W. L. SCHELLENBACH.

LATHE.

APPLICATION FILED APR. 4, 1910.

1,000,442.

Patented Aug. 15, 1911.

4 SHEETS—SHEET 1.

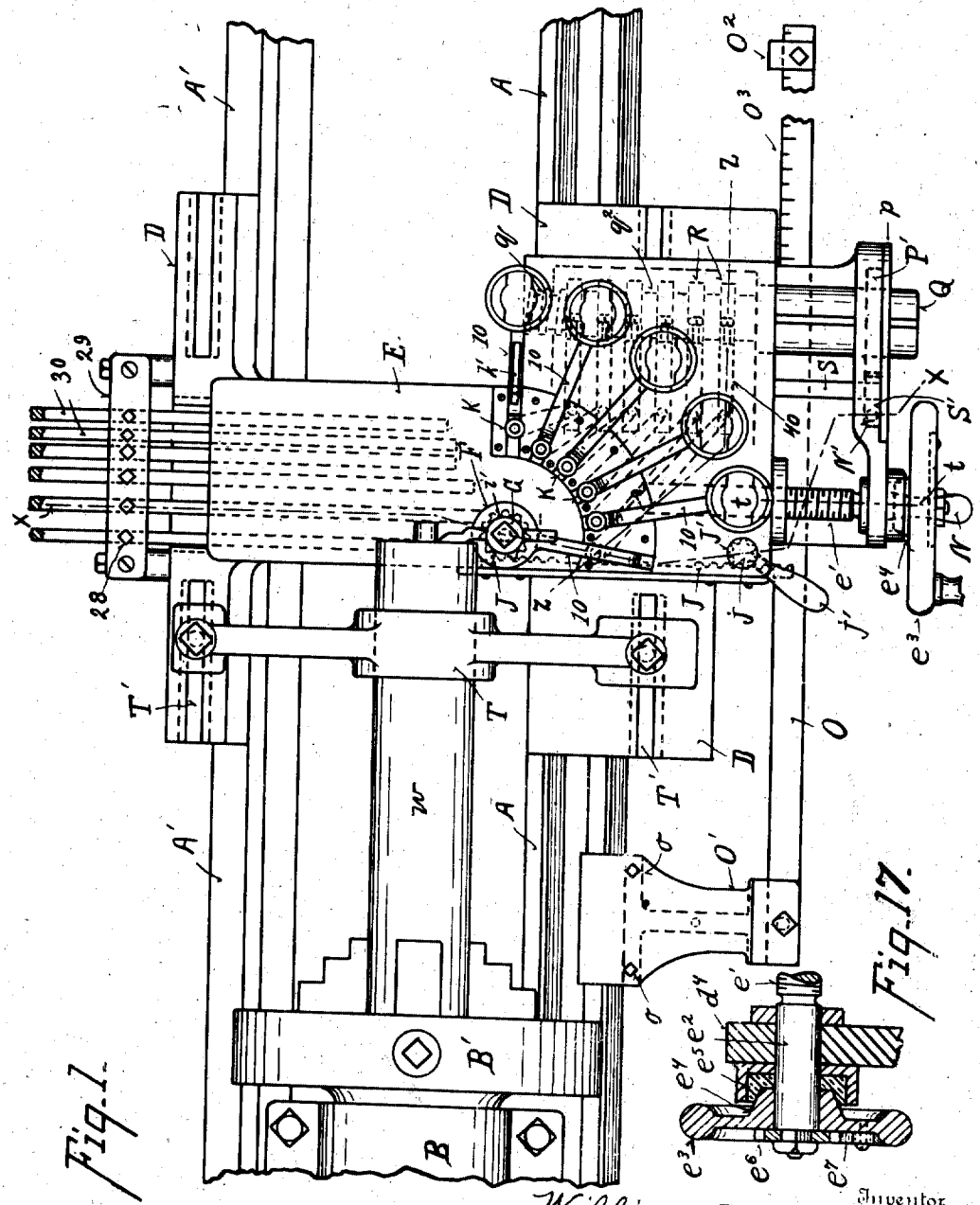

Fig. 1.

Fig. 17.

Witnesses

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4 SHEETS-SHEET 2.

Fig. 2.

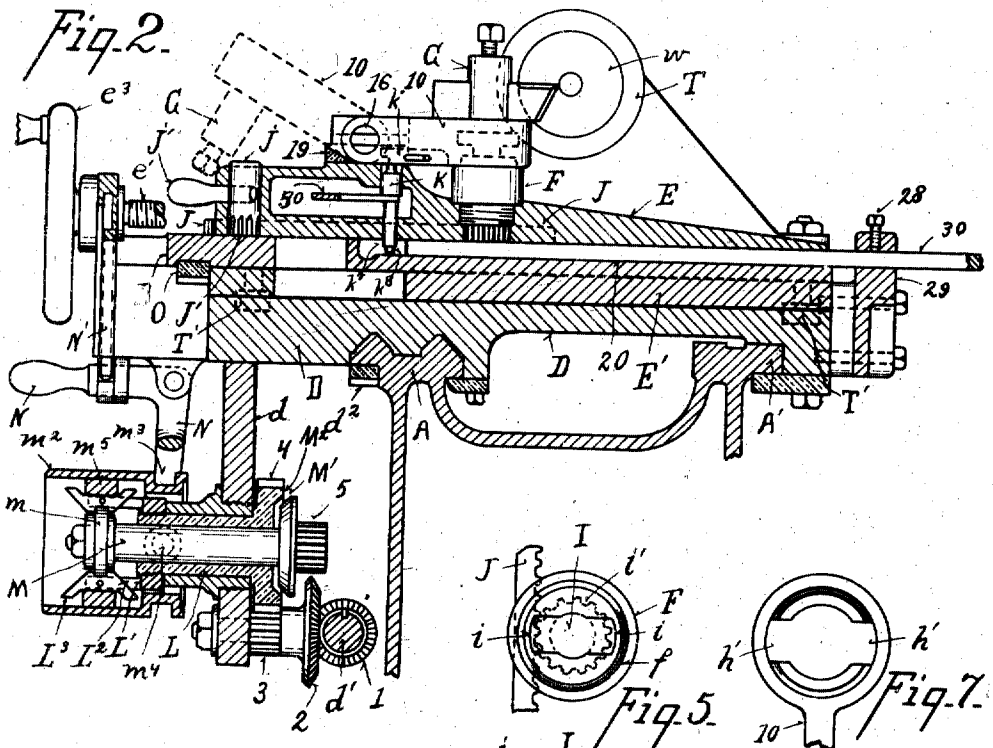


Fig. 5.

