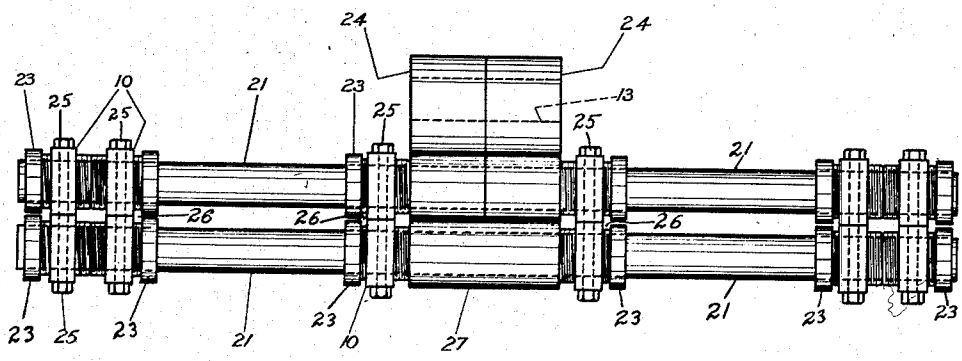
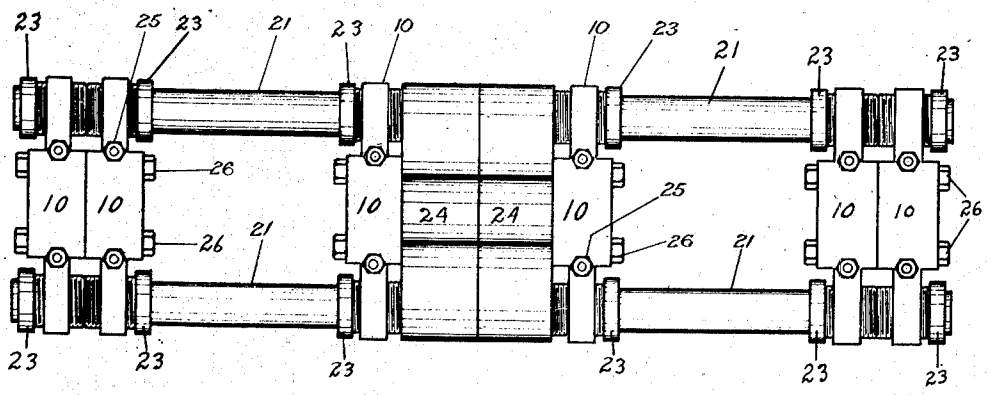
Nov. 21, 1944. K. W. NOLAN 2,363,195

MANUFACTURE OF MACHINE TOOLS

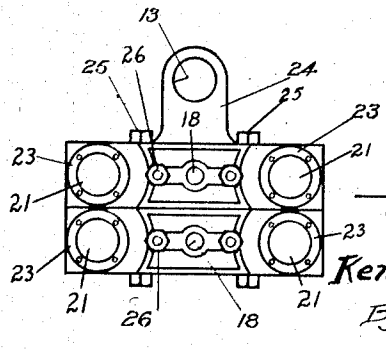
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— FIG. 2 —



