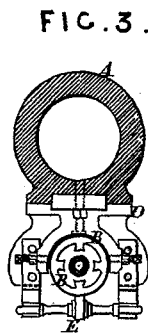
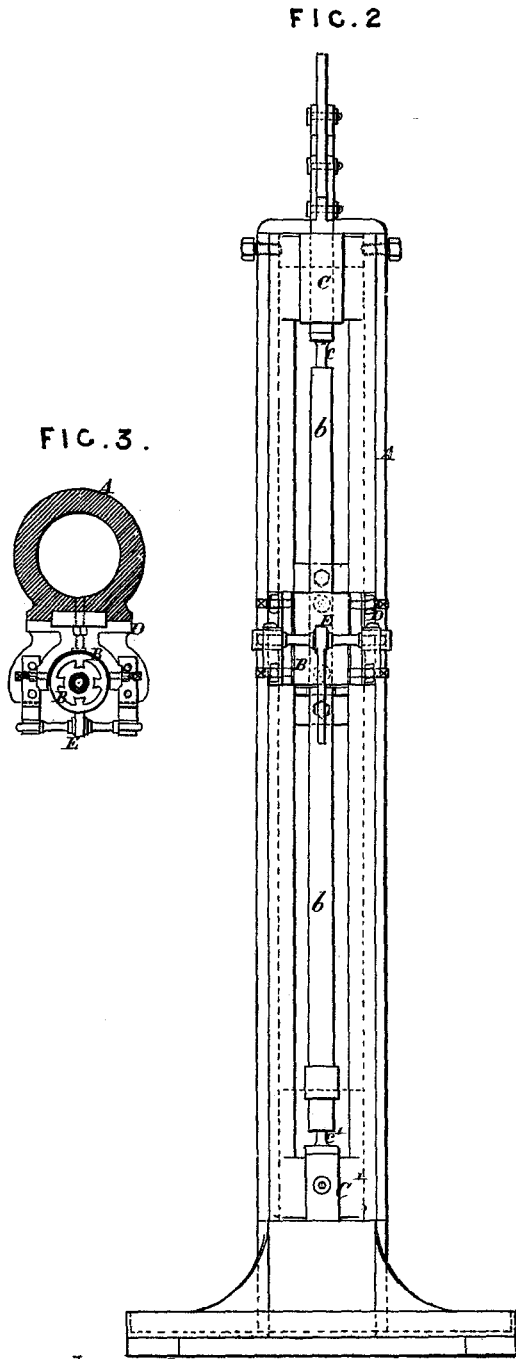
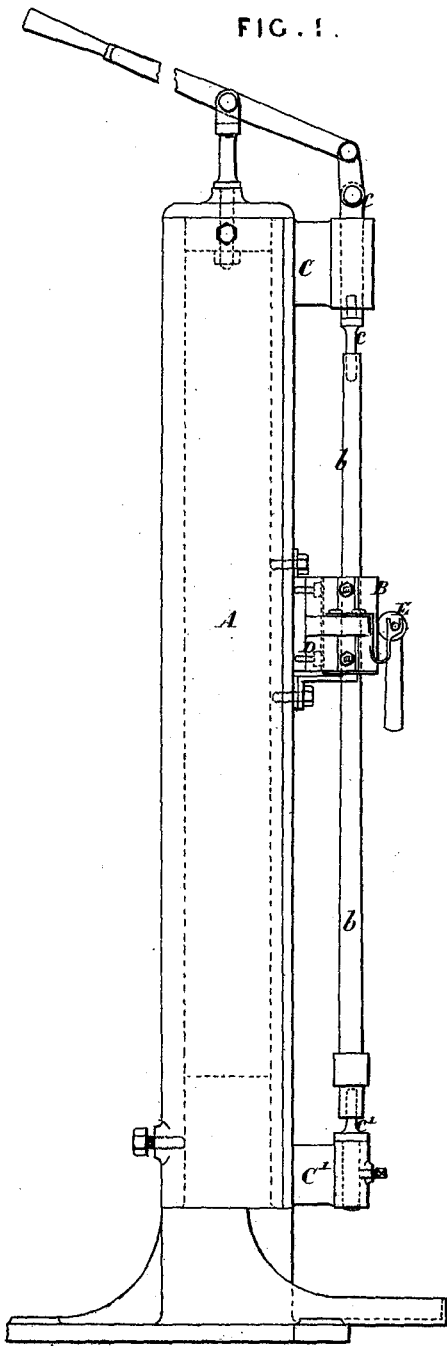


H. C. S. DYER.

MACHINE FOR TURNING GUN-BARRELS.

