

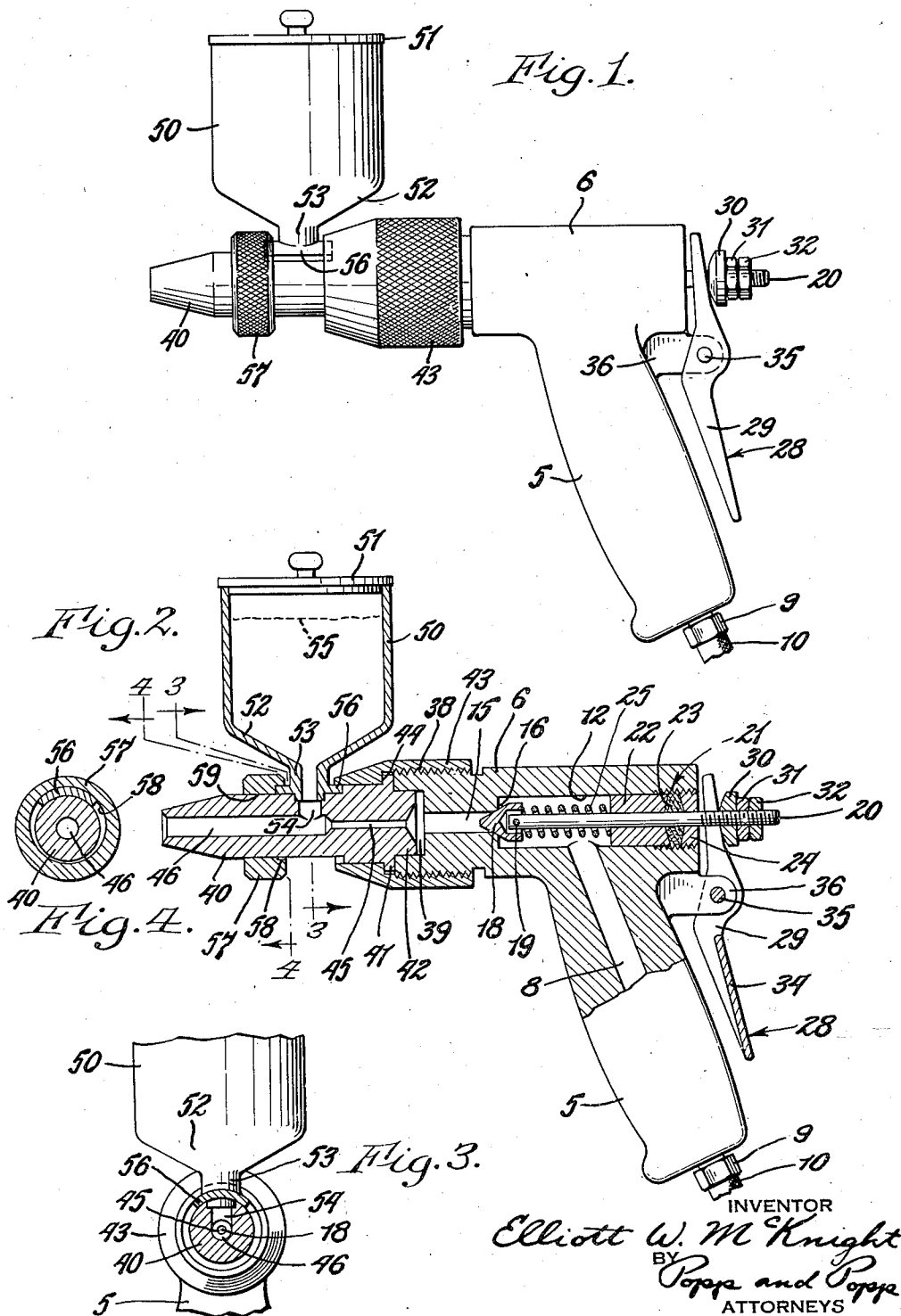
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PRESSURE GUN

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PRESSURE GUN

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This invention relates to a pressure gun for the application of heavy abrasive metal particles to roughen the surface of steel rolls and more particularly to such a gun which is designed to roughen small areas of the rolls which are used to form steel sheets, the surface of these rolls being roughened so that the steel sheets can subsequently be provided with a coating of enamel which will adhere satisfactorily to the sheets.

