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MACHINE TOOL

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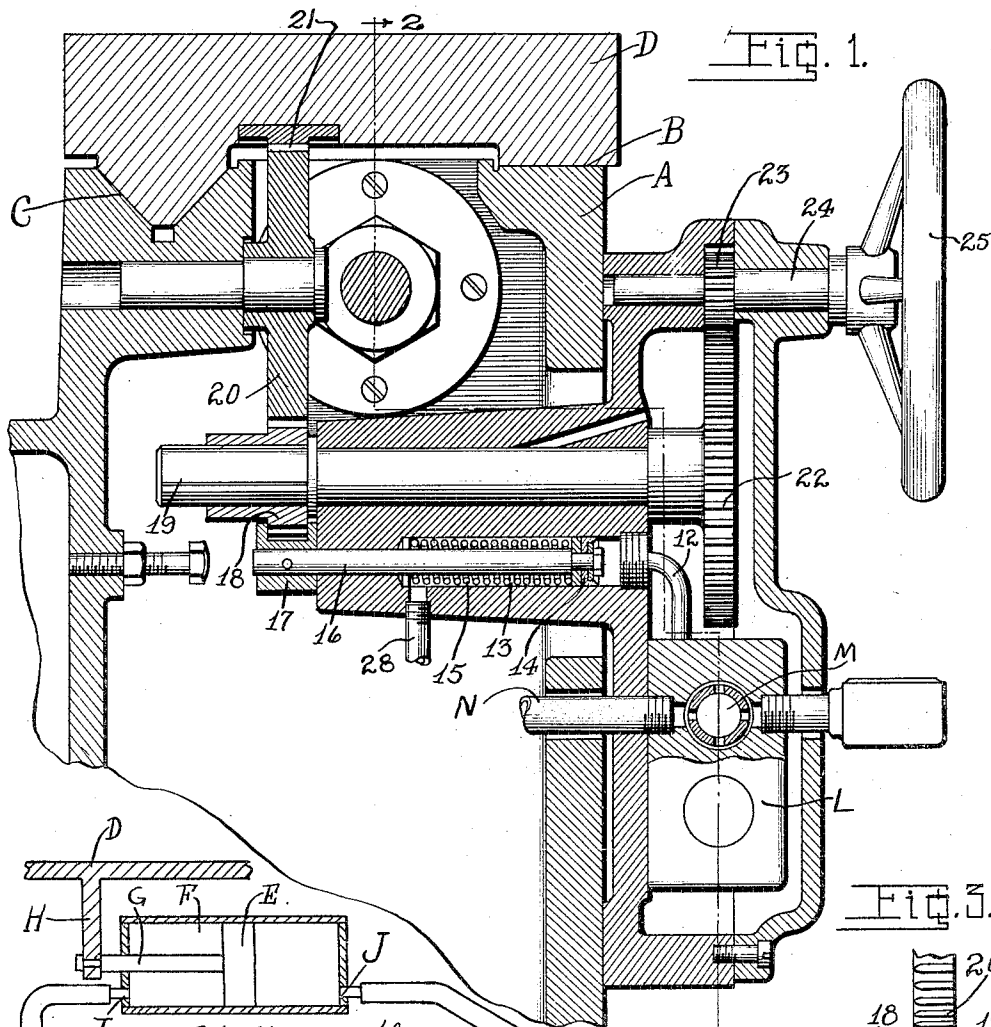


Fig. 1.

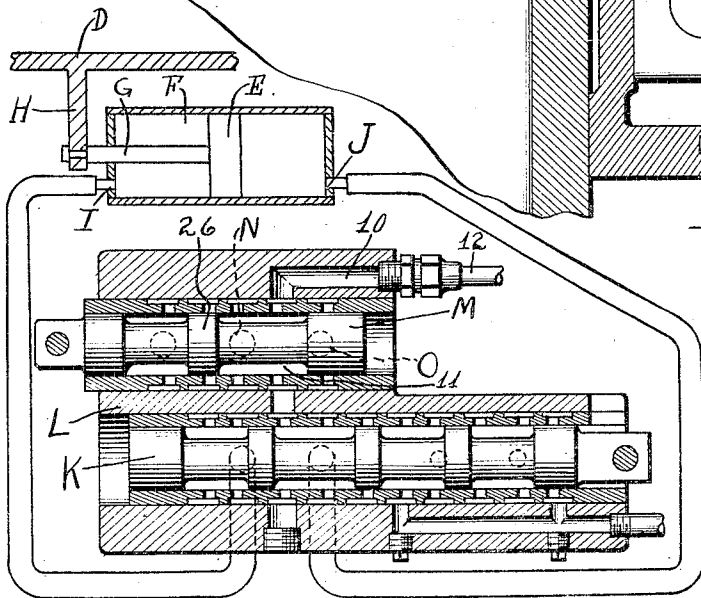


Fig. 2.