No. 181,154.

Patented Aug. 15, 1876.



WITNESSES.

*R. C. Washell*  
*James E. Kay*

INVENTOR

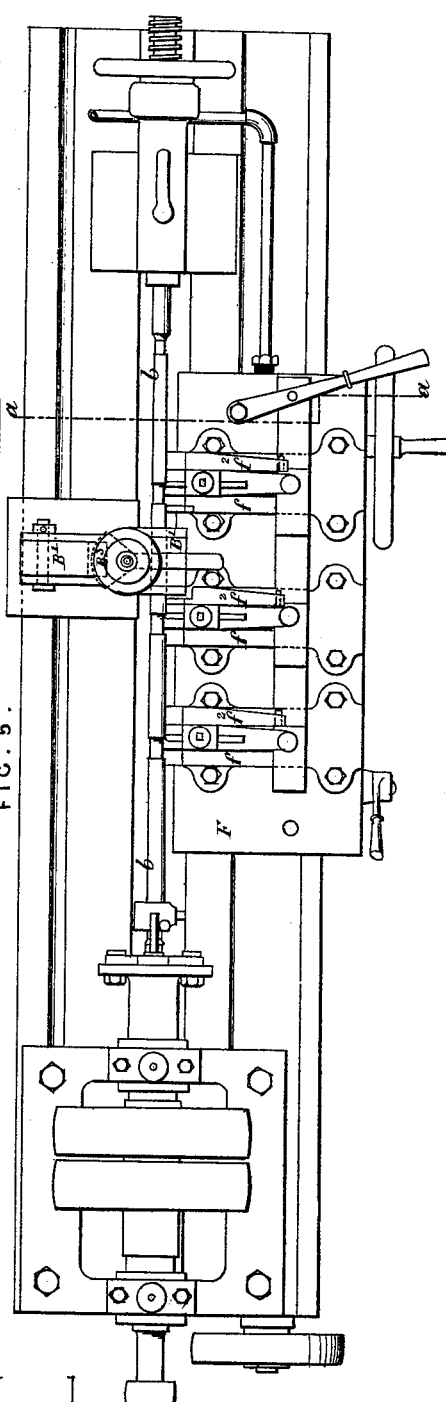
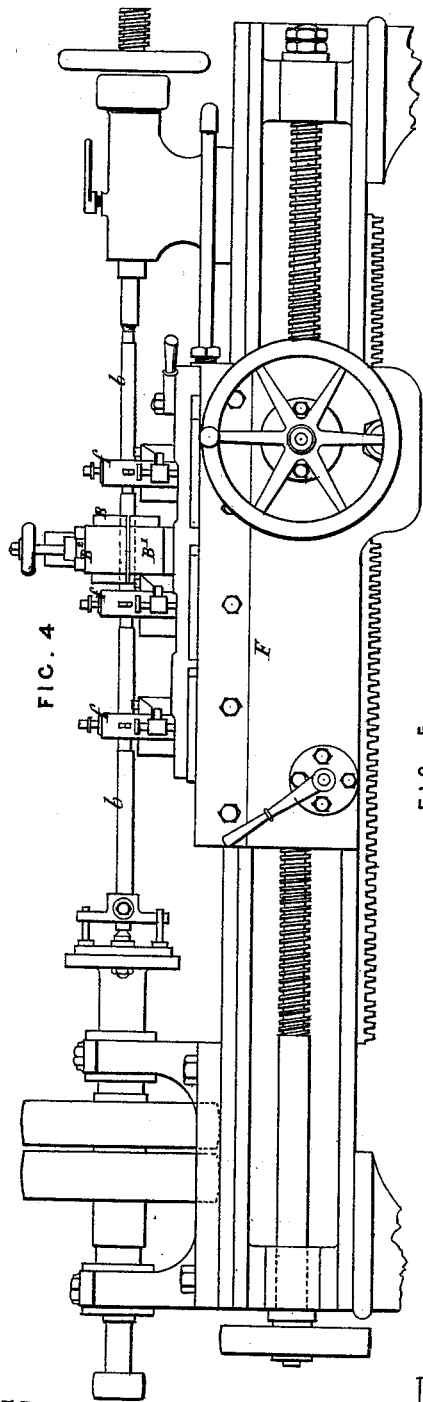
*Henry C. S. Dyer*  
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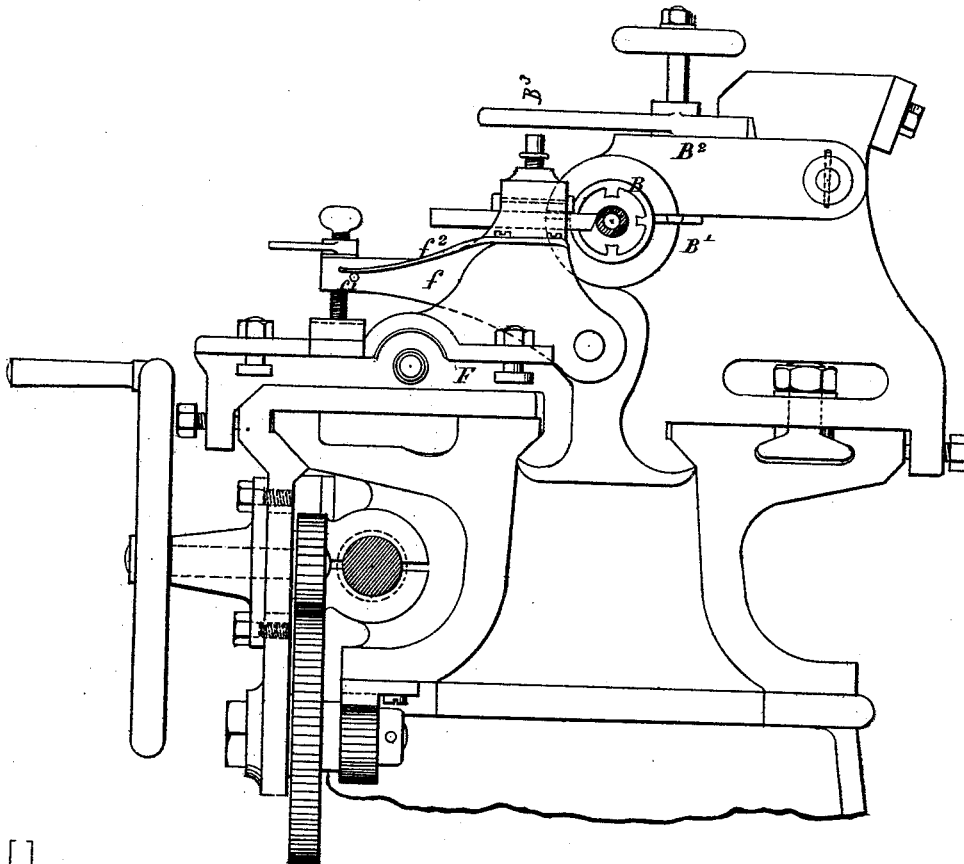
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FIG. 6.



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MACHINE FOR TURNING GUN-BARRELS.  
No. 181,154. FIG. 8 Patented Aug. 15, 1876.

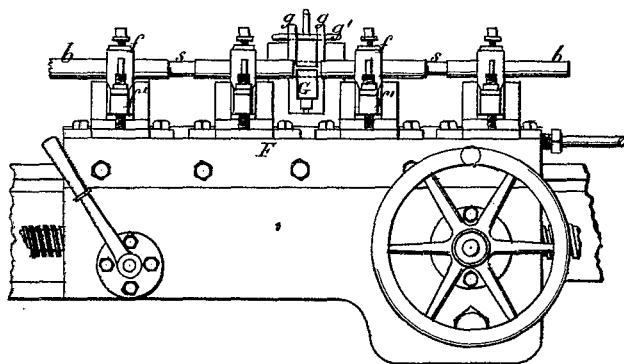


FIG. 9.