Fig. 7.

Fig. 4.

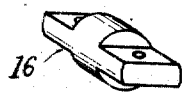


Fig. 6.

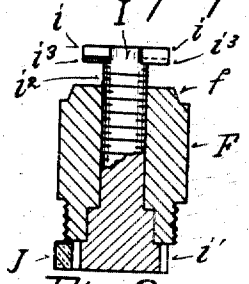


Fig. 8.

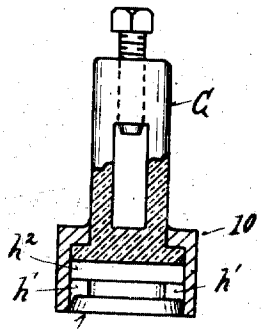
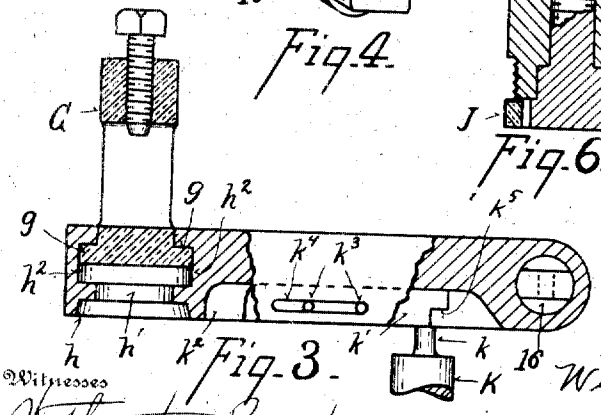


Fig. 3.



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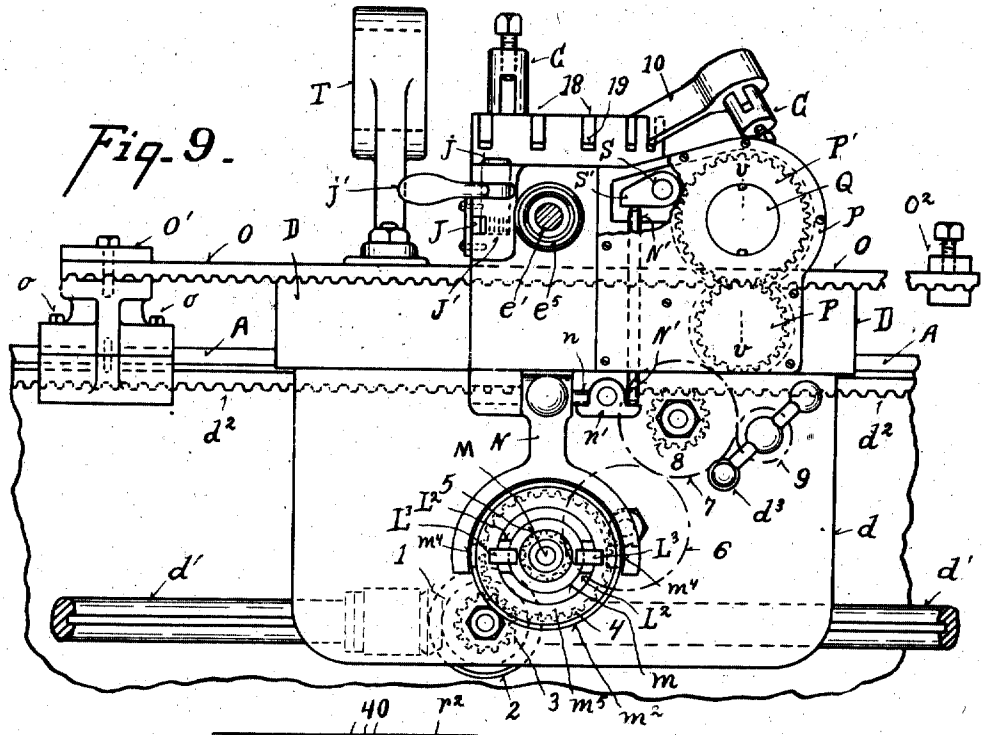
4 SHEETS—SHEET 3.

Fig. 9.



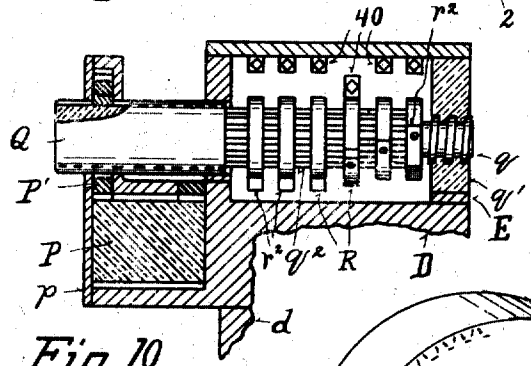


Fig. 10.

