 of the accompanying drawings.

The horizontal shaft or spindle 21, which is arranged at the top of the supporting-frame, is journaled in suitable brackets or supports

26 and 27, and it is provided at its outer end with an emery-wheel 30, which is secured to the shaft or spindle 21 by a nut 28, arranged on the threaded end 29 of the said shaft 21 and engaging the emery-wheel. Instead of employing an ordinary emery-wheel, as illustrated in the accompanying drawings, any other grinding or polishing device may be mounted on the shaft 21, and any suitable form of table or support may be used for holding the work, if found necessary or desirable. Also a spur or sprocket pinion may be substituted for the emery-wheel for driving other attachments or machinery.

The inner end of the horizontal shaft or spindle 21 carries a nut 31, adapted for securing circular saws and various other devices for cutting or otherwise operating on wood or metal to the shaft, and it is provided with spurs 32 to enable it to operate as a chuck. Various tools, polishing devices, and the like may be conveniently mounted on the inner end of the shaft 21 for operating on various objects and materials for a variety of purposes. Also any other form of clutch or chuck may be mounted on the inner end of the shaft for holding either material or tools.

The upper end of the shaft 24 carries a horizontal pulley 33, which is adapted to receive a horizontal belt 34 for a purpose hereinafter explained, and the horizontal shaft 7 also carries a combined pulley and balance-wheel 35, which is provided at its inner face with a series of concentric gears 36, adapted to mesh with a vertically-adjustable pinion 37 of a vertical shaft 38, disposed opposite the vertical shaft 24 and mounted in a like manner and provided at its upper end with a horizontal pulley 39.

The pulley 35 is adapted to receive the belt 40, which is detachably arranged on a small pulley 41 of a fan-shaft 42 of a suitable rotary fan 43, adapted to drive a blast of air through a tapering tube 44 to a forge 45, mounted upon a suitable support at the right-hand side of the supporting-frame, as clearly shown in Fig. 1. The upper end of the tube or conduit 44 is connected with the air and cinder box 46 at the bottom of the forge, and a nipple 47 is provided at a point between the ends of the tube or conduit for the attachment of a flexible tube or other suitable means for carrying a blast of air in front of the operator for removing dust, shavings, and the like from the work. Also such a flexible tube may be connected with a blowpipe, gasolene or spirit lamps, and various other devices and operations where a blast of air or air under pressure may be necessary or desirable. The forge 45, which is closed, as shown, is adapted for light smithwork of a general character and is designed to furnish heat for various other operations, and the top or casing is preferably removable from the base, so that it may be utilized as a furnace, the base being adapted to receive a vertical boiler which may be connected with a verti-

cal or other engine for demonstrating the application of steam or for other purposes. The pipe or conduit 44 is provided at a point above the nipple or branch 47 with a cut-off or gate 48 for controlling or entirely shutting off the air from the forge, to regulate the latter, and to prevent air from entering the same when the nipple or branch 47 is in use.

A combined vise and anvil 49 is arranged at the right-hand side of the apparatus adjacent to the forge, and at one side of the combined vise and anvil is located a box or support 50, adapted to receive a kit of tools. The forge may be readily detached and removed from the support upon which it is mounted when desired.

If desired, a train of gears may be connected with the drive or power shaft for obtaining a slow speed with great power or leverage, which may be advantageously utilized for raising heavy objects or for operating punching, shearing, and other attachments requiring great power and slow speed. The framework may be constructed of any suitable material, either wood or metal, and it is preferably mounted upon casters to enable it to be readily moved about.

The apparatus is provided at its back with dynamos 51 and 52, which may be driven simultaneously or independently and which may be employed for lighting the apparatus at night or for any other work or operation for which a dynamo may be employed. The dynamo 51 is provided with a pulley 53, which is connected by a belt 54 with the combined balance-wheel and pulley 35. The other dynamo 52 is connected by a belt 55 with the large pulley 18 at the left-hand side of the machine. These belts 54 and 55 are designed to be removed when it is not desired to operate the dynamos, which are adapted for general electrical work.

The belt 34, which is arranged horizontally, extends from the horizontal pulley at the upper end of the shaft 24 to a vertical spindle or shaft 56, which is adapted to carry a knife 57 or other suitable tool or device for shaking, grooving, or otherwise operating on material. The shaft or spindle 56 is journaled in upper and lower bearings 58 of an approximately U-shaped frame, which is located between the horizontal bars 6, which form the bed of the lathe, and which is secured to a transverse plate 59, arranged on the upper face of the bed of the lathe and detachably secured thereto by a vertical rod or bolt 60, as clearly shown in Fig. 7 of the accompanying drawings. The plate 59, which extends in advance and in rear of the horizontal bars 6, is perforated for the reception of the rod 60, which has its lower end threaded for the reception of a nut 61. The lower end of the rod or bolt 60 receives a transverse bar or plate 62, which engages the lower faces of the bars 6 of the supporting-frame and securely clamps the attachment or former thereon, and the said attachment or former may be readily

removed by unscrewing the thumb-nut 61 and detaching the bar or plate 62. The vertical shaft or spindle 56 extends through an opening of an adjustable table 63 and is threaded at 64 for the reception of a nut 65, which secures the knife 57 or other tool to the shaft or spindle. The table, which is adapted to be raised or lowered to suit the character of the tool and the size of the work, is provided at its front with a depending arm, which extends through an opening of the plate 59 and is engaged by a set-screw 67, that is mounted in a threaded perforation of the said plate 59. The belt 34 is arranged on a pulley 68 of the vertical shaft or spindle 56; but, if desired, the latter may be connected at its lower end with one of the vertical shafts, which are driven by the concentric gears. Also any suitable device may be provided for compressing or liquefying air, and I desire it to be understood that various changes in the form, proportion, and minor details of construction within the scope of the appended claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