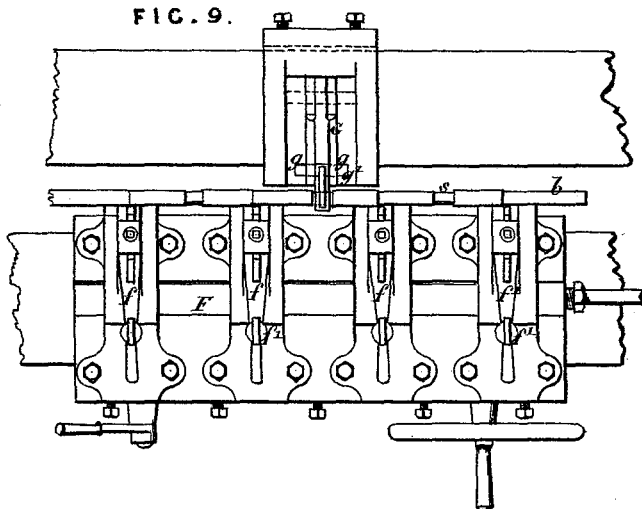
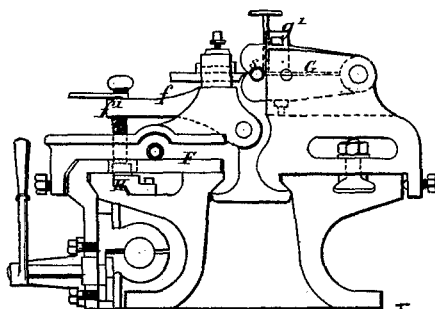


FIG. 10



WITNESSES.