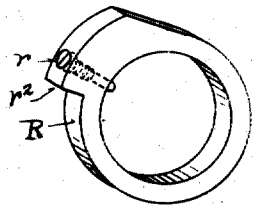
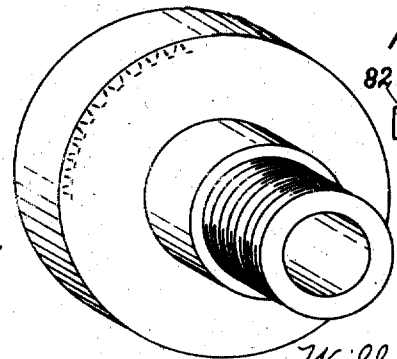


Fig. 11.

Fig. 12.



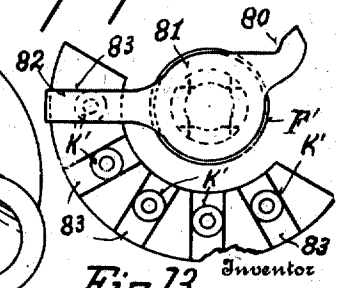


Fig. 13.

Witnesses

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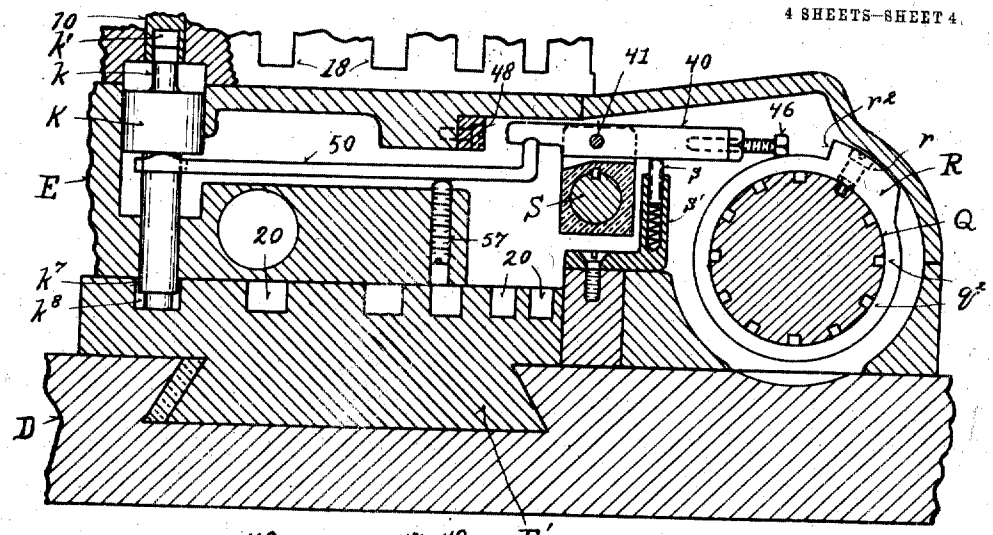

Fig. 14.

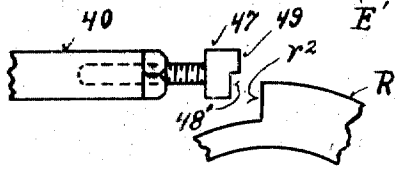

Fig. 16.

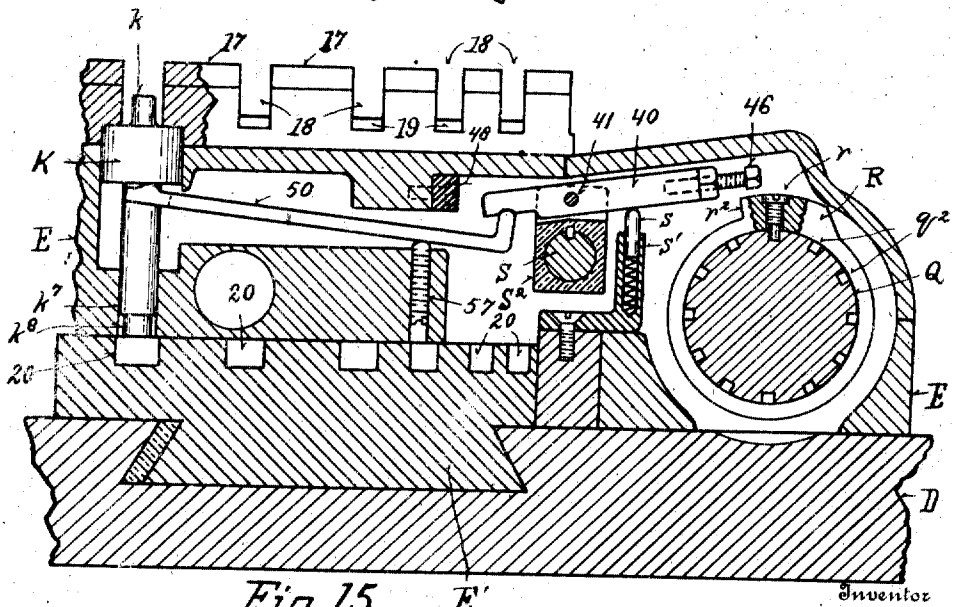

Fig. 15.

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1,000,442. Specification of Letters Patent. Patented Aug. 15, 1911.

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To all whom it may concern:

Be it known that I, WILLIAM L. SCHELLENBACH, a citizen of the United States, residing at Wyoming, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Lathes, of which the following is a specification.

My invention relates to improvements in lathes, and particularly to the tool supporting and controlling mechanism.

One of its objects is to provide a plurality of interchangeable and independent tools.

Another object is to provide a plurality of interchangeable tools or tool holders, each controlled by independent longitudinal or cross-feed stops, or both.

Another object is to provide means to automatically bring into action the stop mechanism of the particular tool in use, while the stop mechanisms of the tools not in use are disconnected.

Another object is to provide improved stop mechanism for both longitudinal and cross-feed.

Another object is to provide improved feed controlling mechanism to be released by said stops.

