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F. H. RICHARDS.

STOP MECHANISM FOR TURRET LATHES.

No. 481,192. Patented Aug. 23, 1892.

Fig. 1

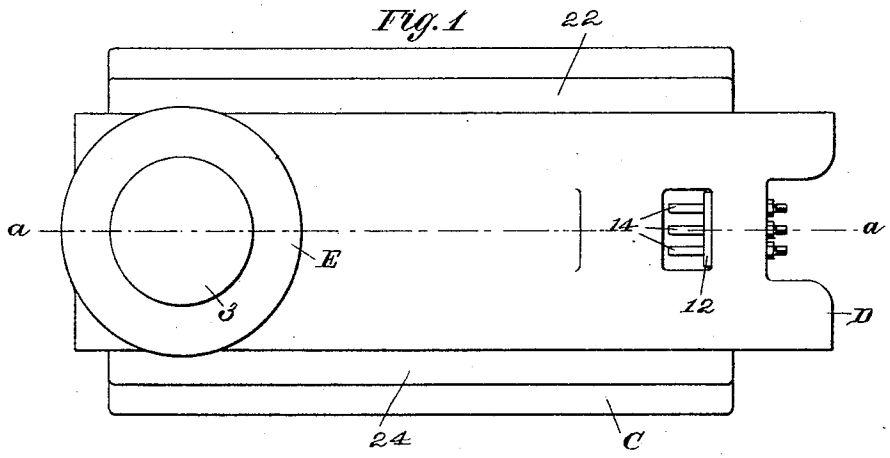

Fig. 2

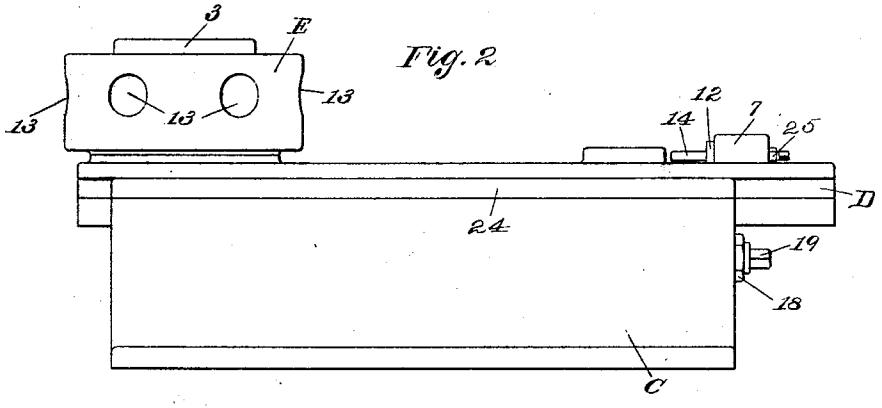

Fig. 3

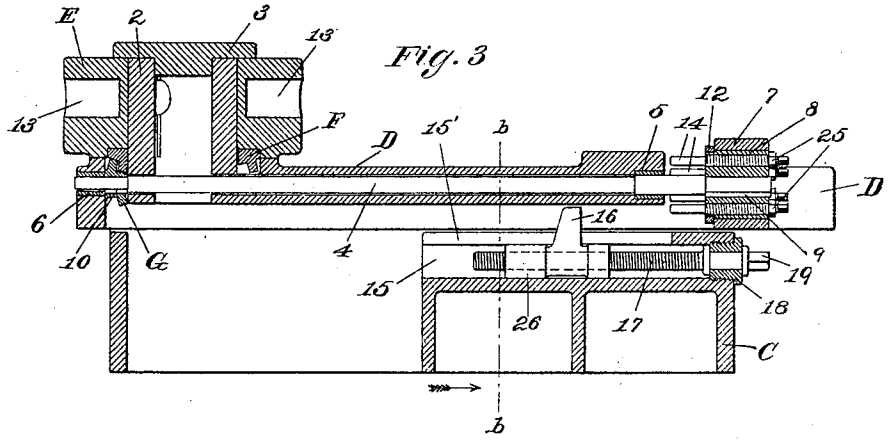

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Fig. 5

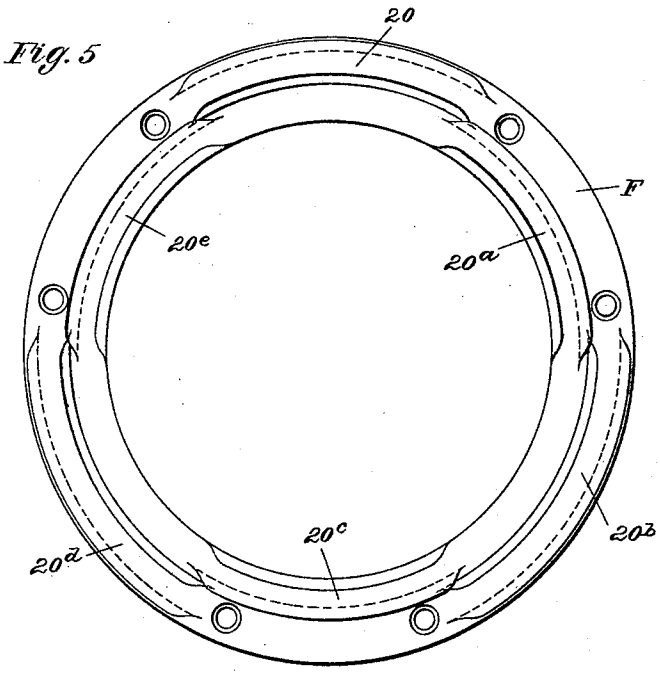

Fig. 6

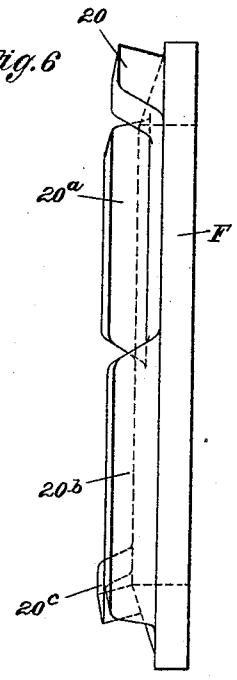

Fig. 4

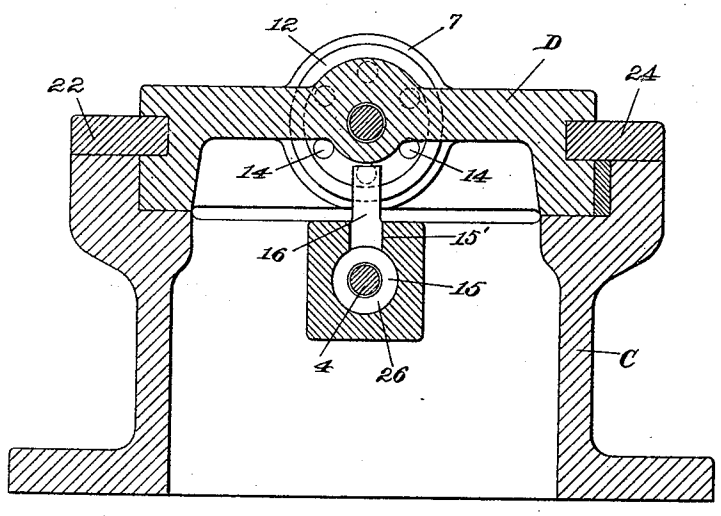

Fig. 7

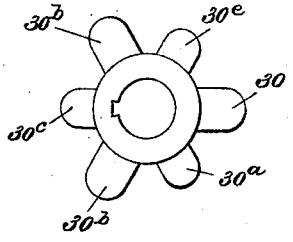

Fig. 8

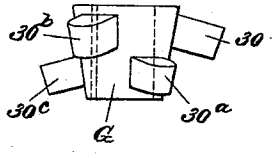

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Fig. 9

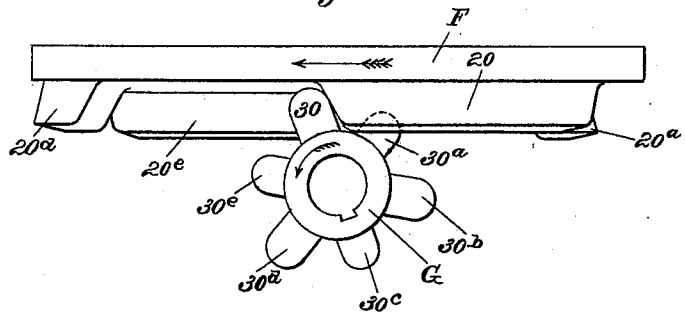


Fig. 10

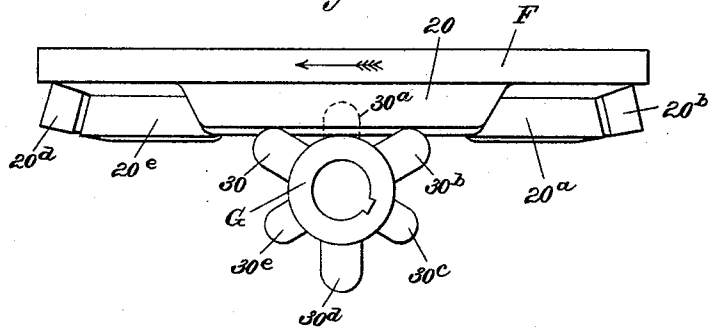