*Rollins Hall*  
*James E. Kay*

INVENTOR

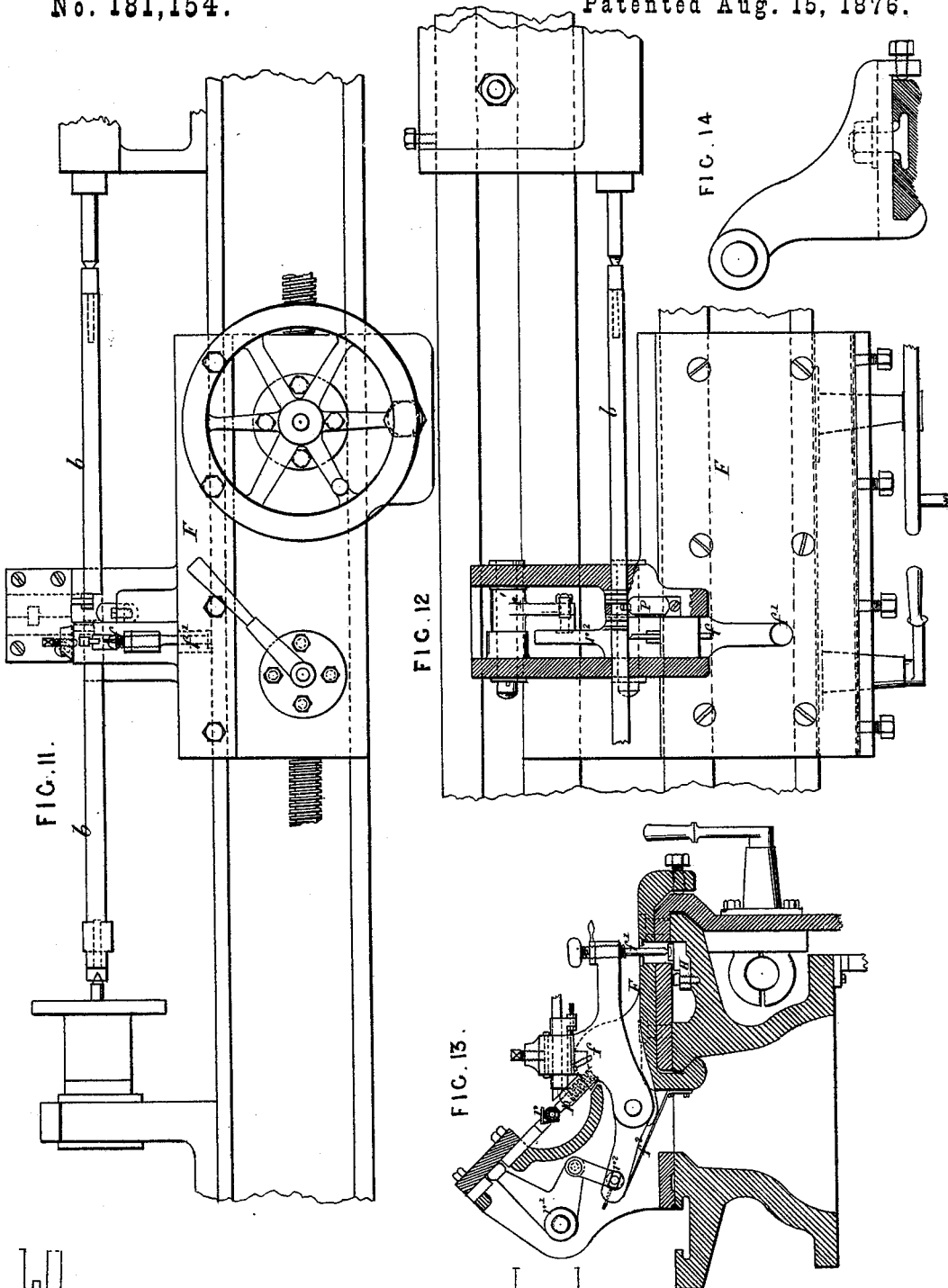
*Henry C. S. Dyer*  
*by Bakewell & Kerr*  
*Atty's*

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# UNITED STATES PATENT OFFICE.

HENRY C. S. DYER, OF WESTHOPE, ENGLAND.

## IMPROVEMENT IN MACHINES FOR TURNING GUN-BARRELS.

Specification forming part of Letters Patent No. **181,154**, dated August 15, 1876; application filed July 24, 1875.

*To all whom it may concern:*

Be it known that I, HENRY CLEMENT SWINERTON DYER, of Westhope, in the county of Salop, England, have invented an Improved Process and Apparatus for Turning the Exterior of Gun-Barrels True with their Bore; and do hereby declare that the following description, taken in connection with the accompanying sheet of drawings hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of my said improvement, by which my invention may be distinguished from others of a similar class, together with such parts as I claim, and desire to secure by Letters Patent—that is to say:

My invention relates to a process and apparatus for turning the exterior surface of the barrels of rifles, muskets, fowling-pieces, and other pieces of like kind, true or concentric with the interior bore, so as to obtain a uniform thickness of metal round the bore, and also to vary that thickness at different parts of the length of the barrel according to a predetermined pattern. For this purpose, after the barrel has been bored to nearly its finished size, and the bore has been made straight, its exterior still remaining rough, I subject it to several successive operations, the nature of which I will first generally describe, (explaining afterward the apparatus which I apply for effecting these operations,) the whole forming a consecutive process by which the rough exterior is finished to the desired form.

The first operation is that of centering the barrel to the bore. This I effect by placing a center plug in each end of the bore, and placing the barrel between centers in a vertical position with a hollow boss surrounding the middle part of the barrel, such boss having its interior considerably larger than the exterior of the barrel, so that within the boss there is a free space around the barrel. This boss, having been turned truly cylindrical on its outside, is adjusted and held in a bearing truly concentric with the centers on which the barrel is mounted. While it is so held I pour into the space in the boss surrounding the barrel a fluid that will set solid, such as cement or plaster-of-paris, or fused material, such as sulphur, which I prefer for this pur-

pose, and I allow this material to set, whereupon I remove the barrel with the boss thus attached to it, the exterior of the boss being concentric with the bore.

