Aug. 29, 1939. A. M. JOHNSON 2,171,271

HONING MACHINE

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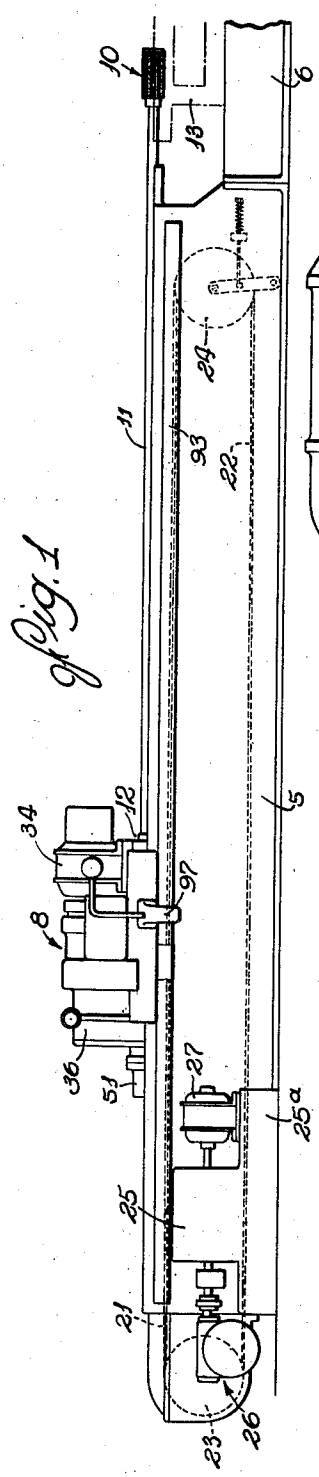