— FIG. 1 —



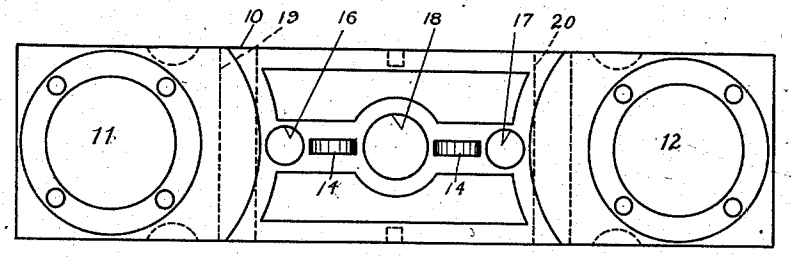
— FIG. 3 —

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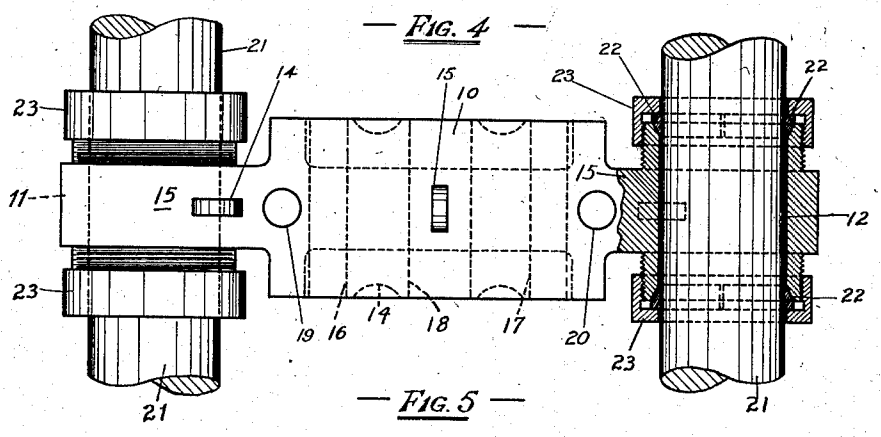
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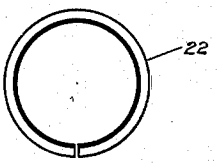
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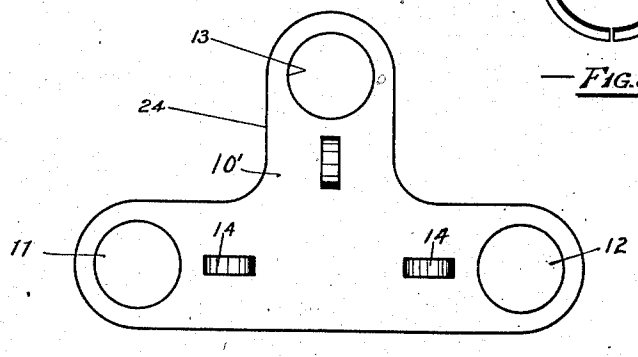
— FIG. 4 —



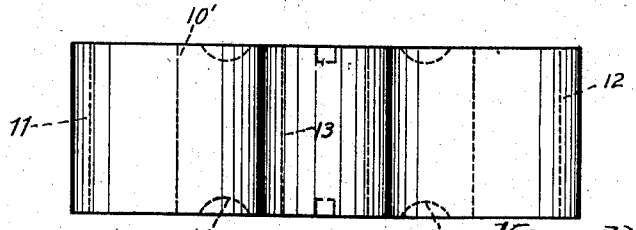
— FIG. 5 —



— FIG. 8 —



— FIG. 6 —



— FIG. 7 —

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Patented Nov. 21, 1944

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UNITED STATES PATENT OFFICE

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MANUFACTURE OF MACHINE TOOLS

Kenneth William Nolan, North Perth, Western Australia, Australia

Application April 21, 1942, Serial No. 439,943
In Australia June 9, 1941

9 Claims. (Cl. 82—32)

This invention relates to improvements in the manufacture of machine tools.

A large proportion of the time and expense involved in manufacturing machine tools is associated with the various supporting beds on which the mounted tools slide in operation. These parts of the machine tools require heavy equipment, skilled labour and great precision. Thus, the actual scraping of the beds is a particularly difficult operation which only relatively few tradesmen are capable of undertaking. In consequence, rapid acceleration in the production of machine tools is limited by the foregoing, as most other parts of the machines are capable of mass production.

A primary object of the present invention is to provide precision units which can be assembled to give precision frames, guides, supports and slides so that the tools can in the main be built up in a short space of time from these mass-produced units.

The invention therefore consists broadly in the use of precision built constructional units which can be assembled so as to provide frames, supporting bases and slides. The main units concerned comprise what may be termed links, each having true faces and two or more spaced holes. These units are used in pairs in conjunction with precision shafts which are located or held therein by means that centralise the clearance. The invention will, however, more readily be understood by reference to the accompanying drawings. In these drawings is shown a frame and a slide built up of the mass-produced precision units. The number of different frames and the like that can be built up is practically without limit, so that almost any type of machine tool can be built up in a rapid manner.

In these drawings, Fig. 1 is a plan of a frame and slide; Fig. 2 is a side elevation thereof; Fig. 3 is an end elevation; Fig. 4 is an end elevation of a link on a larger scale than in the foregoing figures; Fig. 5 is a plan of a link showing means for locking the precision shafts thereto; Fig. 6 is an end elevation of a link having three holes therein; this being on a smaller scale than in the two preceding figures; Fig. 7 is a plan of the three-hole link; and Fig. 8 is an end elevation of a tapered split locking ring.