The next operation is to spot the barrel or to turn on its exterior two or more parts, true with the boss and bore. For this purpose I place the barrel in a species of lathe, centering it by the plugs at each end of the bore, and supporting the boss at its middle in a bearing true with the centers of the lathe. I then apply two or more turning-tools, each of which turns a portion of the barrel, or makes a turned spot concentric with the bore.

When the barrel has been thus spotted, I remove the boss from its middle by breaking up or melting the cementing and filling material, and I then place the barrel in a special lathe, which is provided with bearings to embrace the several spots or turned parts of the barrel, and with several tools to turn off the metal between these spots. All these tools are mounted in hinged spring-rests, which are caused to slide simultaneously along the lathe-bed, and which have pressing-screws that bear on a pattern or guide fixed on the lathe-bed, so that, as the tools advance, their cutting-points are guided toward the axis of the barrel, turning it to the required taper or configuration, to which it is afterward finished by a very light cut in another lathe, where it is supported only by its end centers, and a steadying-rest, and where the finishing-tool and rest are guided by a pattern or guide fixed on the bed.

The apparatus employed in effecting these operations is represented by the figures on the accompanying sheets of drawings, in which—

Figure 1 represents a side view, Fig. 2 a front view, and Fig. 3 a sectional plan, of the centering apparatus.

It consists of a standard or column, A, having two brackets, C C', projecting from it. The lower bracket C' is provided with a plug, c', fitting the bore of the barrel at its breech, and the upper bracket C is provided with a plug, c, fitting the bore of the barrel at the mouth. This plug c is made to slide in its bracket C, and is linked to a lever, by which it can be moved up or down. Near the middle of the standard A is fixed another bracket,

D, forming a semi-cylindrical saddle-piece, with adjusting-screws, against and between which the hollow boss B can be pressed by means of an eccentric lever, E, mounted on springs, the adjusting-screws being so set that the boss B, when pressed against them, has the axis of its exterior surface exactly in line with that of the centers  $c c'$ . The interior of the boss B is made larger than the barrel  $b$ , and is preferably made with ribs or irregularities to prevent the filling material from turning round within it. The barrel  $b$  is passed through the boss B, and centered on the plugs  $c c'$ , and the cementing material (which, as I have previously stated, is preferably fused sulphur) is poured into the annular space of the boss B around the barrel  $b$ . When the material has set, the plug  $c$  is withdrawn, the eccentric E released, and the barrel  $b$  is removed, with the boss B adhering to it, and presenting a cylindrical outer surface truly concentric with the bore of the barrel. The brackets C and D may be made movable to suit different lengths of barrel.

The operation of spotting or turning true parts on the barrel is effected in a lathe, of which Fig. 4 is a side view, Fig. 5 a plan, and Fig. 6 a transverse section, to an enlarged scale. On the bed of this lathe is fixed a strong bracket, B<sup>1</sup>, with a cap, B<sup>2</sup>, jointed to it, the bracket and its cap presenting semi-circular recesses, which receive the boss B, and form a bearing for it to revolve in, true with the centers of the lathe. On the sliding rest F are mounted three tool-holders,  $f f f$ , which are jointed to the rest, and have their tail ends provided with setting-screws  $f^1$ , by which they can be canted forward so as to set the cutting-tools which they hold more toward the axis of the lathe. Each tool-holder is pressed by a spring,  $f^2$ , bearing against a stud on its tail, the said spring having the effect of drawing the tool away from the axis when the screw  $f^2$  is unscrewed. The barrel  $b$  with the boss B on it being placed between the centers, with the boss B lying in the hollow of the bracket B<sup>1</sup>, the cap B<sup>2</sup> is folded down and secured by a catch-lever, B<sup>3</sup>, turned in under a notch in the upper part of the bracket B<sup>1</sup>, the lathe is put in motion, and the three tools turn on different parts of the length of the barrel three spots or parts true with the bore, as shown in Fig. 7, which represents the barrel  $b$  after these parts marked  $s$  have been turned on it, and after the boss B has been removed from it by melting the sulphur or other fused material which had been used, or breaking up the cement or plaster, if such substance had been employed for filling the annular space in the boss.

