April 9, 1929. N. MIKELSON 1,707,988

CYLINDER HONE

Filed Aug. 4, 1927 2 Sheets-Sheet 1

Fig. 1.

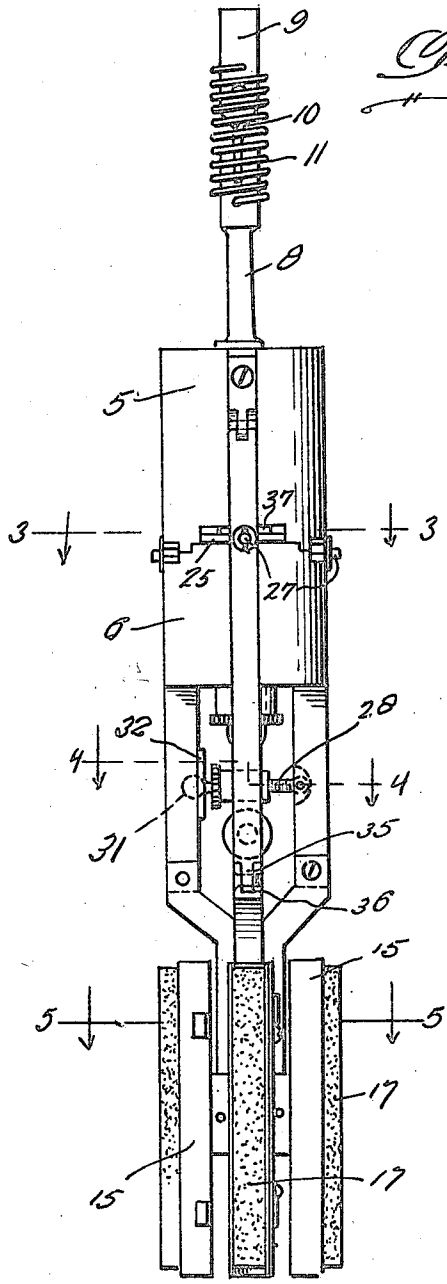


Fig. 4.

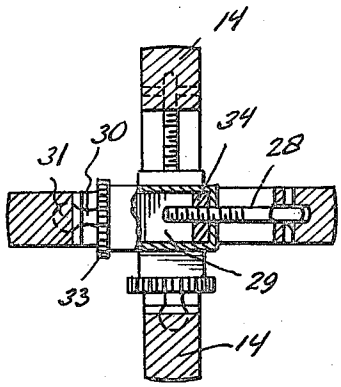
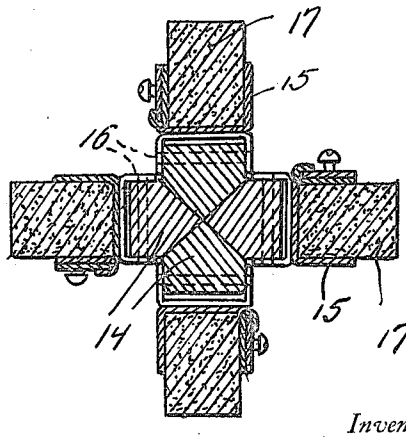


Fig. 5.



Inventor

Nordal Mikelson,

By Clarence A. O'Brien

Attorney

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Fig. 2.