Fig. 1

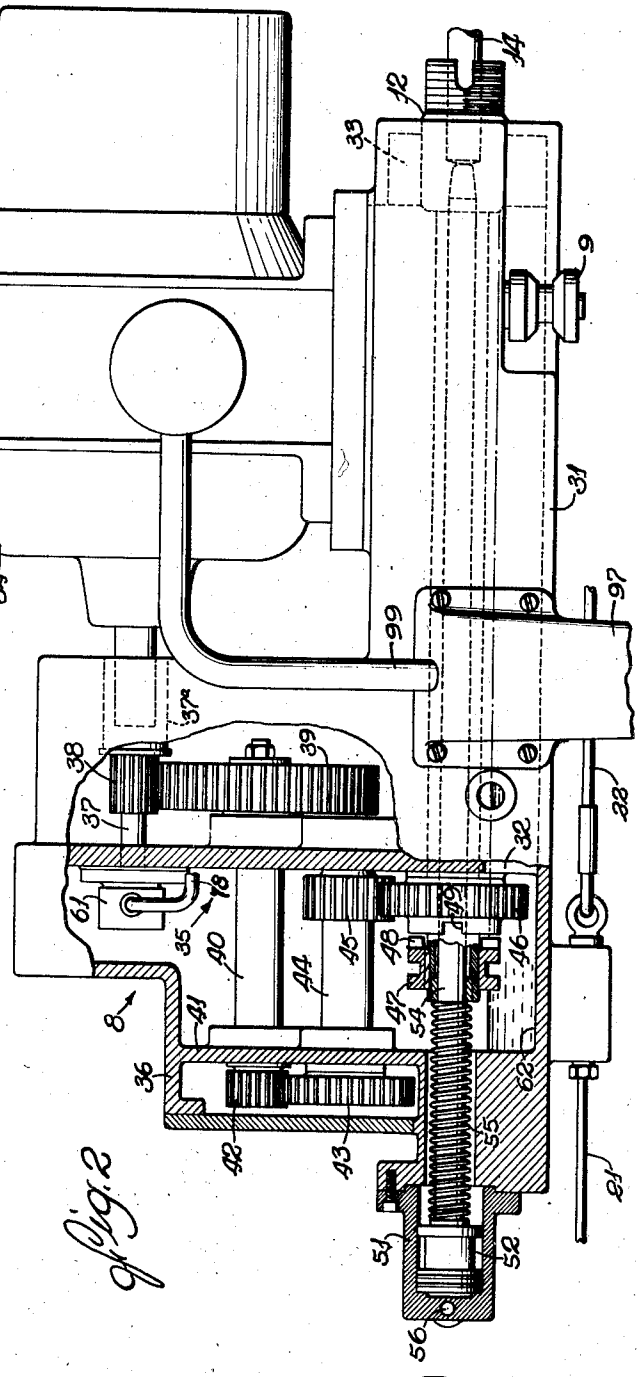


Fig. 2

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Fig. 3

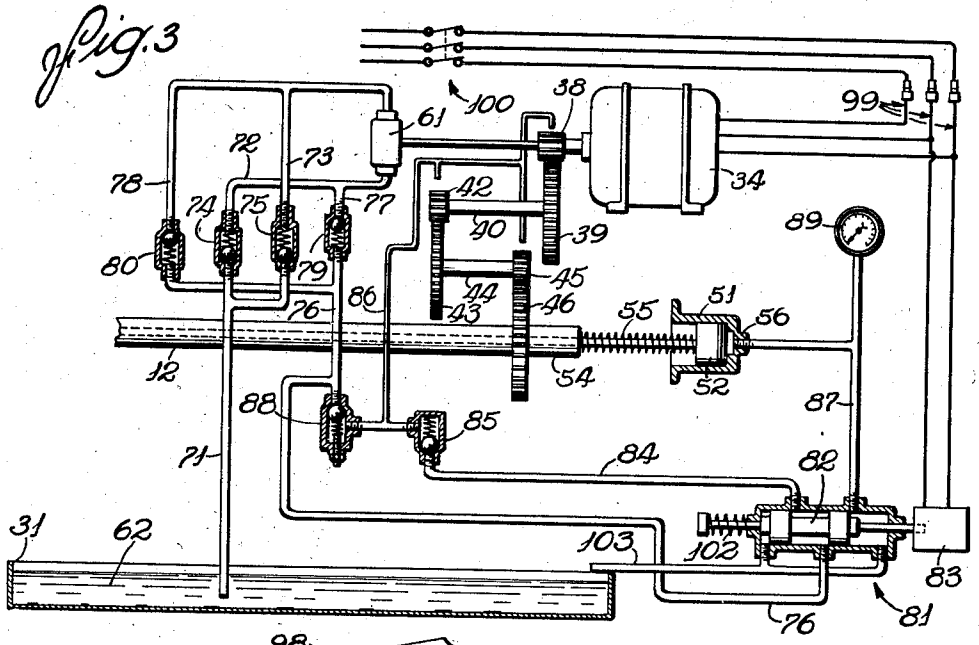
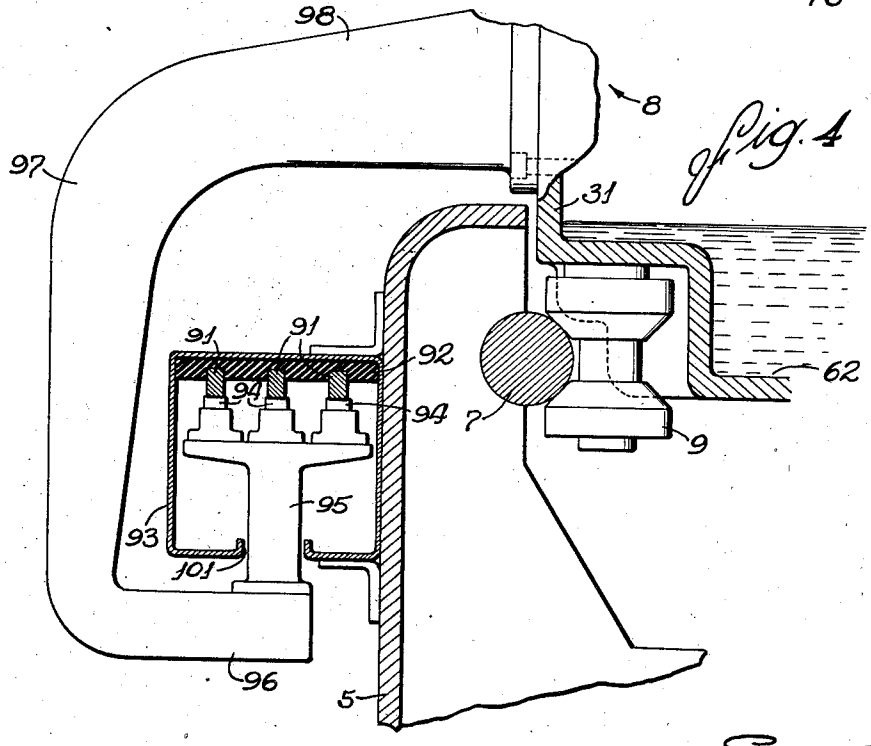


Fig. 4



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HONING MACHINE

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14 Claims. (Cl. 51—34)

The invention relates to honing machines generally, and more particularly to honing machines of the horizontal type.