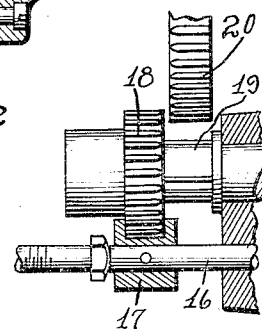


Fig. 3.

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MACHINE TOOL

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This invention relates to improvements in machine tools and has particular reference to an improved control mechanism therefore particularly adapted for use in conjunction with hydraulically operated mechanisms such as the table, wheel slide or the like of conventional grinding machines.

In machine tool mechanisms in which there are power actuated shifting parts it is desirable and customary to provide supplemental or alternatively employable means for manual adjustment thereof.

One of the objects of the present invention is the provision of an automatic control for the coupling of the power and manual adjusting devices for such parts which will increase the safety of operation of the machine by insuring disengagement of the manual operating mechanism therefore thus eliminating the liability of the operator being accidentally injured by a turning part when the parts are subject to power actuation.

A further object of the invention is the provision of an improved mechanism which will render the manual adjusting device automatically available at all times when the parts are not being power actuated thus resulting in a saving of time of the operator in effecting desired adjustments.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification taken in conjunction with the accompanying drawings and it will be understood that I may make any modifications in the specific structural details hereinafter disclosed within the scope of the appended claims without departing from or exceeding the spirit of the invention.

Figure 1 is a vertical sectional view through a portion of a grinding machine illustrating the prime features of the present invention.

Figure 2 is a vertical section as on line 2—2 of Figure 1 through the valve mechanism with the piston and cylinder for actuation of the machine tool table diagrammatically indicated in conjunction therewith.

Figure 3 is a fragmentary view showing the disengaged position of the manual shifting means.

In the drawings, in which the invention is

shown as applied to a grinding machine, the letter "A" designates the bed of the machine having the ways "B" and "C" supporting the reciprocating table member "D". This table is designed to have a reciprocating or back and forth movement imparted thereto as by the piston "E" reciprocable within the pressure cylinder "F." The piston has its rod "G" suitably connected as by bracket "H" to the table so that the parts may move together.

Connections "I" and "J" extend from opposite ends of the cylinder so that the same may be power actuated in either direction as desired. This directional actuation is controlled by a reversing valve "K" contained within the valve box "L" and serves in a well known manner to selectively couple one end of the cylinder with a suitable pump or other pressure supply source and the opposite end with the exhaust line.

It will be noted that the valve box L contains a second sliding valve M which governs the general starting and stopping of the machine. The pressure for actuation of the table cylinder is introduced through the pressure inlet line N while a pressure relief or outlet connection is provided as at O. This valve controlling the flow of actuating pressure into the valve box where its distribution is governed by the position of the reversing valve K.

It will be noted by reference to Figure 2 of the drawings that the valve box L is formed at a point intermediate the inlet N and outlet O with a branch port or passage communicating with the valve cylinder space 11 common to ports N and O. Leading from the port 10 is a conduit 12 extending to cylinder 13 having slidably mounted therein the piston 14 outwardly actuated by spring 15 surrounding a piston rod 16. This rod has on its rearwardly projecting end the shifter yoke 17, spanning pinion 18, splined on shaft 19. In its forward position the pinion meshes with transmission gear 20 carried by the bed and in continuous mesh with rack 21 on the under side of the table. Shaft 19 is further provided with an actuating gear 22 adapted to be rotated by pinion 23 on

shaft 24 having the hand wheel 25 at the front of the machine.

By reference to Figure 1 it will be seen that when the parts are in normal position there is a complete gear line transmission from hand wheel 25 at the front of the machine to rack 21 on the under side of the table so that manual rotation of wheel 25 will correspondingly shift the table member.

However when the starting valve is moved to the left hand position shown in Figure 2 admitting pressure through line N to the valve box L a portion of this pressure will by-pass through line 12 into cylinder 13 forcing piston 14 rearwardly against the pressure of spring 15. This rearward movement will shift pinion 18 out of engagement with gear 20 as shown in Figure 3 thus automatically disconnecting the manual actuating mechanism at the same moment that actuating power is introduced into the valve chamber for hydraulic shifting of the table. The pinion will be held disengaged so long as pressure is being admitted to the valve box for such power actuation. Reversely when the starting valve is shifted toward the right the valve flange 26 will shut off the introduction of pressure from line N to space 11 and will couple this space with exhaust hole thus relieving the pressure in cylinder 13. Expansion of spring 15 will then move pinion 18 back into mesh with gear 20 when the parts are in condition for manual actuation.