The barrel, spotted as shown in Fig. 7, is then rough-turned to very nearly its finished exterior form in a lathe, a side view of part of which is shown in Fig. 8, a plan in Fig. 9, and a transverse section in Fig. 10, four turning-tools being employed so as to effect the work rapidly. The barrel is stead-

ied by its spots  $s$  being held between jaws G mounted on the lathe-bed, and having the bearing formed in their front parts adjusted true with the lathe-centers. Only one pair of the jaws G is shown in Figs. 8 and 9, but it is to be understood that there is a pair employed for each of the spots  $s$ . In order to hold the barrel between the jaws G, the lower jaw has two side cheeks,  $g g$ , projecting upward on each side of the upper jaw, and presenting eyes through which a key,  $g'$ , is passed after the barrel has been introduced and the upper jaw folded down. The tool-holders  $f$  are, like those described for spotting the barrel, all jointed to one sliding rest, F, and are provided with setting-screws  $f^1$  in their tails, but those setting-screws have, at the lower end, washers, which bear on a strip of metal, H, fixed on the lathe-bed, below the rest F. The upper face of the strip H is made to slope a little with such slight curvature as is required to give the barrel its desired tapering outline, and thus serves as a pattern, making a slight change in the position of the turning-tools relatively to the axis of the barrel, as their set-screws  $f^1$  slide along the face of the pattern H.

The barrel, thus rough-turned to shape, is finished in a lathe, of which a side view is shown in Fig. 11, a part plan in Fig. 12, and a cross-section in Fig. 13, the poppet-head being shown in Fig. 14. In this lathe one tool is employed to take the finishing cut along the whole length of the barrel, and so to obliterate any irregularities in its appearance arising from the spotting or the partial turning by several different tools. A steadying-bearing of peculiar construction, to suit the taper of the barrel, is employed to follow the tool as it travels along the barrel. The tool-holder  $f$ , as already described, is jointed to the sliding rest F, and has a set-screw,  $f^1$ , in its tail, with a washer, traveling along a pattern-strip, H, fixed on the lathe-bed, this pattern being made to the finished shape of the barrel. The steadying-rest, which follows the tool as it advances, consists of a plug,  $p$ , pressed upward and forward at an angle of about forty-five-degrees against one side of the barrel, by a helical spring, and of an angle-piece,  $r$ , which bears on the other sides of the barrel. This angle-piece  $r$  is fixed to a slide worked by an arm of a bell-crank lever,  $r^1$ , the other arm of which is linked to an arm,  $r^2$ , projecting from the tool-holder  $f$ . A spring,  $f^2$ , presses this arm upward. The arms of lever  $r^1$  and of the tool-holder  $f$  are so proportioned that, as the tool is made, by means of the pattern H, to approach or recede from the axis of the barrel, the angle-rest  $r$  is, in like manner, made to approach to or recede from the said axis, and, consequently, whatever be the diameter to which the tool turns the barrel at any part of its length, the steadying-rest  $r$  is always set so as to fit the same part as it travels along the barrel, the front plug  $p$  yielding elastically.

Having thus described the nature of my invention, and the best means I know of carrying the same into practical effect, I claim—

1. The process, substantially as herein described, for turning the exterior of gun-barrels true with their bore, such process consisting of the successive operations of centering by means of a boss temporarily attached to the barrel, spotting or turning true parts while the barrel is steadied by the said boss, rough-turning by several tools acting simultaneously and guided on a pattern-strip while the barrel is steadied at its spotted parts, and finishing by a turning-tool and steadying-rest, both guided as they travel by a pattern-strip.

2. The series of machines herein described, consisting of the centering, spotting, rough-finishing, and finishing, machines, substantially as and for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses this 9th day of June, 1875.

HENRY CLEMENT SWINNERTON DYER.

Witnesses:

JNO. P. M. MILLARD,  
CHAS. D. ABEL.