In rolling steel sheets which are to be subsequently coated with enamel, such as when used in the construction of steel automobile bodies, it has been found desirable to roughen the surface of these sheets to permit the paint or enamel to adhere to the surface. The finishing rolls between which the sheets are passed for the purpose of finishing the sheets are therefore provided with a rough surface bearing a resemblance to the rough surface of fine sand paper. The degree of roughness of the hard steel finishing rolls so used in providing rough surfaced steel sheets is determined by the degree of roughness desired in the steel sheets. At present such rolls are roughened by placing them in a chamber and subjecting the surfaces of the rolls to a bombardment of steel particles, the size of the steel particles selected being determined by the degree of roughness desired on the surfaces of the steel sheets and the hard steel rolls, larger steel particles being selected to provide a greater degree of roughness.

In the preparation and use of these hard steel rolls, it frequently happens that they become marred to an extent which causes the roll to leave an impression on the steel sheet being rolled and therefore result in the sheet being rejected on inspection. Such marring can occur through a steel clip or shaving passing through the rolls with one of the sheets, this chip or shaving leaving an indentation in the surface of the corresponding roll so that in subsequent use of this roll a pimple will be reproduced on the sheet each time the roll rotates one revolution.

Heretofore when such a dimple or indentation occurred in one of the rolls it was necessary to shut down the mill, remove the damaged roll, grind the surface of the roll at the damaged spot and the surrounding area so as to remove the damaged spot and feather the surrounding area to merge into the periphery of the roll, this leaving a bright spot on the roll. Following this it was necessary to place the roll in the roughening chamber, bombard the entire surface of the roll so as to bring the surface of the bright spot to the same degree of roughness as the re-

mainder of the roll, and then replace the roll in the mill. To avoid this costly and time consuming procedure, numerous attempts have been made to grind the roll while in the mill, and to roughen the area of the bright spot produced by grinding while the roll is still maintained in the line of service. Prior to the present invention these efforts have not been successful.

It is the principal object of the present invention to provide a pressure gun for the bombardment of the bright spot produced on a hardened steel roll as a result of the grinding away of a damaged spot on the roll and which can be used to roughen such bright spots while the roll is still maintained in the line of service, thereby to relieve the necessity of removing the damaged roll for the purpose of restoring its surface to the necessary uniform, properly roughened condition.

Another object of the invention is to provide such a gun in which a uniform bombardment of the hard steel particles is obtained, the particles being drawn into an air stream from a reservoir and forcibly ejected against the bright spot to be roughened.

Another object of the invention is to provide such a gun which is of simple and inexpensive construction and will stand up under conditions of severe and constant use without getting out of order or requiring repairs.

In the accompanying drawing:

Fig. 1 is a side elevation of a pressure gun for the application of heavy steel particles to roughen the surfaces of bright spots produced on steel rolls by the grinding away of indentations produced on these rolls.

Fig. 2 is a vertical longitudinal section there-through.

Figs. 3 and 4 are fragmentary vertical transverse sections, taken on the correspondingly numbered lines of Fig. 2.

The gun as shown in the accompanying drawing comprises a grip or handle 5 which is formed at its upper end to provide a valve housing 6, to the end of which a barrel is detachably secured. The grip 5 is provided with a central bore 8 and is provided at the lower end of this bore 8 with a fitting 9 which is adapted for attachment to a compressed air supply hose 10, the air passing up through the bore 8 to a horizontal enlarged valve chamber 12 which leads to a reduced passageway 15. The shoulder 16 provided between the enlarged chamber 12 and the reduced passage 15 is formed to provide a seat for a conical valve head 18. This valve head is

mounted, by means of a pin 19, to the inner end of a valve stem 20, the valve head 18 being free to rotate around the pin 19 to a limited degree in order to permit it to adapt itself to the valve seat 16.

The valve stem 20 extends rearward through a packing gland indicated generally at 21 and including an inner cylindrical follower member 22, packing 23 and a threaded head 24 which is screwed into the rear threaded end of the enlarged valve chamber 12 so as to compress the packing 23 against the cylindrical follower 22. This follower 22 bears at its inner end against a helical compression spring 25, the front end of which bears against the valve head 18. It will therefore be seen that the packing gland 21 is maintained under the pressure imposed upon the spring 25 and that this spring in turn tends to hold the valve head 19 in an axially centered and closed position.

The valve stem 20 is moved rearwardly to unseat the valve head 18 by means of a control lever 28. This control lever comprises side parts 29 which are extended upwardly to form a fork straddling the valve stem 20 and interposed between the packing gland 21 and a washer 30 secured to the rearwardly projecting end of the valve stem 20 by means of a nut 31 and a lock nut 32. The lower ends of the side parts 29 of the control lever 28 are connected by an integral grip 34 and the control lever is pivotally mounted adjacent its center on a horizontal pin 35 which is secured to a boss 36 formed integrally with the grip 5 and projecting rearwardly therefrom immediately under the valve housing 6.