Honing machines of the above general character are employed extensively in honing work pieces which, because of their relatively great length, are most conveniently supported in a horizontal position during the honing operation. In this operation, a rapidly rotating expansible abrasive tool or hone is reciprocated over the surface to be dressed, the stroke of the tool being of sufficient amplitude to traverse the same from one end of the work piece to the other. In horizontal machines as heretofore constructed, it has been found impractical to employ the newly developed and highly efficient pressure fluid-expanded hones such as those now used with the short stroke, vertical honing machines. This is due primarily to the difficulty of supplying pressure fluid to the tool-expanding mechanism throughout the long range of travel of the tool. The productive capacity of horizontal honing machines has therefore been limited due to the necessity of employing spring-expanded hones.

One object of the present invention is to overcome the above difficulties and to provide a practical and efficient horizontal honing machine adapted to utilize pressure fluid or other power-actuated hones capable of being expanded to exert a uniform pressure on the work throughout the entire honing operation.

In attaining the above object, advantage has been taken of the fact that full expansion of the honing tool may be effected by shifting the tool-expanding element through a comparatively short stroke and that movements of sufficient amplitude can be imparted to the element by a relatively small, compact hydraulically-actuated mechanism which requires a minimum amount of fluid for its proper operation. By reason of the foregoing and the further fact that a source of power is already available in the reciprocatory tool head, I have found it possible to incorporate in the head a complete pressure fluid supply system including a fluid storage reservoir, a pressure fluid pump, and the necessary control valves for supplying pressure fluid to expand the honing tool. Thus, I effectually overcome the limiting factors which have heretofore prevented the use of hydraulically-expanded hones in horizontal honing machines and provide a simple and practical means which enables such hones to be utilized successfully in any machine regardless of the length of working stroke of the machine.

Another object is to provide a novel arrangement of pressure fluid-actuated hone-expanding means and pressure fluid supply means arranged so that the supply of pressure fluid is automatically discontinued when the rotation of the tool is interrupted.

Still another object is to provide a novel fluid pressure supply system for honing machines whereby pressure fluid for actuating the honing tool may be derived from a rotary pump directly coupled with the spindle drive and rotatable in either direction with the tool spindle.

A further object is to provide improved means for supplying operating current to the spindle driving motor carried on a head which is reciprocated through a relatively long stroke.

Other objects and advantages of the invention will become apparent from the following detailed description of the preferred embodiment illustrated in the accompanying drawings, in which:

Figure 1 is a side elevational view of a horizontal honing machine embodying the features of the invention.

Fig. 2 is a vertical sectional view of the spindle head showing details of the spindle driving and tool-expanding mechanisms.

Fig. 3 is a diagrammatic view showing the mechanical and hydraulic means for driving the spindle and for expanding the tool.

Fig. 4 is a fragmentary view partly in section showing details of the current supply means.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail a preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

The machine selected to illustrate the invention comprises generally an elongated frame or base which, as shown in Fig. 1, consists of a main section 5 and an outboard section 6 bolted or otherwise rigidly secured together in end-to-end relation. Guide bars 7 (Fig. 4) mounted on the side walls of the base section 5 in parallel spaced relation constitute a guideway for a reciprocatory tool head 8. As herein shown, the head is supported on the guide bars by means of vertically disposed spool-shaped roller bearings 9 journaled on the head.

The outboard base section 6 is equipped with suitable fixtures for holding a work piece in a horizontal position to be operated on by a honing tool 10 carried at one end of a hone-driving shaft 11 which is secured at its other end to the projecting end of a rotatable tubular spindle 12 journaled in the head 8. The base section 6 is also equipped with a cradle 13 for supporting the honing tool 10 when withdrawn from the work.