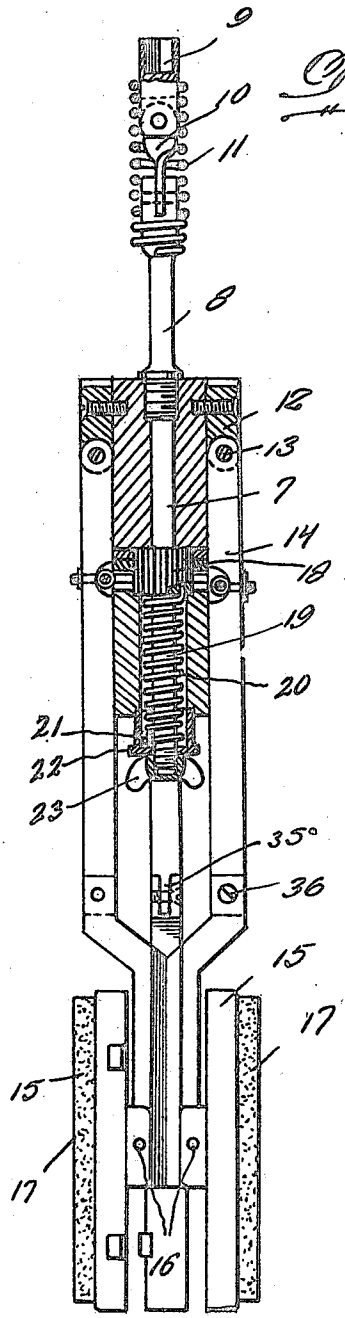


Fig. 3.

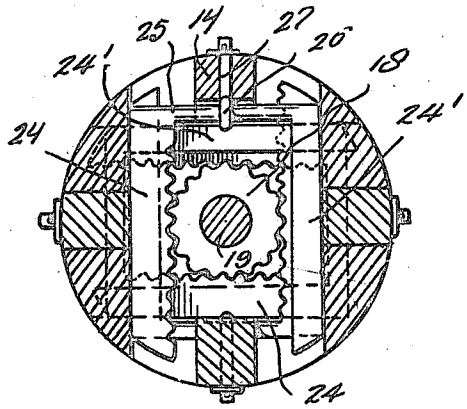
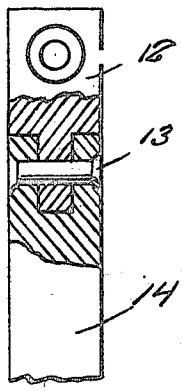


Fig. 6.



Inventor

Nordal Mikelson,

By Clarence A. O'Brien

Attorney.

Patented Apr. 9, 1929. 1,707,988

UNITED STATES PATENT OFFICE.

NORDAL MIKELSON, OF YANKTON, SOUTH DAKOTA.

CYLINDER HONE.

Application filed August 4, 1927. Serial No. 210,585.

My invention relates to hones adapted particularly for finishing the bores of cylinders of internal combustion engines and the like and has for an object to provide a device of this character having a plurality of hones arranged to yieldably press against the walls of the cylinder and adapted to be adjusted for use in cylinders having bores of various sizes, said hones being mounted so that the pressure thereof against the walls of the cylinder will be constant at all times.

Another object of the invention is to provide means for limiting the expansion of the hones during a particular honing operation to a predetermined extent.

Another object is to mount the hones so that they will always and automatically accommodate themselves throughout the length of their honing surface upon the cylinder walls.

Another object is to provide an apparatus of this character of simple and practical construction, efficient and reliable in performance, relatively inexpensive to manufacture and otherwise well adapted for the purposes for which the same is intended.

Other objects and advantages reside in the special construction and combination of the various parts, reference being had to the accompanying drawings forming a part thereof, wherein:—

Figure 1 is an elevational view of a cylinder hone constructed in accordance with my invention.

Figure 2 is a vertical sectional view therethrough.

Figure 3 is a transverse sectional view taken along a line 3—3 of Figure 1,

Figure 4 is a similar view taken along a line 4—4 of Figure 1,

Figure 5 is a similar view taken along a line 5—5 of Figure 1, and

Figure 6 is a detail with parts shown in vertical section of the pivotal connection for the upper end of the hone arm.

Referring now to the drawing wherein for the purpose of illustration I have disclosed a preferred embodiment of my invention, I provide a pair of hone arm supporting blocks of substantially cylindrical formation and arranged in a vertical position in end to end relation and constituting an upper block 5 and lower block 6. Each of the blocks has a bore 7 extending vertically therethrough, the upper end of the bore in the upper block 5 having a pin 8 threadedly inserted therein, to the upper end of which pin is attached a tool socket member 9, said pin and said socket member having a universal joint 10 interposed therebetween permitting angular adjustment between the pin and the socket member and having a coil spring 11 arranged on the adjacent ends thereof whereby to normally retain the parts in an alined position.