As shown in the drawings, link members 10 are employed. These have true faces at right angles to each other and two spaced holes 11 and 12 which are an exact counterpart of the other links that are used in conjunction therewith. In the case of a three-hole link 10', as shown in Fig. 6, the third hole is referenced 13. Each link on each face may be provided with keyways 14 and 15, to receive keys, such as keys of the Woodruff type to enable the links to be guidingly brought face to face in true alignment. In some cases dowels may be used for this purpose. Each link will preferably be provided with bolt holes 16 and 17 passing through it in the same direction as the holes 11 and 12. There will also be a central locating hole 18 and bolt holes 19 and 20 at right angles thereto. The purpose of these will be apparent later in the description. There are precision shafts 21 adapted for a sliding fit in the holes 11 and 12, and these shafts are of smaller diameter than the holes and supported or held relatively in such holes by means that adjust and centralise the shafts so that the axial centers of the shafts coincide or aline accurately with the axial centers of the holes. In other words, the shafts are held in the holes so that when a shaft is centered there is the same very small space all around between the shaft and the face of the hole. The foregoing may be effected in a number of ways. One way is that illustrated, by the use of tapered split micrometric adjusting and locking rings 22. These fit into a taper formed at the entrance to the hole 11 or 12 on each side and have pressure applied thereto by a locking collar 23 that is adapted to screw on threads formed on each side of the bosses of the link 10. It will be obvious that two shafts so held between two spaced links, may be micrometrically adjusted with relation to each other and locked in adjusted position so that the shafts will be absolutely parallel, and this is the basis on which the construction of the units is based.

If reference is made to the example shown in Figs. 1, 2 and 3, it will be seen that there are four precision shafts 21, which at each end are held in four precision links 10 and locked thereto in a manner that centralises the clearance. At each end the four links 10 employed are bolted together by vertical bolts 25 and by horizontal bolts 26. The use of the keys referred to in the keyholes 14 and 15 will give an absolutely true frame in which there are the four shafts 21 parallel to each other. Adapted to move on these shafts is a slide unit. This may be a built up unit that is comprised of two three-hole link members 24 that are held in the two upper precision shafts 21. Obviously one large link 24 could be built and answer the same purpose. There are also two spacing or distance members 27. These are members having the precise length re-

quired with true parallel faces, and held in position as are the three unit link members 24 by a link member 10 on each side. As far as the slide is concerned, this means that there are two link members on each side of the three-hole links 24 and also two link members one on each side of the distance members 27. It will be obvious that as this slide unit is to be capable of movement on the precision shafts 21, the collars 23 are used to confine in each link and spacing unit a store of lubricant which seals the clearance space between the unit and shaft. The third hole 13 in the links 24 can be used as a bearing for a rotating tool shaft or a dead shaft.

It will be apparent that when reference is made to precision shafts, this will include shafts which are hollow. It will also be obvious that if hollow shafts are used, these may be locked to the links when so required by expansion caused by pressure exerted internally in any desired manner.

In some cases links having more than three holes may be used.

I claim:

1. Improvements in machine tools comprising the combination of precision built links having holes therein in precision alignment, two pairs of parallel precision shafts fitted in the holes in the links, said shafts being of smaller diameter than said holes, adjusting and locking means for centralizing the shafts in the holes and locking the shafts to the links, one or more three-hole precision links adapted to slide on the shafts of one pair and having a third hole for use as a bearing for a revolving tool shaft or dead shaft, links on each side of and secured to the three-hole link or links, and a distance member with two parallel end faces held in position on the other pair of shafts by certain of said links.

2. A frame construction for machine tools comprising a pair of spaced parallel links having parallel holes formed therein, the holes in one link being in line with the holes in the other link, a pair of parallel non-rotatable rods or shafts fitted in the holes in the links, the shafts being of smaller diameter than the holes so that the opposed surfaces of the shafts and walls of the holes are spaced from each other, and separate adjusting means at each end of each hole in each link for adjusting the shafts in the holes relative to the walls of the holes and to each other so as to bring the axes of the shafts and holes in accurate alinement and the shafts in true parallelism.