The honing tool 10 may be of any suitable and well known type. It comprises generally a series of elongated abrasive stones arranged around a cylindrical carrier for radial movement into and

out of engagement with the surface of the work piece. In the case of tools designed for honing internal cylindrical surfaces, the abrasive stones are normally held within the carrier by means of annular springs and are moved radially outwardly or expanded to operate upon the work. This outward movement or expansion of the abrasive elements of the tool is effected by means of a movable tool-actuating element herein shown as a longitudinally shiftable rod 14 acting through suitable cams incorporated in the tool. As herein shown, the actuating rod 14 extends through the drive shaft 11 to the head 8 which is equipped with novel hydraulically-actuated means for shifting the rod to expand and contract the tool, as will be described in detail hereinafter.

Suitable means is provided for reciprocating the head 8 on the guideway to repeatedly traverse the honing tool from one end of the work piece to the other. Due to the relatively long stroke required for this purpose, the reciprocating means preferably comprises a pair of flexible cables 21 and 22 each connected at one end to the head 8 and anchored at the other end to a grooved cable drum 23 rotatably supported at one end of the base section 5. The cable 21 leads directly from the head to the cable drum while the cable 22 is carried over a sheave 24 yieldably supported at the opposite end of the base section 5. Thus, when the cable drum 23 is rotated, first in one direction and then in the other direction, the cables are alternately wound up and paid out to move the head back and forth on the guideway.

Rotation of the cable drum 23 is preferably effected by means of a hydraulic motor enclosed in a housing 25 supported on the sub-base 25a secured to one side of the base section 5 adjacent the end carrying the cable drum. The motor is drivingly connected with the drum through a worm drive mechanism indicated generally by the reference character 26. Pressure fluid is supplied to the motor by a suitable pump enclosed in the housing 25 and driven by an electric motor 27 mounted on the sub-base 25a. Suitable valves are interposed between the pump and the hydraulic motor for starting and stopping the cable drum and for controlling its direction of rotation as is well known in the art.

The head 8 in its preferred form comprises generally a rectangular hollow base casting 31 having an integrally formed cross member 32 which constitutes a rear bearing for the spindle 12. The spindle has a front bearing 33 at the forward end of the casting 31, the bearings being spaced apart so as to hold the spindle rigid and prevent vibration or chatter when the machine is operated.

Any suitable source of power such as a hydraulic or electric motor may be utilized for driving the spindle 12. Moreover, the driving motor may be mounted on the head for reciprocation therewith or it may be mounted on the base of the machine and drivingly connected with the spindle by a splined drive shaft in well known manner. In the exemplary machine, the spindle is arranged to be driven by an electric motor 34 mounted on the forward end of the casting 31. The motor 34 may be of any suitable type and it is preferably reversible so that the tool spindle may be rotated in either direction. The motor is drivingly connected with the spindle 12 through a speed-reducing gear train 35 enclosed in a gear housing 36 which rises from the base casting 31 at the rear of the motor.

The gear train 35, which may be of any suitable character, is herein shown as comprising a terminal shaft 37 journaled on the cross member 32 and directly connected with the motor shaft by a coupling member 37a. Keyed to the shaft 37 is a pinion 38 meshing with a gear 39 fast on a cross shaft 40 journaled in suitable bearings formed in cross member 32 and a rear cross member 41 cast integrally with the casing 36. A pinion 42 fast on the shaft 40 drives a gear 43 keyed to a second cross shaft 44 which carries a pinion 45 meshing with a gear 46 rotatably mounted on the spindle 12. A clutch member 47 splined to the spindle 12 for movement longitudinally thereof is provided with suitable clutch elements in the form of projecting lugs 48 arranged to engage in complementary notches 49 in the hub of the gear 46 to complete a driving connection between the gear and the spindle. Thus, when the clutch is engaged, the spindle is rotated by the motor 35 and, through the medium of the drive shaft 11, it rotates the honing tool 10. Movement of the clutch member 47 to engaged or disengaged position may be effected in any suitable and well known manner.

Mounted at the rear of the head 8 in axial alinement with the spindle 12 is a cylinder 51 which constitutes the working cylinder for a piston 52. A rod 54, rigid with the piston 52, projects forwardly through the hollow spindle and engages the inner end of the tool-actuating rod 14. A coiled compression spring 55 bearing at one end against the spindle and at the other end against the piston 52 tends to force the piston and the rod 54 to the left or withdrawn position shown in Fig. 2. When the parts are in this position, the contracting springs of the honing tool 10 are effective to contract the tool and shift the actuating rod 14 rearwardly to maintain it in engagement with the piston rod 54.