It will therefore be seen that pressing the grip portion 34 of the control lever 28 forwardly against the grip 5 will serve to draw the valve stem 20 rearwardly against the resistance of the helical compression spring 25 and permit compressed air from the supply hose 10 to pass upwardly through the bore 8, chamber 12 and past the valve seat 16 into the reduced passage 15.

The forward end of the valve chamber 6 is externally threaded as indicated at 38 and is also formed to provide an enlarged bore 39 extending a short distance inwardly from its front end and joining the reduced passage 15. A barrel 40 is secured to the front end of the valve chamber 6, this barrel being provided for this purpose with an annular flange 41 adjacent its rear reduced end 42, this flange fitting against the front end face of the valve chamber 6 and its reduced rear end 42 fitting into the enlarged bore 39 at the front end of the valve chamber 6. The barrel 40 is held in this position by a threaded sleeve 43 which is screwed onto the external threads 38 at the front end of the valve chamber 6 and which has an annular internal shoulder 44 which bears against the forward face of the annular flange 41 of the barrel. At its rear end the barrel 40 is provided with a coaxial bore 45 of reduced diameter leading to a coaxial bore 46 of enlarged diameter at the front end of the barrel and through which latter enlarged bore 46 the compressed air and hard steel particles are ejected from the gun and against the bright spot of the hard steel roll which is being roughened.

I have found that to provide a continuous supply of heavy, hard steel filings to the stream of compressed air passing through the gun, it is necessary that these particles be sucked from a reservoir which contains a supply of these particles. For this purpose it is necessary that these

particles be supplied by gravity to the rear end of the enlarged bore 46 of the barrel immediately adjacent its small bore 45 since at this point a suction is created through the discharge of the small stream of air from the small bore 45 into the enlarged bore 46. I have further found that it is necessary that both the small bore 45 and the large bore 46 be each of uniform diameter throughout its length in order to provide proper feeding of the hard steel particles to the air stream and to provide a uniform pattern of the particles in the blast of air discharged from the gun.

The reservoir 50 is shown as being in the form of a container having an open top closed by a removable cover 51 and having a conical bottom 52 leading to a reduced neck 53. The depending reduced neck 53 discharges into a central passage 54 leading downwardly into the rear end of the enlarged bore 46 immediately adjacent the discharge of the reduced bore 45 of the barrel. The reservoir 50 is adapted to be filled with particles 55 of hard steel of a size selected to impart the desired degree of roughness to the bright spot on the surface of the hardened steel roll being redressed.

In order to conveniently secure the reservoir 50 in an upright position on the barrel 40, the lower end of its neck 53 is recessed into the barrel and this neck is provided with a rounding flange 56 which is formed to fit the periphery of the barrel. This flange extends rearwardly under the forward end of the sleeve 43 and at its front end this flange 56 is secured by a ring 57 to the barrel 40. In order to conveniently tighten the forward end of the flange 56 against the barrel and hold it in a locked position, the ring 57 is provided on its rear side with a circular recess 58 which is eccentrically disposed with reference to the bore 59 of the ring. It will be seen that upon slipping the ring 57 over the barrel of the gun with the forward end of the flange 56 entering the eccentric recess 58 that the ring and reservoir can readily be locked in position by the simple expedient of turning the ring so that the eccentric recess 58 will wedge against the forwardly projecting end of the flange 56 and hold it in locked engagement with the barrel.

In operation the reservoir 50 is filled with a quantity of hard steel particles of a size selected to produce the desired degree of roughness on the hard steel roll being redressed. Compressed air is also supplied to the gun through the supply line 10.

When a steel particle becomes embedded in the roughened roll through which the steel sheets are passed so as to leave an indentation in the roughened surface of the steel sheets and cause them to be rejected, the rolling mill is shut down for a sufficient length of time to permit the embedded particle to be located and to permit this particle to be ground out by means of a grinding stone. This grinding leaves a bright spot upon the roll and the gun forming the subject of the present invention is then brought into operation. The operator directs the barrel 40 of the gun against the bright spot and presses the grip piece 34 of the control lever 28 against the grip 5 so as to draw the valve stem 20 rearwardly and unseat the valve head 18 from its seat 16 against the resistance of the helical compression spring 25. This permits compressed air to flow past the valve seat through the axial enlarged bore 15 and reduced bore 45 into the enlarged main bore

46 of the barrel 40. The discharge of the compressed air from the reduced bore 45 into the coaxial main enlarged bore 46 of the barrel creates a suction in the passage 54 which draws the steel particles downwardly so that these particles are drawn into the air stream by the suction effect created as well as by the force of gravity. The particles so drawn out of the reservoir 50 are discharged at high velocity from the barrel 40 of the gun against the bright spot so that this bright spot is effectively roughened and its surface brought to the same condition as the rest of the peripheral surface of the roll. After the bright spot has been completely roughened to so conform to the rest of the roll surface, the gun is withdrawn, the roll cleaned and the mill placed back in operation.