It further consists in certain details of form, combination and arrangement, all of which will be more fully set forth in the description of the accompanying drawings in which:

Figure 1 is a top plan view of part of a lathe, including the tool carriage, and embodying my improvements. Fig. 2 is a vertical section through the same on line *x—x* of Fig. 1. Fig. 3 is a detail view partly in section of one of the tool posts and its hinged carrier detached. Fig. 4 is a perspective view of a journal for one of said hinged carriers. Fig. 5 is a detached top plan view of the tool support on which the tool carriers or holders seat. Fig. 6 is a central vertical section through the tool support of Fig. 5. Fig. 7 is a detail bottom plan view of part of one of said hinged carriers of Fig. 3. Fig. 8 is a view partly in central vertical section through Fig. 7. Fig. 9 is a front elevation of the tool carriage, apron, and part of the lathe ways. Fig. 10 is a detail sectional view through part of the longitudinal feed stop mechanism on line *v—v* of Fig. 9. Fig. 11 is a detached perspective view of one of the stop rings. Fig. 12 is a perspective view illustrating one class of work to be operated upon. Fig. 13 is a detail top plan view of a modification of the tool supporting mechanism. Fig. 14 is a section on line *z—z* of Fig. 1, through part of the tool carriage and stop mechanism, and illustrating the stop mechanism in position to stop the tool carriage. Fig. 15 is a view similar to Fig. 14 and illustrating the stop mechanism parts in inoperative position. Fig. 16 is a detail of a modification of the stops of Figs. 14 and 15, to provide for rough and finish cuts. Fig. 17 is a detail sectional view on line *t—t* of Fig. 1, illustrating the hand wheel and cross-feed screw clutch mechanism.

The accompanying drawings represent one embodiment of my invention, which is capable of embodiment in several different forms or modifications.

In the accompanying drawings A A′ represent the ways or bed of an engine lathe; B represents part of the head stock and B′ a chuck, in which the work *w* is mounted or carried, all of which parts may be of ordinary construction.

D represents the main tool carriage, which is adapted to travel longitudinally upon the ways A A′. The carriage D is provided with an apron *d*, which carries a train of gears, 1, 2, 3, 4, 5, 6, 7, 8 and 9, which receive motion from a splined shaft *d′*, driven from the lathe head stock in the usual manner. Beveled gear 1 is carried by a bracket on the apron, and is splined to shaft *d′* so as to travel with the apron and, to rotate with shaft *d′*. Gear 1 meshes with and drives beveled gear 2, the stem of which carries a spur gear 3, which meshes with and drives gear 4. Gear 5 is adapted to be clutched to and thus driven with gear 4. Gear 5 when clutched to gear 4 in turn drives gears 6, 7 and 8. Gear 8 meshes with a rack d^2 on the lathe way A and thus serves to propel the carriage D along the ways A A′. A hand propelled gear 9 meshes with gear 7 and serves when gear 5 is disengaged from gear 4 to feed the carriage D by hand through the crank d^3. Other forms of power driven carriage feed mechanism may be employed in place of that above described.

Mounted in ways E upon the main tool carriage D is a cross-feed tool carriage E, which is adapted to be fed transversely of the ways A A′ by means of a hand operated feed screw *e′*, which has a fixed bearing at e^2 in a bracket d^4, forming part of the carriage

D. The hand wheel e^3 which serves to turn the feed screw e' is preferably provided with a friction or yielding engagement with the screw e' to feed the carriage E toward the work, comprising the cone member e^4 on the hand wheel and a counterpart member e^5, rigidly carried by the shank of the screw e', which members are adapted to slip when the carriage E encounters an obstacle or excessive resistance. A ratchet wheel e^6 on the shank of screw e' and a spring pawl e^7, carried by the hand wheel e^3, furnish a positive connection between the hand wheel and feed screw to feed carriage E in the opposite direction.

Mounted upon the carriage E is a tool support or post F, which is adapted to interchangeably support a series of independent tools or tool holders. The tools and parts interchangeably carried by the support F may be formed integral or in two or more parts constituting the tools and the tool holder or carrying members, and may be detachable or removable, or may be pivotally or otherwise attached to the carriage member E.

The tool posts are preferably supported in carriers or links 10, as illustrated in Figs. 1 and 2, which links are pivotally attached to the carriage E, so as to successively or selectively bring the several tool posts carried thereby to a common center or point above the support F. The several carriers 10 are provided with inclined recesses h, to register with a conical head f on the support F, and are adapted to be locked rigidly in position on the support F by means of a key I, carried by the support, and the cross arms of which key pass through slots h' in the under face of the carriers and engage in annular recesses h^2 to lock said carriers in place. The key I is provided with a gear i' at its lower end, which meshes with a rack J, which rack engages and is reciprocated by a gear J′ on the shaft j, which is given a partial revolution by hand lever j' to engage or disengage the key I from the tool carriers. The shank j^2 of the key I is preferably threaded into the post F, so that the rotation of gear i' serves to draw the cross arms i of the key downward to secure a firm engagement between the respective carriers and the post F. Said cross arms i may, if desired, be beveled, as indicated at i^3 Fig. 6, in place of, or in conjunction with, the threaded shank, to secure a firm engagement between the post F and the carrier locked thereto.

The base portions of the respective tool holders have cross arms g, similar to the cross arms i of the key I, which pass the slotted opening h' in the carriers, and when partly rotated hold the tool holders in place relative to the carriers, and permit the tool holders to be rotated to secure the desired angular adjustment of the tools.

The respective carriers 10 are pivotally attached to the carriage E by pivot pins 16, Fig. 4, the ends of which pins are flattened and pierced to engage dowel pins on the carriage E and are held in place by cap plates 17. The pivotal portion of the respective carriers 10 are seated in recesses 18 formed in the carriage E and by the sides of the plates 17, and the carriers when in the idle position rest upon buffers 19 in the outer edge of said recesses.