Movement of the piston 52 to the right, as viewed in Fig. 2, is effective to shift the tool-actuating rod 14 forwardly to expand the tool into engagement with the work. Such movement is imparted to the piston by the introduction of pressure fluid through a port 56 in the outer end of the cylinder 51. In short stroke honing machines, pressure fluid is conducted to the tool-expanding cylinder through flexible or telescoping conduits. Such an arrangement is impractical, however, in a machine of the type under discussion because of the distance through which the head is required to move in traversing the tool over the work. The invention, accordingly, contemplates the provision of a complete pressure fluid supply system in the reciprocatory head, thereby rendering flexible or telescoping connections unnecessary.

As shown in Figs. 2 and 3, the pressure fluid supply system comprises a rotary pump 61 arranged to draw fluid from a reservoir or sump 62 formed by the hollow casting 31 of the head and to deliver the fluid under pressure through suitable hydraulic circuits to the cylinder 51. The fluid employed is preferably oil suitable for lubricating the bearings of the spindle 12 and gear train 35, thus enabling a single pump to supply both the tool-expanding mechanism and the lubricating system.

The pump 61 is preferably arranged to be driven by the same power source as the tool spindle 12. As herein shown, the pump is supported on the cross member 32 at the rear of the motor and is coupled directly with the terminal shaft 37 of the driving gear train. With this arrangement, an adequate supply of pressure fluid is insured whenever the spindle is rotated. More-

over, interruption of the supply of pressure fluid is effected automatically when the spindle driving motor is stopped, thus insuring contraction of the tool when the rotation of the tool spindle is interrupted in this way.

In the honing operation, it is sometimes desirable to rotate the tool spindle in one direction for a predetermined time and then reverse the direction of rotation for a like period. Since the pump 61 is mechanically coupled with the spindle drive mechanism, its rotation will likewise be subject to reversal. To enable the pump to function properly under these conditions, the invention provides a novel hydraulic circuit arranged to deliver the pressure fluid to the tool-actuating cylinder 51 regardless of the direction in which the pump is rotated.

As shown in Fig. 3, the hydraulic circuit comprises an intake line 71 having branches 72 and 73 connected respectively to the two ports of the pump. A check valve 74 interposed in the branch 72 permits oil to be drawn through that branch when the pump is rotated in one direction, while a reversely positioned check valve 75 interposed in the branch 73 prevents the pressure oil from being discharged back through the line 71 to the sump. When the pump is rotated in the other direction, the oil is drawn through the branch 73 while the check valve 74 prevents return of the fluid to the sump through the intake line 71.

The pressure line which in the present instance comprises a pipe 76, is arranged similarly to the intake line so as to receive a supply of oil under pressure delivered from either port of the pump. To this end, the pressure line divides into two branches 77 and 78 which join the intake branches 72 and 73 connecting with the two pump ports. Check valves 79 and 80 interposed in the respective branches 77 and 78 admit pressure oil from either port of the pump while preventing oil flow in the reverse direction.

Interposed between the pressure line 76 and the tool-actuating cylinder 51 is a reversing valve 81 having a plunger 82 movable between two positions by a solenoid 83. With the valve plunger in the position shown in Fig. 3, pressure oil is directed through a line 84 and check valve 85 to a pipe 86 comprising a part of the lubricating system which distributes the oil to the bearings and gears of the spindle driving gear train. When the valve plunger 82 is shifted to the right end of the valve casing by energization of the solenoid 83, pressure oil from the line 76 is directed by way of a pipe 87 to the inlet port 56 of the cylinder 51 and acts to shift the piston 52 into tool-expanding position. The pressure exerted on the piston is controlled by an adjustable relief valve 88 which may be set to open at a predetermined pressure and by-pass the pressure fluid to the pipe 86 of the lubricating system. The check valve 85 prevents the oil thus by-passed from returning to the sump through the valve 81. A pressure gauge 89 connected with the pipe 87 provides visual indication of the pressure exerted on the piston 52 to enable the attendant to regulate the tool pressure as required.

In the particular embodiment of the invention illustrated in Fig. 3, the solenoid 83 is connected in multiple with the spindle driving motor 34 so that the tool will expand when the motor is started and contract when the motor is stopped. It will be understood, of course, that the solenoid may be arranged in a separate circuit if desired, so that the tool can be expanded or contracted independently of the motor.