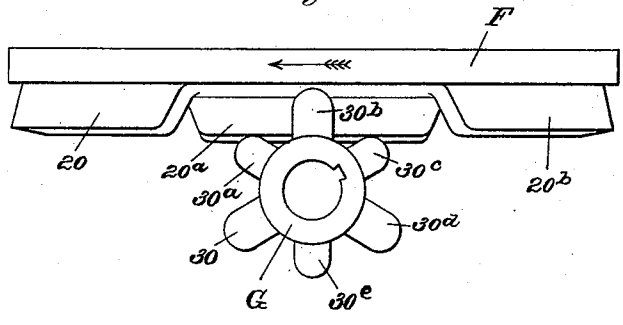


Fig. 11



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UNITED STATES PATENT OFFICE.

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STOP MECHANISM FOR TURRET-LATHES.

SPECIFICATION forming part of Letters Patent No. 481,192, dated August 23, 1892.

Application filed November 23, 1891. Serial No. 412,865. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Stop Mechanisms for Turret-Lathes, of which the following is a specification.

This invention relates to stop mechanisms for the sides of turret-lathes, the object being to furnish a stop mechanism having a multiplicity of adjustable stops, one for each tool carried by the turret, so that the stroke of each tool may be regulated and limited independently of the other tools of the set.

In the drawings accompanying and forming a part of this specification, Figure 1 is a plan view of the slide-block, turret-slide, and turret of a turret-lathe furnished with my improvements. Fig. 2 is a front elevation of the same. Fig. 3 is a central vertical section of the parts in line *a a*, Fig. 1. Fig. 4 is an enlarged cross-sectional view on the line *b b*, Fig. 3, as seen from the left hand in said figure. Figs. 5 and 6 are enlarged plan and side views, respectively, of the turret-gear; and Figs. 7 and 8 are similar views of the stop-shaft pinion. Figs. 9, 10, and 11 are three views on the same scale, illustrating the operation of the gearing.

Similar characters designate like parts in all the figures.