K represents vertically movable pins or plungers, seated in vertical bearings in the carriage E with their upper ends k projecting into the recesses 18 in position to be engaged and depressed by sliding members k' carried in recesses k^2 in the under faces of the carriers 10 when said carriers are in the operative position. The sliding members k' are held in the recesses k^2 by means of pins k^3 projecting into slotted openings k^4, and said members k' are provided with offsets k^5, so that by adjusting the members k', the stems k may be caused to engage the under faces of the mebers k' to fully depress the plungers K; or to engage the offsets k^5 to partially depress the plungers K, or so that the stems k will miss the ends of the members k' and fail to depress the plungers K. The lower ends of the plungers K project into transverse channels 20 in the lower part of the carriage E, in which channels are located a series of adjustable stop rods 30. The lower ends of said plungers K, by means of the adjustment of the members k', are adapted to present two engaging faces k^7, k^8 to the ends of the stop rods 30 one of which surfaces k^7 serves as a stop for the tool on the roughing or primary cut and the other k^8 serves as a stop for the tool on the final or finishing cut. The stop rods 30, are adjustable endwise in the recesses 20, to meet the requirements of different classes of work, and adapted to be locked to position by set screws 28 carried by bracket 29 on the carriage D. Plungers K and stop rods 30 serve to independently stop the transverse feed of carriage E at a predetermined point for each tool, and the adjustment of any tool to operative position shifts its stop mechanism into operative position, and releases the plunger K to shift the mechanism to inoperative position, as soon as the tool is moved to its idle position.

The longitudinal feed of the carriage D on the ways A A′ is controlled by independent stop mechanism for the respective tools, preferably in the following manner. The gear 4 is continuously driven from the shaft d', and is carried on a sleeve L, journaled to the apron d. Sleeve L is held against end play by a collar L′ threaded to sleeve L and adapted to be locked thereto by a set screw or similar locking means. The collar L′ has outwardly projecting

studs L^2, to which are pivotally attached tumblers L^3, which at their inner edges engage a collar m on the stem M of clutch member M′ carrying the gear 5. The clutch member M′ is adapted to engage a counterpart clutch member M^2 on the gear 4 to lock the gears 4 and 5 together, and the tilting of the tumblers L^3 serves to shift the stem M endwise to engage or disengage the clutch members M′, M^2. A sleeve m^2 has an annular recess m^3 engaged by pins m^4, carried by a forked bell crank shaped controlling lever N to shift the sleeve m^2 endwise. The sleeve m^2 carries a ring m^5, which when shifted endwise tilts the tumblers L^3 upon their pivots. The controller lever N has a pin n which engages a tumbler n', which is adapted to be rocked by the end thrust of a rod N′ to rock the lever N and disengage the clutch members M′, M^2 to stop the carriage longitudinal feed.

A rack bar O is carried by a clamp O′, which clamp is adjustable to the desired position on the lathe way A and then locked by clamp screws o. The rack bar O slides freely through a recess in the carriage D and has at its opposite end an adjustable stop block O^2. The upper face of the rack O is also preferably provided with an index or scale O^3 to facilitate the adjustment of the carriage and the stop O^2. The rack O engages and drives a gear or pinion P, which is mounted in a recess in the carriage D and held in place by means of a face plate p. The gear P in turn drives a gear P′, which is splined to a shaft Q and serves to rotate the shaft Q, but allowing shaft Q to move endwise. A screw q at the opposite end of shaft Q is threaded into a nut q', carried by carriage E, and serves to alternately shift the shaft Q endwise as it is rotated in opposite directions, as well as to carry the shaft Q endwise with the feed of carriage E. A portion of the shaft Q is provided with a series of longitudinal slots q^2 in its periphery, and a series of cam rings R are arranged at intervals on said shaft and locked thereto by screws r, having their inner ends reduced and adapted to enter any one of the slots q^2 to lock the respective cams R to the desired positions. A shaft S is journaled in bearings in the carriage D, and has at one end a crank arm or tappet S′, to engage the opposite end of the rod N′, to control the clutch member M′. The shaft S carries a sleeve or collar S^2, which is splined to shaft S and moves endwise on said shaft with the carriage E, and has pivotally attached to its upper edge a series of rock bars 40, which bars are engaged upon one side of their pivots 41 by spring actuated studs s seated in recesses in brackets s' carried by the carriage E. The studs s serve normally to hold the rock bars 40 in a tilted position, so as to be out of the path of the rotating cam rings R, as indicated in Fig. 15. A series of levers 50 are fulcrumed respectively upon adjustable screw studs 57 and are in engagement at one end respectively with the opposite ends of the rock bars 40, while the opposite ends of said levers 50 are forked to receive the reduced lower portions of the plungers K and to engage beneath the enlarged portion of said plungers K, so that the adjustment of any one of the tools to operative position upon the post F will cause the member K′ of carrier 10 of said tool to engage and depress the plunger K beneath said carrier, which through its lever 50 will act upon the corresponding rock bar in opposition to its spring stud s, and will tilt said rock bar into the path of the shoulder r^2 of its cam ring R, and the engagement of the shoulder r^2 of the cam ring R with the head of the adjustable screw 46 forming the end of the rock bar 40 will force the rock bar 40 endwise toward the stop bar 48, which movement of the rock bar 40 will serve to rock the shaft S and release the clutch member M′ to stop the longitudinal feed of the carriage. This automatic release of clutch M′ is designed to occur before the ends of the respective rock bars 40 have come into contact with the positive stop bar 48, and the operator is thus enabled, where great accuracy is required, to feed the carriage D by hand lever d^3, until the end of the particular stop bar 40 comes into contact with the bar 48. The object of the nut q' with the end of the shaft Q threaded thereto is to provide for an endwise movement of the cam rings R, so that said rings may be of comparatively small diameter and make two or more revolutions while the carriage travels the length of rack O, and the rings R can be adjusted lengthwise, as well as circumferentially of shaft Q, and, if desired, pass on one or more revolutions between and miss the bars 40, until the carriage has reached the desired position for the stop to act, thus providing for a greater range of longitudinal feed of the carriage than could otherwise be attained without further increasing the diameter of the cam rings R.