The outer surface of the blocks 5 and 6 have longitudinally extending grooves formed therein, rod segments 12 being fixedly secured in the upper ends of each of said grooves of the upper block 5 and having transverse pivot pins 13 upon which hone supporting arms 14 are pivotally carried, said arms being normally seated within the longitudinally extending grooves formed in the block.

The lower ends of the arms 14 are freely carried and have hone frames 15 pivotally carried as at 16 at the lower ends thereof, said frames having hones 17 extending outwardly therefrom and disposed in a vertical position.

The arms 14 may be formed in sections connected near the lower ends of the arms, the lower end of the upper section being formed into a tenon 35 with squared corners and adapted to seat within the bifurcated upper end of the lower section. The sections are firmly secured by means of screws 36. This construction enables the lower sections of the arms to be detached and the position of the hones reversed so as to permit the finishing of the exterior walls of pistons and the like as well as the interior walls of cylinders.

Any suitable number of the hone arms 14 may be provided, the present embodiment of the invention disclosing a device having a set of four of such arms arranged in pairs for adjustment in directions opposite to each other. The adjacent ends of the blocks 5 and 6 have transversely arranged slots 37 formed therein, each of the blocks being provided with one of said slots and arranged at different horizontal planes and at right angles with respect to each other. The slots communicate at the interior of the blocks to form a pocket within which is rotatably mounted a gear 18 carried on the upper end of a vertically disposed shaft 19 extending downwardly through the bore of the lower block 6. The gear is freely mounted on the shaft and arranged for tensional adjustment by a coil spring 20 carried by the shaft with its upper end attached to the gear and its lower end engaged by a pin 21 formed on an adjusting nut 22. A wing nut 23 is threadedly car-

ried on the lower end of the shaft whereby to retain the nut 22 in adjusted position.

Within each of the slots formed between the blocks 5 and 6 is arranged a pair of U-shaped rack bars 24, each of said bars being disposed at a different horizontal plane and with teeth formed on the inner edge of one of the parallel sides of each bar, the toothed edges of each pair of bars engaging opposite sides of the gear 18, and with the bars of one pair arranged at right angles to the bars of the other pair. The side of each of the bars opposite from the toothed edge is smooth and forms a guide 24′ for the bar, slidably disposed against the side wall of the slot, each of said bars having one end of the parallel sides thereof connected by a transverse pin 25 inserted through an eye 26 formed on a pin 27 suitably attached to one of the hone arms 14. It is thus apparent that upon the rotation of the gear 18 the rack bars 24 will be simultaneously moved in a transverse direction to force the hone arms 14 inwardly or outwardly with respect to the blocks 5 or 6 depending upon the direction of rotation of said gear. Therefore, upon creating a suitable tension upon the spring 20 by the nut 22 the gear 18 will be operated to yieldably force the hone arms 14 outwardly thus forcing the hones 17 against the cylinder walls.

In order to limit the outward movement of the arms 14 during a particular grinding or honing operation, I provide each pair of arms with an adjustable stop comprising a threaded pin 28 pivotally carried by one of the arms and slidably inserted within one end of a hollow socket member 29, the opposite end of said member having a shank 30 with a ball 31 formed at the end thereof and swivelly mounted within a recess formed in the opposite hone arm 14. A plate 32 secures the ball in position in said recess. The socket member 29 is provided with a knurled adjusting nut 33 said socket member being square-shaped in cross section and adapted to carry a nut 34 within the same and arranged on the threaded end of the bolt 28 whereby upon the rotation of the socket member by means of the knurled nut 33 the nut 34 will be moved longitudinally along the bolt thus serving to move the hone arms 14 toward or away from each other as desired.