3. A frame construction for machine tools comprising a pair of spaced parallel links having parallel holes formed therein, the holes in one link being in line with the holes in the other link, a pair of parallel non-rotatable rods or shafts fitted in the holes in the links, the shafts being of smaller diameter than the holes so that the opposed surfaces of the shafts and walls of the holes are spaced from each other, separate adjusting means at each end of each hole in each link for adjusting the shafts in the holes relative to the walls of the holes and to each other so as to bring the axes of the shafts and holes in accurate alinement and the shafts in true parallelism, and locking means at the end of each hole in each link for locking the adjusting means in adjusted position and fixing the rod or shaft to the link.

4. A frame construction for machine tools comprising a pair of spaced parallel links having parallel holes formed therein, said holes having tapered end portions and the holes in one link being in line with the holes in the other link, a pair of parallel non-rotatable rods or shafts fitted in the holes in the links, the shafts being of smaller diameter than the holes so as to leave clearance spaces between the same and the walls of the holes, tapered adjusting rings fitted about the shafts at each end of each hole in each link and movable longitudinally thereof and in engagement with the tapered end portions of the holes for adjusting the shafts to centralize the shafts in the holes and to bring said shafts into absolute parallelism, and means for adjusting said rings and locking the same in adjusted position and also fixing the shafts against rotation to the links.

5. A frame construction for machine tools comprising a pair of spaced parallel links having parallel holes formed therein, said holes having tapered end portions and the holes in one link being in line with the holes in the other link, a pair of parallel non-rotatable rods or shafts fitted in the holes in the links, the shafts being of smaller diameter than the holes so as to leave clearance spaces between the same and the walls of the holes, split spring, tapered adjusting rings fitting about the shafts and projecting into the opposite ends of the holes in the links and movable longitudinally thereof and in engagement with the tapered end portions of the holes for adjusting the shafts to centralize the shafts in the holes and to bring said shafts into absolute parallelism, and means about each shaft at opposite sides of each link and engaging the rings at each end of each hole therein for adjusting said rings and locking the same in adjusted position and fixing the shaft to the link.

6. A frame construction for machine tools comprising a pair of spaced parallel links having end portions with parallel holes formed therein, said holes having tapered end portions and the holes in one link being in line with the holes in the other link, a pair of parallel non-rotatable rods or shafts fitted in the holes in the links, the shafts being of smaller diameter than the holes so as to leave clearance spaces between the same and the walls of the holes, split spring, tapered adjusting rings fitting about the shafts and into the tapered ends of the holes in the links and movable longitudinally thereof and in engagement with the tapered end portions of the holes for adjusting the shafts to centralize the shafts in the holes and to bring said shafts into absolute parallelism, and collars about each shaft at opposite sides of each end of each link and in threaded engagement with said ends of the link and in contact with the rings at the ends of the hole therein for adjusting the rings and locking them in adjusted position and fixing the shaft to the link.

7. In a frame construction for machine tools, frame members comprising a pair of links each having a body portion of rectangular formation and formed with substantially flat faces arranged at right angles to each other adapting the links to be arranged in side-by-side or superposed abutting relation, said links having pairs of registering holes adapting the links to be bolted together side by side and also having pairs of registering holes adapting them to be bolted together in superposed relation, and each link being further provided with cylindrical end openings terminating in tapered end portions.

8. Improvements in machine tools comprising the combination of two spaced sets of links each consisting of two pairs of spaced, parallel pre-

cision built links having holes therein in precision alignment, two pairs of parallel precision shafts fitted in the holes of the links of the respective pairs of each set of links, bolts connecting the links of each pair of links, bolts connecting the pairs of links of each set of links, means for centralizing the shafts in the holes of the links and locking the shafts to the links, and a slide unit adapted to slide on the shafts.

9. Improvements in machine tools comprising the combination of two spaced sets of links each consisting of two pairs of spaced, parallel precision built links having holes therein in precision alignment, two pairs of parallel precision shafts fitted in the holes of the links of the respective pairs of each set of links, bolts connecting the links of each pair of links, bolts connecting the pairs of links of each set of links, means for centralizing the shafts in the holes of the links and locking the shafts to the links, and a parallel slide unit formed of links slidably mounted on the shafts, distance members slidably mounted on the shafts on opposite sides of said sliding links, and means for holding said sliding links and distance members assembled and in sliding engagement with the shafts.

KENNETH WILLIAM NOLAN.