It will further be seen that the reservoir 50 can readily be removed by the simple expedient of rotating the ring 57 so as to bring its eccentric recess 58 to a position where the flange 56 of the reservoir is not wedged against the barrel 40, the ring 57 being thereupon readily capable of being drawn forwardly so that the reservoir can be removed. It will further be seen that the gun is of extremely simple and inexpensive construction and will not get out of order or require repair or replacement under conditions of severe and constant use even considering the abrasive nature of the material which the gun is designed to bombard against the steel rolls.

I claim as my invention:

1. A pressure gun for the application of heavy abrasive metal particles to roughen the surface of steel rolls, comprising a barrel having a large axial outlet bore of uniform diameter at its front end and having a small coaxial inlet bore of uniform diameter at its rear end communicating with said large bore, means for supplying air under pressure to said inlet bore of said barrel, and means for supplying by gravity heavy abrasive metal particles to one side of said large outlet bore immediately adjacent the discharge of said small inlet bore into said large outlet bore and in a vacuum zone created in said large outlet bore by the discharge of compressed air from said small inlet bore, comprising a vertical passage in said barrel leading from said large outlet bore to the exterior thereof, a reservoir having a discharge neck fitting into said passage and adapted to be filled with a quantity of said heavy abrasive metal particles, a flange projecting laterally from said neck and fitting along the top of said barrel and a collar rotatably mounted on said barrel and having a circular recess which is arranged eccentrically with reference to its bore, said eccentric recess being adapted to be fitted over said flange whereby upon turning said collar said flange is locked against said barrel.

2. A pressure gun for the application of heavy abrasive metal particles to roughen the surface of steel rolls, comprising a single metal body formed to provide a grip and a valve housing at the upper end of said grip, said valve housing being provided at its rear end with an enlarged horizontal bore and at its front end with a coaxial reduced bore communicating with the front end of said enlarged bore, the shoulder between

said bores being formed to provide a valve seat, means for supplying compressed air to said enlarged bore, manually operable valve means arranged in said enlarged bore and cooperating with said valve seat to control the admission of compressed air to said small bore, said valve housing also being externally threaded at its front end and being provided at its front end with an enlarged circular recess arranged coaxially of said bores, a barrel projecting forwardly from said valve housing and having its rear end fitted in said recess and being provided adjacent its rear end with an annular flange engaging the front face of said valve housing around said recess, an internally threaded sleeve engaging the threaded front end of said valve body and having a shoulder engaging the forward face of said flange to hold said barrel in said recess, said barrel also having a large outlet bore of uniform diameter at its front end arranged coaxially of said bores of said valve housing and having a small coaxial inlet bore of uniform diameter communicating with said large bore of said barrel and said reduced bore of said valve housing, and means for supplying heavy abrasive metal particles to one side of said large bore of said barrel immediately adjacent the discharge of said small inlet bore of said barrel into said large outlet bore of said barrel and in a vacuum zone created in said large outlet bore of said barrel by the discharge of compressed air from said small inlet bore of said barrel, comprising a vertical passage in said barrel leading from said enlarged bore of said barrel to the exterior thereof, a reservoir having a discharge neck fitting into said passage and adapted to be filled with a quantity of said heavy abrasive metal particles, a flange projecting transversely from said neck and fitting along the top of said barrel and having one end fitted between said sleeve and said barrel and a collar rotatably mounted on said barrel and having a circular recess which is arranged eccentrically with reference to its bore, said eccentric recess being adapted to be fitted over the other end of said flange whereby upon turning said collar said flange is locked against said barrel.

3. A pressure gun for the application of particles at high velocity against a surface to be treated, comprising a barrel having a bore which is open at one end, means for supplying air under pressure to the inner end of said bore and means for supplying by gravity particles to one side of said bore comprising a vertical passage in said barrel leading from said bore to the exterior thereof, a reservoir having a discharge neck fitting into said passage and adapted to be filled with a quantity of said particles, a flange projecting laterally from said neck and fitting around the top of said barrel, and a collar rotatably mounted on said barrel and having a circular recess which is arranged eccentrically with reference to its bore, said eccentric recess being adapted to be fitted over said flange whereby upon turning said collar said flange is locked against said barrel.

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