As illustrated in Fig. 16, the adjustable heads 47, of the rock bars 40 are provided with two faces 48′, 49, either of which are adapted to be brought into engagement with the face r^2 of the respective rings R, by adjusting the slide k' to cause the stem k to engage either the under face of the slide k' or its offset k^5, thus depressing the head 47 to greater or less extent, and providing stops for both rough and finish cuts in the longitudinal carriage feed.

In the modification, Fig. 18, the respective tools 80 may be attached to their respective carriers, or holders, 81, or may be formed

integral with said carriers. The respective carriers instead of being pivotally attached to the tool carriage and movable on their pivots to and from operative position, as illustrated in Figs. 1 and 2, are detached from the tool carriage in their inoperative positions, and may be supported on a convenient rack or table, and are adapted to be selectively locked to a common operative position upon the tool support F'. Said respective carriers 81, are each provided with a projecting arm 82, which is adapted when the carrier is locked to operative position to seat in one of the recesses 83, in the top of the tool carriage, and by engagement with the side walls of said recess, to prevent the carrier from rotating, and to insure a given tool repeatedly occupying the same position relative to the carriage, and its arm 82 in engagement with the desired stop member K'. The arms 82 may be provided with slides similar to the slides k'. Thus as many tools as there are slots or recesses 83, may be successively locked to the tool support F', and employed in the same manner as the pivotally attached tools heretofore described.

The mechanism herein illustrated and described is designed to produce duplicate pieces of work in quantities, and of larger diameter than could be passed through the bore of a head-stock spindle. Its operation is as follows: If the work is to be cut from solid stock, a piece of cylindrical stock of any desired length less than the length of the lathe bed, and within the swing capacity of the lathe, is clamped at one end of the chuck B' and supported near the opposite end in a guide or rest T carried by the tool carriage D, to which the rest is clamped by T-slots T'. The several tools necessary to carry out the operations required, such as facing, boring, tapping, and threading, are mounted in the respective tool holders G, and the transverse stops 30 adjusted to stop the feed of the respective tools at the points desired. The housing over the cam rings R is then removed and the several cam rings are released from the shaft Q, by means of the screw r, and said cam rings readjusted to stop the longitudinal feed for the respective tools at the points desired. The lathe is then started and the several tools successively brought into operative position above the support F and locked there while performing their respective operations, each tool being stopped either transversely or longitudinally or both by the operation of the stop mechanism heretofore described. After each piece of work has been severed from the stock piece w, or completed without severing, the clamp carrying the rack O is released, and the rack O adjusted until the stop O^2 strikes the carriage D when rack O is again clamped to the lathe bed, and the tool carriage is in position ready to commence operations upon a fresh section of the stock piece w.

In Fig. 12 I have shown a gear blank, representing another general class of work comprising castings and drop forgings, and where many duplicates are to be produced. With this class of work the blanks are successively clamped in the chuck B' and successively operated upon by the respective tools, the adjustment of the tools and stops being as above described, except that rack O does not require readjustment after each series of operations, the carriage, after each series of operations being fed by hand lever d^3 back to its initial position with reference to the rack O. The number of tools employed will depend upon the nature of the work.

The tool carriage mechanism herein illustrated and described is capable of being applied to any ordinary style of engine lathe, and by shifting the sliding members k' out of contact with the stem k of the plungers K, the stop mechanism becomes inoperative without disturbing its adjustment, and the lathe can be used in the usual manner of using engine lathes. As compared with lathes of the turret type, the carriage and the tool support is enabled to get close up to the work, and the operator can get close to and watch the progress of the work; also work of much larger dimensions than heretofore can be readily duplicated in quantities.

The term "tool" in the claims hereof is employed to designate the tool proper and its carrier or holder, where said parts are not specifically designated, and whether said parts are integral or separately formed, and whether detachable or pivotally connected to the tool carriage.

The mechanism herein illustrated and described is capable of considerable modification without departing from the principle of my invention.

Having described my invention, what I claim is:

1. In a lathe, a tool carriage adapted to travel forward and backward on ways, a plurality of tool holders, a support carried by said tool carriage and adapted to successively receive and support said respective tool holders in the same relation with reference to the carriage, non-rotary tools carried by said tool holders, and means to lock the respective tool holders to said support.

2. In a lathe, a tool carriage, mechanism to feed said tool carriage, a plurality of tool holders, a support carried by said tool carriage and adapted to successively receive and support said respective tool holders, and to repeatedly support said respective tool holders in the same relation with reference to the work, mechanism to lock the respec-

tive tool holders to said support, and a plurality of independent stop members each adapted to be shifted to operative position by a corresponding tool holder when locked to operative position, to automatically release said tool carriage feeding mechanism to stop the tool carriage feed at predetermined positions of said tool carriage.

3. In a lathe, a tool carriage movable transversely of the lathe bed, mechanism to feed said tool carriage, a plurality of adjustable stop bars adapted to stop the carriage feed at different predetermined positions of said tool carriage, a plurality of tool holders, a support carried by said tool carriage and adapted to successively receive and support any one of said respective tool holders, and to repeatedly support said respective tool holders in the same relation with reference to the work, mechanism to lock said respective tool holders to said support, and a plurality of independent stop members each adapted to be actuated when a corresponding tool holder is locked to said support, to bring said respective stop members into operative relations with said respective adjustable stop bars to stop the carriage feed.