To prevent accumulation of pressure in the rear of cylinder 13 a suitable outlet 28 is coupled therewith taking care of any leakage past the plunger.

I claim:

1. In a machine of the character described the combination with a pair of relatively translatable parts of power means for imparting such relative movement, auxiliary manually actuatable means for imparting such movement having an independent connection with the parts and automatic means for selectively determining the availability of said shifting mechanisms.

2. In a machine tool, the combination with a pair of relatively translatable parts of power means for effecting such translation, manual means selectively operable to effect such translation having an independent connection with the parts and means for automatically rendering the manual mechanism inoperative when the power mechanism is rendered operative.

3. In a machine tool, the combination with a pair of relatively translatable parts of power means for effecting such translation, manual means selectively operable to effect such translation having an independent connection with the parts, means for automatically rendering the manual mechanism inoperative when the power mechanism is rendered

operative, and means for automatically reconnecting the manual control mechanism.

4. In a hydraulically actuated machine tool the combination with a pair of relatively translatable parts of means for hydraulically translating same, additional known hydraulic means for effecting a corresponding movement, mechanical means for effecting a translation of the parts and an hydraulic disconnecter automatically actuatable by application of hydraulic power to the machine to disconnect the other actuating mechanism.

5. In a hydraulically actuated machine tool the combination with a pair of relatively translatable parts of means for hydraulically translating same, additional known hydraulic means for effecting a corresponding movement and an hydraulic disconnecter automatically actuatable by application of hydraulic power to the machine to disconnect the other actuating mechanism, and additional means for automatically reconnecting said other mechanism on discontinuance of the hydraulic actuation of the parts.

6. A machine of the character described including a bed, a table reciprocable thereon, an hydraulic transmission line for supplying actuating power to the table, a mechanical transmission line for supplying actuating power to the table and connections between the hydraulic and mechanical lines for rendering the mechanical line inoperative when the actuating mechanism of the hydraulic line is operated.

7. In a machine tool structure the combination with a pair of relatively translatable parts, of an interruptible mechanical transmission for effecting said relative movement, an hydraulically actuatable means for interrupting said mechanical transmission, and additional means for automatically re-establishing the effectiveness of the mechanical transmission.

8. In mechanism of the character described, the combination with a pair of relatively translatable parts of hydraulic means for actuating said parts, an interruptible mechanical transmission for actuating said parts, an hydraulically actuatable interrupter for the mechanical transmission and a single control valve for simultaneously coupling an hydraulic actuating supply with the translating mechanism and the interrupter.

9. In an hydraulic grinder, the combination with a bed and a unit reciprocable on the bed, of a mechanical transmission for effecting movement of the unit, said transmission including a part movable to interrupt the transmission train, hydraulically actuatable means for shifting the interrupter in one direction and resilient means for oppositely urging same when the hydraulic pressure is relieved.

10. In a machine of the character described the combination of a bed, a translatable mem-

ber carried thereby, a rack secured to the member, a manually actuable hand wheel carried by the bed, a gear train extending between the hand wheel and the rack and oper-
5 able by the hand wheel, the said gear train including a shiftable gear to interrupt the gear train, power means connected with the member for actuating same, and automatic means for shifting the slidable gear to inter-
10 rupt the gear train when the power means is employed.

11. In a machine of the character described the combination with a bed, a member carried thereby and translatable relative there-
15 to, a piston operatively coupled with the member, a cylinder enclosing the piston, an hydraulic medium, a conduit extending from opposite ends of the cylinder for conveying the hydraulic medium thereto, a valve in the
20 conduit controlling the flow of the medium through the conduit, an interruptible mechanical transmission line for translating the table, and means actuable by the hydraulic medium simultaneously with the flow of the
25 medium through the conduit for interrupting the mechanical transmission line when the hydraulic mechanism is employed for translating the member.

12. In a machine of the character described
30 the combination with a bed, of a table carried thereby and translatable relative thereto, an hydraulically actuable mechanism for translating the table, including a source of fluid under pressure, and a valve controlling
35 the flow thereof, an interruptible mechanical transmission line for translating the table including a shiftable gear, a shifter rod therefor, a piston on the rod, a cylinder enclosing the piston, and a conduit extending from the
40 cylinder to the control valve for conveying the hydraulic medium to the cylinder on operation of the valve to actuate the piston and shift the gear to interrupt the mechanical transmission line when the hydraulic mecha-
45 nism is actuated.

In testimony whereof I affix my signature.
FREDERICK S. HAAS.

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