The slide-block C is in a general way substantially the same as the slide-blocks of ordinary turret-lathes, being fitted to receive the turret-slide and to be fixed to the bed of a lathe in the usual manner. The turret-slide D is arranged to slide in ways formed in said block, and is or may be held in place thereon by the usual straps 22 and 24. The turret E is revolubly supported on the forward end of said slide by means of a stud or column 2, which I have shown formed integral with said slide after the manner described in my concurrent application, Serial No. 412,871, filed November 23, 1891. Said turret is bored to fit closely but to turn freely on said stud, and a suitable cap, as 3, is provided for holding the turret in place thereon. As usual in turret-machines (sometimes designated as "screw-machines,") the turret is mounted on a slide D to have its axis crosswise to the line of movement of said slide. The set of slide-stops corresponding to the divisions of the turret are carried by an independent stop-cylinder, which is located at the rear end of the turret-slide and is actuated through a shaft that is geared to the turret to have corresponding movements therewith. Said cylinder or stop-carrier is arranged with its axis longitudinally of the line of movement of the turret-slide, so as to bring the series of adjustable stops carried thereby into the most favorable positions for coacting successively with the stop or abutment of the slide-block. Where the proportions and arrangement of the principal parts will permit, the shaft-actuating gearing may be of the ordinary bevel-gears; but owing to the relatively large diameter of the column 2 and the close proximity of the stop-shaft to the under side of the turret I have devised a system or modified kind of bevel-gearing especially adapted for the present requirements.

The turret-gear (designated in a general way by F) is fixed to the under side of the turret, the slide D being suitably recessed, if necessary, for this purpose. The slide is bored horizontally to receive the stop-shaft 4, which is journaled therein at 5 and 6, and has an enlargement at 7 near the rearward end thereof, that is bored to receive the stop-carrier 8, which carrier is fitted to freely turn within said bore and is fixed by a key 9 to the right-hand end of the shaft 4.

The cylinder 8 is provided with a ring-nut or collar 12, which bears against the forward side of the bearing 7 to receive the thrust of the stops. Said cylinder is bored and tapped to receive the series of adjusting-screws 14, which in the present case are six in number, corresponding to the number of tool-sockets 13, usually formed in the turret. Each of the stop-screws 14 is shown furnished with a check-nut 25 for properly fixing it in place. Near the left-hand end thereof the stop-shaft 4 has fixed thereto by means of a key 10 the pinion G, which meshes with the turret-gear F, and by means of which said shaft is actuated to have corresponding forward move-

ments with the turret. Owing, however, to the peculiar nature of said gearing, as herein shown, said shaft movements do not exactly coincide with those of the turret, but are of shorter duration. This feature of the apparatus will be understood from the detail views, Figs. 5 to 11, inclusive, and the following explanation thereof: The turret-gear F and the pinion G each have a number of gear teeth or cogs corresponding to the number of intermittent movements made during one revolution thereof, being in the present case six in number. On each of said gear-wheels F and G said cogs are arranged in two sets, alternating substantially as shown in the detail views. For the sake of convenience the teeth or cogs of the gear F are designated in a general way by 20 and separately by 20, 20^a, 20^b, 20^c, 20^d, and 20^e and the teeth of the pinion G by 30, 30^a, 30^b, 30^c, 30^d, and 30^e. On the wheel F the cogs 20, 20^b, and 20^d constitute the outer set, while 20^a, 20^c, and 20^e are the inner set. In like manner on the pinion G the cogs 30, 30^b, and 30^d constitute the outer set and the cogs 30^a, 30^c, and 30^e the inner set, which inner and outer sets correspond to and engage with the aforesaid outer and inner sets, respectively, of the turret-gear F. The cogs of the wheel F are elongated, being of the form of segmental ribs, as will be understood by comparison of Figs. 5, 6, 9, 10, and 11 and operate after the manner of cam-faces upon the cogs of the pinion. The pinion-cogs 30 are more nearly of the nature of ordinary gear-teeth, as will be understood from Figs. 7, 8, 9, 10, and 11.

The operation of the described gearing is illustrated in Figs. 9, 10, and 11, representing successive positions of the gears, which revolve in the direction of the arrows shown thereon in Fig. 9. On rotating the turret from one position thereof to its next successive position the gear F, being fixed to said turret, turns with it, and through the pinion G and the shaft 4 turns the stop-cylinder 8 to bring the proper adjusting-screw 14 into position to engage the stop 16, and thereby limit the forward movement of the slide. In Fig. 9 the tooth 20 of the gear and the tooth 30 of the pinion are in engagement, and said wheels are supposed to be revolving in the direction of arrows thereon. In Fig. 10 the gear F is supposed to be still revolving in the same direction, but the pinion G is not revolving, the teeth 30 and 30^b simply sliding on the surface or face of the tooth 20 of said gear. The pinion now remains inactive until the tooth 30^a thereof shall engage tooth 20^a of the gear, at which time the pinion is given another partial turn in the same direction, as before. In Fig. 11 the parts are shown in another position. The tooth 30^a having engaged the tooth 20^a, the pinion has been given another partial turn and the teeth 30^a and 30^c are sliding on the tooth 20^a, the pinion remaining stationary. The described construction of the gear F and pinion G gives to the shaft 4 an intermittent rotary movement, whereby each stop-screw is successively brought into position to engage the stop or abutment 16 at the proper time.