4. In a lathe, a tool carriage adapted to travel forward and backward on ways, a plurality of tool holders pivotally attached to said carriage and movable to a common operative position and to different non-operative positions, a plurality of non-rotary tools carried by said tool holders, and means to lock said tool holders successively in said operative position.

5. In a lathe, a tool carriage comprising a primary member carried on the lathe bed and adapted to be fed longitudinally of said lathe bed, and a secondary non-rotary member carried by said primary member and movable transversely of the lathe bed, independent mechanisms to feed said respective carriage members, a plurality of independent tools each having an operative position with reference to said secondary carriage member and an inoperative position, an independent stop mechanism for each tool adapted to control both the longitudinal and transverse feed of said tool carriage members, said respective stop mechanisms each having an operative and an inoperative position, and means controlled by the movements of said respective tools to operative or inoperative position, to shift their respective stop mechanisms to operative or inoperative position.

6. In a mechanism of the character described, a lathe, a tool carriage adapted to travel forward and backward on ways, and provided with a non-rotary tool support, power driven mechanism to feed said tool carriage, an automatically controlled member to release said power driven mechanism, a plurality of independent tools each having an operative position with reference to said carriage and tool support and an inoperative position, an independent stop member for each tool having an operative and an inoperative position, and movable in unison with said respective tools to operative or inoperative position, and means adapted to be engaged by said respective stop members to actuate said automatically controlled releasing member to automatically release the power driven carriage feeding mechanism.

7. In a mechanism of the character described, a lathe provided with a stationary rack and a shaft adapted to drive a train of gears on a tool carriage, a tool carriage, a train of gears carried by said tool carriage, driven by said shaft, and engaging said stationary rack to feed said tool carriage longitudinally of said lathe bed, a clutch interposed in said train of gears, a plurality of independent tools each having an operative position with reference to said carriage and an inoperative position, an independent stop member for each tool having an operative and an inoperative position, and movable in unison with said respective tools to operative or inoperative position, a rack adjustable along said lathe bed, a stop member receiving motion from said adjustable rack through the longitudinal feed of said tool carriage, said respective stop members being adapted to interengage at predetermined positions of the tool carriage, and mechanism controlled by the engagement of said stop members to release said clutch to stop the feed of said tool carriage.

8. In a lathe, a tool carriage, mechanism to positively feed said tool carriage longitudinally of the lathe bed, a clutch controlling said tool carriage feed mechanism, a non-rotary tool support mounted on said carriage, a plurality of tools each having an operative position with reference to said tool support and an inoperative position, an independent stop member for each tool having an operative and an inoperative position, and movable in unison with said respective tools to operative or inoperative position, a rack, a stop member receiving motion from said rack through the movements of the tool carriage, said respective tool controlled and rack controlled stop members being adapted to interengage at predetermined positions of the tool carriage, and mechanism controlled by the engagement of said stop members to automatically release said clutch and stop the tool carriage feed.

9. In a lathe, a tool carriage, mechanism to positively feed said tool carriage longitudinally of the lathe bed, a clutch controlling said tool carriage feed mechanism, a non-rotary tool support mounted on said carriage, a plurality of tools each having an operative position with reference to said

tool support and an inoperative position, an independent stop member for each tool having an operative and an inoperative position, and movable in unison with said respective tools to operative or inoperative position, a rack adjustable along said lathe bed, a shaft receiving rotary motion from said rack through the movements of the tool carriage, a plurality of stop members receiving motion from said shaft, said tool controlled stop members and said shaft driven stop members being adapted to interengage in pairs at predetermined positions of the tool carriage, and mechanism controlled by the engagement of said stop members to release said clutch and stop the tool carriage feed.

10. In a lathe, a tool rest movable transversely of the lathe bed, mechanism to feed said tool rest, a plurality of independent tools each having an operative position with reference to said tool rest and an inoperative position, a stop member for each tool having an operative position for rough cut work and a different operative position for finish cut work, and an inoperative position, said stop members being movable in unison with said respective tools to operative or inoperative positions, and mechanism adapted to engage said respective stop members in their operative positions to stop the tool rest feed at predetermined positions of the tool rest.

11. In a lathe, a tool carriage adapted to travel forward and backward on ways, a non-rotary tool rest mounted upon said carriage, mechanism to feed said carriage, a plurality of independent tools adapted to be non-rotatively supported with reference to said tool carriage and tool rest, and each having an operative position with reference to said tool carriage and an inoperative position, a stop member for each tool having an operative and an inoperative position, and adapted to be shifted to operative or inoperative position in unison with the movements of said respective tools, and an adjustable member for each stop adapted to be shifted into or out of operative relations with said respective stops, and when in operative relations with said stops to cause said stops to move to operative or inoperative position in unison with the movements of said tools.

12. In a lathe, a tool carriage, mechanism to feed said tool carriage, a plurality of independent tools non-rotatively supported with reference to said carriage, and each having an operative position with reference to said tool carriage and an inoperative position, a stop member for each tool having a plurality of different operative positions and an inoperative position and adapted to be shifted to an operative or inoperative position in unison with the movements of said respective tools, and adjustable mechanism to independently control the positions of said respective stops when their corresponding tools are in operative position.

13. In a lathe, a tool carriage comprising a primary member carried on the lathe bed and adapted to be fed longitudinally of said lathe bed, and a secondary non-rotary member carried by said primary member and movable transversely of the lathe bed, independent mechanisms to feed said respective carriage members, a plurality of tools each having an operative position with reference to said secondary carriage member and an inoperative position, an independent stop mechanism for each tool having an operative and an inoperative position and movable in unison with said respective tools to operative or inoperative position to stop the respective carriage feeds at predetermined positions of the respective carriage members, and adjustable means to vary the stopping point of said respective carriage members to provide for the use of said respective tools for both rough and finish cuts.