In the operation of the device the tension of the spring 20 is released so as to permit the hone arms 14 to be moved inwardly and the hones 17 are then adjusted to their proper positions by means of the knurled nut 33 to spread the arms for honing the cylinder to a desired diameter. By reason of the sliding engagement between the bolt 28 and the end of the socket member 29 the arms 14 may be pressed inwardly in order to permit the insertion of the hones within the cylinder. Thereupon the adjusting nut 22 is operated to create a tension upon the spring 20 whereby to yieldably force the arms 14 outwardly through the operation of the spring upon the gear 18 and rack bars 24. The hones 17 will thereby be forced against the cylinder walls under a constant yielding pressure during the honing operation and may continue until the nut 34 engages the inner end of the socket member 29 which limits the outward expansion of the arms 14. The operator is then able to determine that the cylinder has been honed to the proper diameter in accordance with the original setting of the device.

It is thus apparent that any number of cylinders may be honed to a uniform bore from the original setting of the device and without necessitating any further adjustment therein.

It is obvious that the device is susceptible to various changes in shape, size and form, without departing from the spirit thereof or the scope of the appended claims, and I accordingly claim all such forms of the device to which I am entitled.

I claim:

1. In a cylinder hone, a plurality of hone arms having hones pivotally mounted at the lower end thereof, a pair of blocks providing a pivotal support for the upper ends of said arms, a gear interposed between said blocks, rack bars operatively engaged by said gear and connected with said arms, yieldable operating means for said gear and adapted to cause the movement of said arms in one direction and means connected with said arms limiting the movement thereof.

2. In a cylinder hone, a plurality of hone arms having hones arranged at the lower ends thereof, a pair of blocks pivotally supporting the upper ends of the arms, a gear rotatably mounted between said blocks, pressure actuating means for said gear, a rack bar connected with each of said arms and operatively engaged by said gear whereby to move said arms in one direction and means extending between said arms adapted to limit the movement of the same.

3. In a cylinder hone, a plurality of hone arms having hones mounted at the lower ends thereof, a pair of blocks pivotally supporting said arms by their upper ends, a gear rotatably mounted between said blocks, rack bars interposed between said blocks and movable transversely thereof and connected with said arms whereby to move the same in one direction, a spring tensionally connected to said gear, means for tensionally adjusting said spring and means for limiting the movement of said arms against the tension of said spring comprising a bolt connected at one end to one of said arms, a socket member swivelly connected to an opposite arm and adapted to slidably receive said bolt and a nut threadedly carried on the bolt and operated

by said socket member whereby to adjustably limit the sliding movement therebetween.

4. In a cylinder hone, a plurality of hone arms having hones arranged at their lower ends, a pair of blocks pivotally supporting the upper ends of the arms and having bores extending therethrough, hone attaching means threadedly inserted in the bore of one of said blocks, a shaft extending in the bore in said other block and having a gear rotatably mounted thereon and disposed between said blocks, a spring tensionally actuating said gear, a tension adjusting nut for said spring, a wing nut arranged to secure the tension adjusting nut in adjusted position, a rack bar attached to each of said arms and engageable by said gear for simultaneous transverse movement and means for limiting the outward movement of said arms against the tension of the spring comprising a bolt carried by one of the arms, a socket member swivelly attached to an opposite arm and adapted to slidably receive said bolt through one end thereof and a nut threadedly arranged on said bolt and disposed within said socket member and arranged for operation thereby whereby to limit the extent of the sliding movement between the bolt and said socket member.

5. In a cylinder hone, a plurality of hone arms having hones pivotally mounted at the lower ends thereof, a supporting member having a pair of intersecting transverse slotted openings therein, providing a pivotal support for the upper end of said arm, a gear carried by said member, and centrally disposed in said opening, a plurality of U-shaped rack bars disposed in superposed relation in said openings, each bar having one of its parallel sides provided with teeth on its inner edge, and its opposite side forming a guide slidably disposed against the wall of the opening, means connecting the bars with said arms, said means operatively engaged with said gear and arranged to yieldably urge the arm in one direction and interconnecting means for the oppositely disposed arms limiting the movement thereof.

In testimony whereof I affix my signature.

NORDAL MIKELSON.