To provide for regulating the forward stroke of the turret-slide without varying the separate tool-stops, the stop 16 is made adjustable on the slide-block C, which is bored at 15 to receive the stop-slide 26. Above said bore 15 said block is slotted at 15′ for the upwardly-projecting stop 16, whose slide 26 is threaded to receive the stop-slide screw 17. The outer end of the screw 17 is journaled in a split nut or bearing 18, that is screwed into the threaded end of the bore 15 of the block C. By means of a wrench applied to the squared end 19 of the screw 17 the operator may adjust the stop 16 to limit, as required, the forward movement of the slide.

Having thus described my invention, I claim—

1. In a stop mechanism of the class specified, the combination, with the turret-slide and with the turret revolubly mounted thereon, of an independent stop-carrier, adjustable stops carried by said carrier, and means actuating the stop-carrier with the turret, substantially as described.

2. In a stop mechanism of the class specified, the combination, with the slide-block, of the stop 16 adjustable thereon, the turret-slide carried on the slide-block and carrying the turret revolubly mounted thereon, the stop-carrier furnished with adjustable stops, and a shaft and gearing actuating the stop-carrier with the turret to bring said adjustable stops successively into working position, substantially as described.

3. In a stop mechanism of the class specified, the combination, with the slide-block having the bore 15 and the slot above said bore, of the stop-slide fitting in said bore and having the stop extending upwardly through said slot, a screw engaging said stop-slide for moving the same in the slide-block, and the turret-slide having a stop engaging the stop 16, substantially as described.

4. In a stop mechanism of the class specified, the combination, with the slide-block having a stop, of the turret-slide supported on said block and having the turret revolubly mounted thereon, the stop-cylinder journaled in the turret-slide and carrying the adjustable stops, the shaft for rotating the stop-cylinder, and gearing, substantially as described, actuating said shaft from the turret, substantially as described.

5. In a stop mechanism of the class specified, the combination, with a slide-block and a stop thereon, of the turret-slide having the turret revolubly mounted thereon, a stop-cylinder furnished with adjustable stops and revolubly supported on the turret-slide in position for one of its stops to engage said slide-block stop, the turret-gear F, fixed to the turret, the pinion G, meshing with said turret-

gear, and means connecting said pinion and stop-cylinder, whereby the stop-cylinder is intermittently revolved to bring the turret-slide stops successively into working position, substantially as described.

6. In a stop mechanism, the combination, with the turret-slide, of the turret and the independent stop-carrier, both supported on the slide and operatively connected for corresponding movements, and adjustable stops carried by the stop-carrier, substantially as described.

7. In a stop mechanism, the combination, with the turret-slide, of the turret revolubly mounted thereon and having its axis crosswise to the direction of the slide movement, a stop-cylinder revolubly mounted on the turret-slide and having its axis longitudinal of the slide movement, and stop-cylinder-actuating devices operatively connecting the turret and said cylinder, substantially as described.

8. In a stop mechanism, the combination, with the slide having the bearing 7, of the cylinder journaled in said bearing and a series of stops adjustably fixed in said cylinder, substantially as described.

9. In a stop mechanism, the combination, with the slide-block having a stop, of the turret-slide supported on said block and having the turret revolubly mounted thereon, the stop-cylinder journaled in the turret-slide and carrying adjustable stops, and means operatively connecting the turret and stop-cylinder to have corresponding movements, substantially as described.

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