14. In a lathe, a tool carriage comprising a primary member carried on the lathe bed and adapted to be fed longitudinally of the lathe bed, and a secondary member carried by said primary member and movable transversely of the lathe bed, a tool support carried by said secondary carriage member, a plurality of tools adapted to be interchangeably locked to operative position upon said support, and an independent stop member for each tool, carried by said secondary tool carriage member and each having an operative and an inoperative position, said respective stop members being adapted to be engaged and held in their operative positions by the respective tools when locked to operative positions, and mechanism controlled by said respective stop members to stop the feed of said respective tool carriage members at predetermined positions of said tool carriage members.

15. In a lathe, a tool carriage, a tool support carried by said carriage, a key carried by and threaded to said support, means to rotate said key and to thereby cause endwise movement of said key, a plurality of tools adapted to interchangeably seat upon said support, means to hold said respective tools against rotation relative to said support and repeatedly in the same relation relative to said support, and interengaging faces on said tools and said key to lock said tools in place upon said support.

16. In a lathe, a tool carriage, a tool support carried by said carriage, a locking member carried by said support, a plurality of tools adapted to interchangeably seat upon said support, means to hold said respective tools against rotation relative to said support and repeatedly in the same re-

lation relative to said support, interengaging faces on said tools and said locking member to lock said tools in place upon said support, and mechanism to shift said locking member to lock and unlock said tools.

17. In a lathe, a tool carriage, mechanism to positively feed said tool carriage longitudinally of the lathe bed, a clutch controlling said tool carriage feed mechanism, a plurality of tools each having an operative position with reference to said tool carriage and an inoperative position, an independent stop member for each tool having an operative and an inoperative position, and movable in unison with said respective tools to operative or inoperative position, a rack adjustable along said lathe bed, a shaft receiving rotary motion from said rack through the movements of the tool carriage, means to shift said shaft endwise in unison with its rotary motion, a plurality of rotary stop members adjustably carried by said shaft, said tool controlled and said rotary stop members being adapted to interengage in pairs at predetermined positions of the carriage and mechanism controlled by the engagement of said stop members to release said clutch and stop the tool carriage feed.

18. In a mechanism of the character described, a tool carriage, mechanism to feed said tool carriage, a multiple tool support carried stationarily with reference to said tool carriage and adapted to interchangeably support a plurality of independent tools, and to repeatedly support the same tool in the same relation with reference to said carriage, mechanism to lock said tools successively to said tool support, and an independent stop member for each tool, having an operative and an inoperative position, and movable in unison with said respective tools to operative or inoperative position, said respective stop members being adapted to automatically stop the feed of said tool carriage.

19. In a lathe, a tool carriage mechanism to feed said tool carriage selectively by power or by hand, a tool support mounted on said carriage, a plurality of tools non-rotatively supported upon and with reference to said carriage, and each having an operative position relative to said tool support, and an inoperative position, a stop member for each tool having an operative and an inoperative position and movable in unison with said respective tools to operative or inoperative position, mechanism adapted to be actuated by said respective tool controlled stop members to release said tool carriage power feed, and a positive stop for both power and hand feed, adapted to stop the tool carriage hand feed subsequent to the release of said power feed to attain an accurate stop of the tool carriage.

20. In a lathe, a tool carriage mechanism to feed said tool carriage selectively by power or by hand, a non-rotary tool support mounted on said carriage, a plurality of tools non-rotatively supported with reference to said carriage, and each having an operative position relative to said non-rotary tool support, and an inoperative position, a stop member for each tool having an operative and an inoperative position and movable in unison with said respective tools to operative or inoperative position, mechanism adapted to be actuated by said respective tool controlled stop members to release said tool carriage power feed, and a positive stop for both power and hand feed, adapted to stop the tool carriage hand feed subsequent to the release of said power feed to attain an accurate stop of the tool carriage.

21. In a lathe, a tool carriage, mechanism to feed said carriage longitudinally of the lathe bed, a plurality of independent tools non-rotatively supported with reference to said carriage and each having an operative position with reference to said carriage and an inoperative position, an independent stop member for each tool carried by said tool carriage and having an operative and an inoperative position, and movable in unison with said respective tools to operative or inoperative position, and an adjustable stop member adapted to interengage with said respective tool controlled stop members to stop the carriage feed at predetermined positions of said carriage.

22. In a lathe, a tool carriage, mechanism to feed said carriage longitudinally of the lathe bed, a plurality of independent tools each having an operative position with reference to said carriage and an inoperative position, an independent stop member for each tool carried by said tool carriage and having an operative and an inoperative position, and movable in unison with said respective tools to operative or inoperative position, and a stop member carried by said carriage and movable in ratio to the movement of said carriage, and adapted to engage said respective tool controlled stop members when in operative position to stop the carriage feed at predetermined positions of said carriage.

23. In a lathe, a tool carriage, mechanism to feed said tool carriage, a tool support carried stationarily by and with relation to said tool carriage and to which a plurality of independent tools are adapted to be selectively locked, a plurality of independent tools adapted to be selectively seated and locked to operative position upon said tool support, and independent means controlled by each of said respective tools when locked to operative position adapted to stop said tool carriage at varying predetermined positions.

24. In a lathe, a tool carriage adapted to

travel forward and backward upon the lathe bed, a non-rotatively supported tool rest mounted upon said carriage, a plurality of independent stop members adapted to travel transversely of the carriage feed, and a plurality of tools adapted to be successively locked to a common operative position upon said tool rest, each of said tools having a point of engagement with said tool rest common to all of said tools and another individual point of engagement with said tool rest, whereby said independent stops may be respectively engaged and controlled by said tools when locked to operative position.

In testimony whereof I have affixed my signature in presence of two witnesses.

WILLIAM L. SCHELLENBACH.

Witnesses:

C. W. MILES,

ALBERT W. SCHWARTZ.