While current may be supplied to the spindle driving motor 34 and to the valve-operating solenoid 83 in any suitable manner, the present invention provides a novel current supply apparatus for this purpose which avoids the use of flexible cables as heretofore employed. This apparatus, as shown in Fig. 4, comprises a series of elongated conductor bars 91 supported in parallel spaced relation by supporting members 92 of suitable insulating material. The conductor bars and supporting members are assembled as a unit within an elongated casing 93. The casing is supported at one side of the base section 5 with the conductor bars extending parallel to the reciprocatory path of the head 8.

A connection between the conductor bars 91 and the equipment carried on the head 8 is provided by means of brushes 94 carried on a supporting member 95 for sliding engagement with the conductor bars. The supporting member 95 is mounted on one leg 96 of a rigid, generally U-shaped bracket 97. The other leg 98 of the bracket is secured to the head 8 as shown in Fig. 4. The bracket 97 is preferably of hollow construction and through it runs a suitable conductor cable 99 (Figs. 2 and 3) connecting with the motor 34 and the solenoid 83. Current is supplied to the conductor bars 91 through a suitable switch 100 (Fig. 3) located for convenient access by the attendant.

Referring again to Fig. 4, the bottom wall of the casing 93 is formed with an elongated slot 101 for the reception of a brush-supporting member 95. This slot extends parallel to the bars 91 so that the member may move freely with the head in its reciprocation and maintain the brushes 94 in contact with the conductor bars. The current supply circuits for the spindle driving motor 34 and solenoid 83 are thus completed through the brushes 94 and conductor bars 91 while the head is reciprocated on the guideway. The casing 93, however, protects the brushes from grinding chips and prevents the workmen from coming into contact with the line conductors.

In operating the machine, reciprocation of the head 8 is started in the usual way. When the honing tool enters the work, the spindle driving motor 34 is started by closure of the switch 100 to rotate the tool. The tool which is in its contracted condition as it enters the work, begins to expand as soon as the pump 61 delivers a supply of pressure fluid since the valve solenoid 83 operates the valve 81 to tool-expanding position when the spindle driving motor is started. The pump 61 also supplies oil to the lubricating system through the pressure line 76, valve 88, and pipe 86.

Operation of the valve 81 directs pressure fluid from the pressure line 76 through the line 87 and into the outer end of the cylinder 51 to shift the piston 52 inwardly. The piston acting through the piston rod 54 shifts the tool-actuating rod 14 to expand the honing tool into operative engagement with the work.

When the honing operation is completed, switch 100 is opened to stop the spindle driving motor and to deenergize the solenoid 83. Deenergization of the solenoid permits the valve plunger 82 to be retracted by its retracting spring 102. The line 87 connecting with the cylinder 51 is thereby connected with a drain pipe 103 so that the spent pressure fluid may be discharged from the cylinder and returned to the sump 62. Discharge of fluid from the cylinder is effected by the spring 55 which urges the piston 52 toward

the outer end of the cylinder and relieves the pressure on the tool-actuating rod **14**. The tool is accordingly contracted and may be withdrawn from the work in the usual manner.

If the current supply for the motor **34** is interrupted either accidentally or otherwise at any time during the honing operation, the pump **61** will cease to deliver pressure fluid to the cylinder **51**. Moreover, the solenoid valve **81** will be returned to normal position, thus permitting immediate collapse of the tool.

The operation of the tool-expanding mechanism is entirely independent of the direction in which the pump **61** is driven as the check valves **74**, **75**, **79** and **80** interposed in the hydraulic circuit invariably direct the pressure fluid into the pressure line **76**. Further, the tool pressure may be varied as required for different classes of work by simply adjusting the pressure relief valve **88**.

It will be apparent from the foregoing that the invention provides a horizontal honing machine of novel and improved construction adapted to utilize pressure fluid or other power-actuated honing tools. All of the mechanism for expanding the honing tool, including the pressure fluid supply means, is incorporated in the reciprocatory head, thus avoiding the use of flexible or telescoping hydraulic circuit connections. The pressure fluid supply means and tool spindle are arranged to be driven by a common source of power, thus simplifying the machine and providing for the automatic termination of the supply of pressure fluid when the rotation of the tool spindle is interrupted.