It will be seen that the apparatus is simple and comparatively inexpensive in construction, that it is especially designed for use in industrial and manual-training schools, that it will enable a pupil to be fully instructed in all the branches of a complete course in such schools, and that it will develop all of the muscles of the body and does not overtax the upper portion of the body and leave the lower limbs undeveloped. It will also be apparent that the apparatus is adapted for operating all kinds of devices and attachments for operating on wood, metal, and other material and that a variety of speeds is provided for enabling such attachments and devices to be properly operated.

What I claim is—

1. In an apparatus of the class described, the combination of a frame, a crank-shaft arranged at the bottom of the frame, the horizontal shaft 7, located above and connected with the crank-shaft, a pulley mounted on the shaft 7 and provided at one of its faces with gears, the vertical shaft extending upward from a point above the horizontal shaft 7 and provided at its top with a pulley located at the top of the frame, and a vertically-adjustable pinion mounted on the vertical shaft and adapted to mesh with the said gears, substantially as described.

2. In an apparatus of the class described, the combination of a frame, a horizontal crank-shaft arranged at the bottom of the frame, the horizontal shaft 7, located above the crank-shaft and connected therewith, the vertical pulleys mounted on the shaft 7 and provided at their inner faces with gears, the vertical shafts located at opposite sides of the frame and extending to the top thereof and provided with horizontal pulleys, and the vertically-adjustable pinions mounted on the

vertical shafts and adapted to mesh with the said gears, substantially as described.

3. In an apparatus of the class described, the combination of a frame, a horizontal crank-shaft arranged at the bottom of the frame, the horizontal shaft 7 located above and connected with the crank-shaft, the vertical shafts located above the shaft 7 and extending to the top of the frame and provided with horizontal pulleys, the vertical pulleys mounted on the shaft 7 and provided with gears, the vertically-adjustable pinions mounted on the vertical shafts and adapted to mesh with the gears, the vertical spindle adapted to hold a tool and located between the vertical shafts, a horizontal pulley mounted on the vertical spindle, and a belt adapted to connect the pulley of the spindle with either of the pulleys of the vertical shafts, substantially as described.

4. In an apparatus of the class described, the combination of a frame, the shaft 7 arranged horizontally, means for rotating the shaft 7, a pulley mounted on the shaft 7, and provided at one of its faces with gears, the vertical shaft having an adjustable pinion adapted to mesh with the said gears, a vertical spindle provided at its upper end with means for holding a tool, pulleys mounted on the vertical shaft and on the vertical spindle, and a belt connecting the pulleys, substantially as described.

5. In an apparatus of the class described, the combination of a frame, a crank-shaft arranged at the bottom of the frame, the horizontal shaft 7 located above and connected with the crank-shaft, a pulley mounted on the shaft 7 and provided at one of its faces with gears, the vertical shaft having an adjustable pinion adapted to mesh with the said gears, a vertical spindle provided with means for holding a tool, and means for connecting the spindle with the vertical shaft, substantially as described.

6. In an apparatus of the class described, the combination of a frame, a crank-shaft arranged at the bottom of the frame, the horizontal shaft 7 located above and connected with the crank-shaft; a pulley mounted on the shaft 7 and provided at one of its faces with gears, the vertical shaft having an adjustable pinion adapted to mesh with the said gears, a vertical spindle provided at its upper end with means for holding a tool, pulleys mounted on the vertical shaft and on the vertical spindle, and a belt connecting the pulleys, substantially as described.

7. In an apparatus of the class described, the combination of a frame provided with bars 6 spaced apart, a table adjustably mounted on the frame, and having an opening, a spindle extending vertically through the opening and provided at its upper end with means for holding a tool, the horizontal shaft 7, the vertical pulley mounted on the horizontal shaft and provided at one of its faces with gears, the vertical shaft having an ad-

justable pinion adapted to mesh with the said gears, horizontal pulleys mounted on the vertical shaft and on the spindle, a belt connecting the horizontal pulleys, and means for
5 operating the horizontal shaft, substantially as described.

8. In an apparatus of the class described, the combination of a frame provided at the top with an opening, a plate extending across
10 the opening, a substantially U-shaped frame secured to the plate and provided with bearings, a table adjustably mounted on the plate and having an opening, a shaft journaled in
15 the bearings of the U-shaped frame and extending through the opening of the table and adapted to receive a tool, and means for driving the shaft, substantially as described.

9. In an apparatus of the class described,

the combination of a supporting-frame having an opening, a plate extending across the
20 opening of the supporting frame, a clamping device connected with the plate and extending through the said opening and engaging the frame, a substantially U-shaped frame
25 arranged in the opening of the supporting-frame and secured to the said plate, and a table having an opening and provided with an arm detachably secured to the plate, substantially as described.

In testimony that I claim the foregoing as
30 my own I have hereto affixed my signature in the presence of two witnesses.

JOHN E. KELLY.

Witnesses:

A. L. MCINTOSH,

D. D. KELLY.