The invention also provides novel hydraulic circuits whereby the pressure fluid pump is rendered effective regardless of the direction of which it is rotated, thus enabling the pump to be coupled directly with a tool spindle which may be rotated in either direction.

I claim as my invention:

1. A honing machine comprising, in combination, an elongated horizontally disposed frame, means for supporting a work piece adjacent one end of the frame, a horizontal guideway on the other end of the frame, a head mounted on said guideway for movement toward and from the work piece, a tubular spindle journaled on said head and carrying an expansible and contractible honing tool, a tool-actuating rod extending through said spindle, spring means acting on said rod normally effective to hold the rod in a retracted position to permit contraction of the tool, means for reciprocating said head to traverse the tool over the work piece, means for expanding the tool into operative engagement with the work piece including a hydraulic cylinder mounted on said head, a piston in said cylinder operable to shift the tool-actuating rod against the action of said spring to expand the tool, a pump for supplying pressure fluid to said cylinder to operate the piston, and common power driven means on said head for rotating said spindle and for driving said pump.

2. A honing machine comprising, in combination, an elongated horizontally disposed frame, means for supporting a work piece adjacent one end of the frame, a horizontal guideway on the other end of the frame, a head mounted on said guideway for movement toward and from the work piece, a tubular spindle journaled on said head and carrying an expansible and contractible honing tool, a tool-actuating rod extending through said spindle, spring means acting on said rod normally effective to hold the rod in a position to permit contraction of the tool, means for reciprocating said head to traverse the tool over the work piece, and hydraulic means for shifting said actuating rod to expand the tool into engagement with the work piece, said hydraulic means including a cylinder mounted on the head, a piston operating in said cylinder and operatively connected with said rod, a fluid pressure pump mounted on said head, means for driving the pump, a hydraulic circuit for carrying pressure fluid from said pump to said cylinder, and valve means in said hydraulic circuit controlling the flow of pressure fluid in said hydraulic circuit.

3. A honing machine comprising, in combination, an elongated horizontally disposed frame, means for supporting a work piece adjacent one end of the frame, a horizontal guideway on the other end of the frame, a head mounted on said guideway for movement toward and from the work piece, a tubular spindle journaled on said head and carrying an expansible and contractible honing tool, a tool-actuating rod extending through said spindle, spring means acting on said rod normally effective to hold the rod in a position to permit contraction of the tool, means for reciprocating said head to traverse the tool over the work piece, means for expanding the tool into operative engagement with the work piece including hydraulic means carried on said head for shifting said actuating rod from its normal position into tool-expanding position, said hydraulic means including a cylinder and piston for shifting said actuating rod to expand the tool, a pump for supplying pressure fluid to said cylinder, a valve controlling the supply of pressure fluid to the cylinder, an electric motor for driving said pump and for rotating the tool spindle, and a valve-operating solenoid connected in multiple with said motor operative to direct pressure fluid into said cylinder to expand the tool when said motor is running and to shut off the supply of pressure fluid from the cylinder when the motor is stopped.

4. In a horizontal honing machine, in combination, a reciprocatory head, a spindle journaled on said head and carrying an expansible and contractible honing tool, means for supporting work to be operated on by the tool, means for reciprocating said head to traverse the tool over the work, hydraulically-operated means for expanding the tool into engagement with the work including a source of pressure fluid carried on said head, a valve for controlling the supply of pressure fluid to said hydraulically-operated means, a motor for driving the tool spindle, and means operative when said motor is running for operating said valve to expand the tool, said last means being effective when the motor is stopped to release the valve and thereby initiate the contraction of the tool.

5. In a horizontal honing machine comprising, in combination, a reciprocatory head, a spindle journaled on said head and carrying an expansible and contractible honing tool, means for supporting work to be operated on by the tool, means for reciprocating said head to traverse the tool over the work, means carried entirely on said head for expanding the tool into operative engagement with the work, said expanding means including a hydraulic cylinder and piston, a pressure fluid pump for supplying fluid under pressure to said cylinder, a reservoir for the fluid, and valve means controlling the

flow of pressure fluid from said pump to said cylinder and from said cylinder to said reservoir.

6. In a horizontal honing machine, in combination, a reciprocatory head, a spindle journaled on said head and carrying an expansible and contractible honing tool, means for supporting work to be operated on by the tool, means for reciprocating said head to traverse the tool over the work, hydraulically-operated means for expanding the tool into operative engagement with the work including a source of pressure fluid carried on said head, a solenoid valve for controlling the supply of pressure fluid to said hydraulically-operated means, a motor for driving the tool spindle, and a common circuit for supplying operating current to said motor and said solenoid valve.

7. In a horizontal honing machine, in combination, a reciprocatory head, a spindle journaled on said head and carrying an expansible and contractible honing tool, means for supporting work to be operated on by the tool, means for reciprocating said head to traverse the tool over the work, a motor for rotating the spindle and tool, and hydraulically-operated means for expanding the tool into operative engagement with the work including a pressure fluid pump mounted on said head and arranged to be driven by said spindle-rotating motor.

8. A horizontal honing machine comprising, in combination, a reciprocatory head, a spindle journaled on said head and carrying an expansible and contractible honing tool, means for supporting work to be operated on by the tool, means for reciprocating said head to traverse the tool over the work, means for rotating the spindle and the tool, hydraulically-operated means for expanding the tool into operative engagement with the work, a fluid reservoir in said head, a pump carried on said head for withdrawing fluid from said reservoir and delivering it under pressure to said tool-expanding means to operate the same, and means for driving said pump.

9. In a honing machine, in combination, a reciprocatory head, a spindle journaled on said head and carrying an expansible and contractible honing tool, means for supporting work to be operated on by the tool, means for reciprocating said head to traverse the tool over the work, hydraulically-operated means on said head for expanding the tool into operative engagement with the work, a pump mounted on said head for supplying pressure fluid to said hydraulically-operated means, and a common source of power on said head for driving said pump and said spindle.

10. In a horizontal honing machine, in combination, a reciprocatory head, a spindle journaled on said head and carrying an expansible and contractible honing tool, means for supporting work to be operated on by the tool, means for reciprocating said head to traverse the tool over the work, a motor operative to rotate said spindle in either direction, hydraulically-operated means for expanding the tool into operative engagement with the work, a hydraulic circuit for said tool-expanding means, a rotary pump directly connected with said spindle rotating motor for supplying pressure fluid to the tool-expanding means through said hydraulic circuit, and valves interposed in said hydraulic circuit to render said tool-expanding means effective independent of the direction in which said pump is driven by said motor.

11. In a horizontal honing machine, in combination, a reciprocaatory head, a spindle journaled on said head and carrying an expansible and contractible honing tool, means for supporting work to be operated on by the tool, means for reciprocating said head to traverse the tool over the work, power-driven means for rotating said spindle in either direction, hydraulically-operated means for expanding the tool into operative engagement with the work, a rotary fluid pressure pump mechanically coupled with said spindle-driving means, and a hydraulic circuit for delivering the pressure fluid from the pump to said tool-expanding means when the pump is driven in either direction.

12. In a honing machine comprising, in combination, a reciprocatory head, a spindle journaled on said head and carrying an expansible and contractible honing tool, means for supporting work to be operated on by the tool, means for reciprocating said head to traverse the tool over the work, a motor mounted on said head, a train of gears enclosed within the head for drivingly connecting said motor with the tool spindle, pressure fluid operated means for expanding the tool, a pump adapted to deliver oil under pressure, and a hydraulic circuit for directing a portion of the oil to said tool-expanding means to expand the tool and for directing another portion of the oil to said gears to lubricate the same.

13. In a honing machine comprising, in combination, a reciprocatory head, a spindle journaled on said head and carrying an expansible and contractible honing tool, means for supporting work to be operated on by the tool, means for reciprocating said head to traverse the tool over the work, means including a train of gears enclosed in said head for driving the tool spindle, pressure fluid operated means for expanding the tool, and a pump on said head for supplying oil under pressure to operate said tool-expanding means and to lubricate said gear train.

14. In a honing machine, in combination, an elongated horizontally disposed frame, means for supporting a work piece adjacent one end of the frame, a horizontal guideway on the other end of the frame, a head mounted on said guideway for movement toward and from the work piece, a tubular spindle journaled on said head and carrying an expansible and contractible honing tool, a tool actuating rod extending through said spindle, spring means acting on said rod normally effective to hold the rod in a retracted position to maintain the tool in contracted condition, means for reciprocating the head to traverse the tool repeatedly from one end of the work piece to the other, and power actuated means on the head for rotating said spindle and for shifting said tool actuating rod endwise against the action of said spring to expand the tool into operative engagement with the work piece.

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