

H. J. DUNCAN.
LATHE.

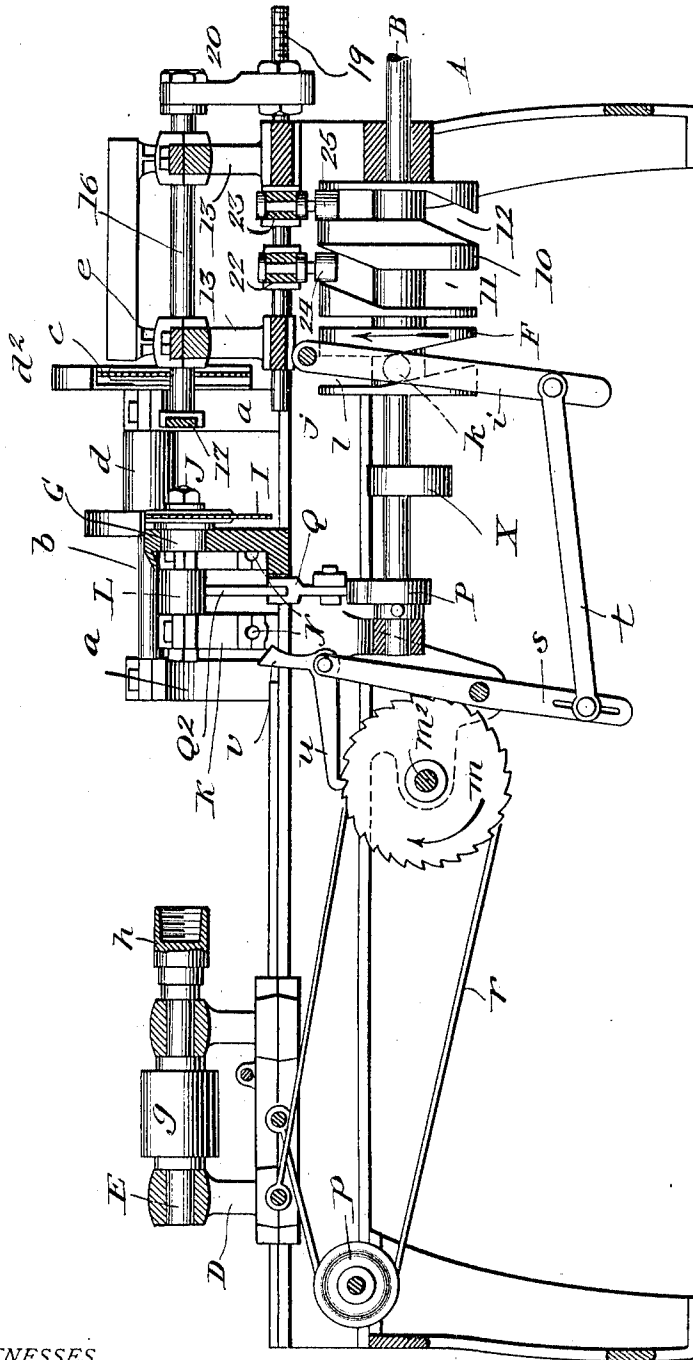
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1,061,459.

Patented May 13, 1913.

4 SHEETS—SHEET 1.

Fig. 1



WITNESSES

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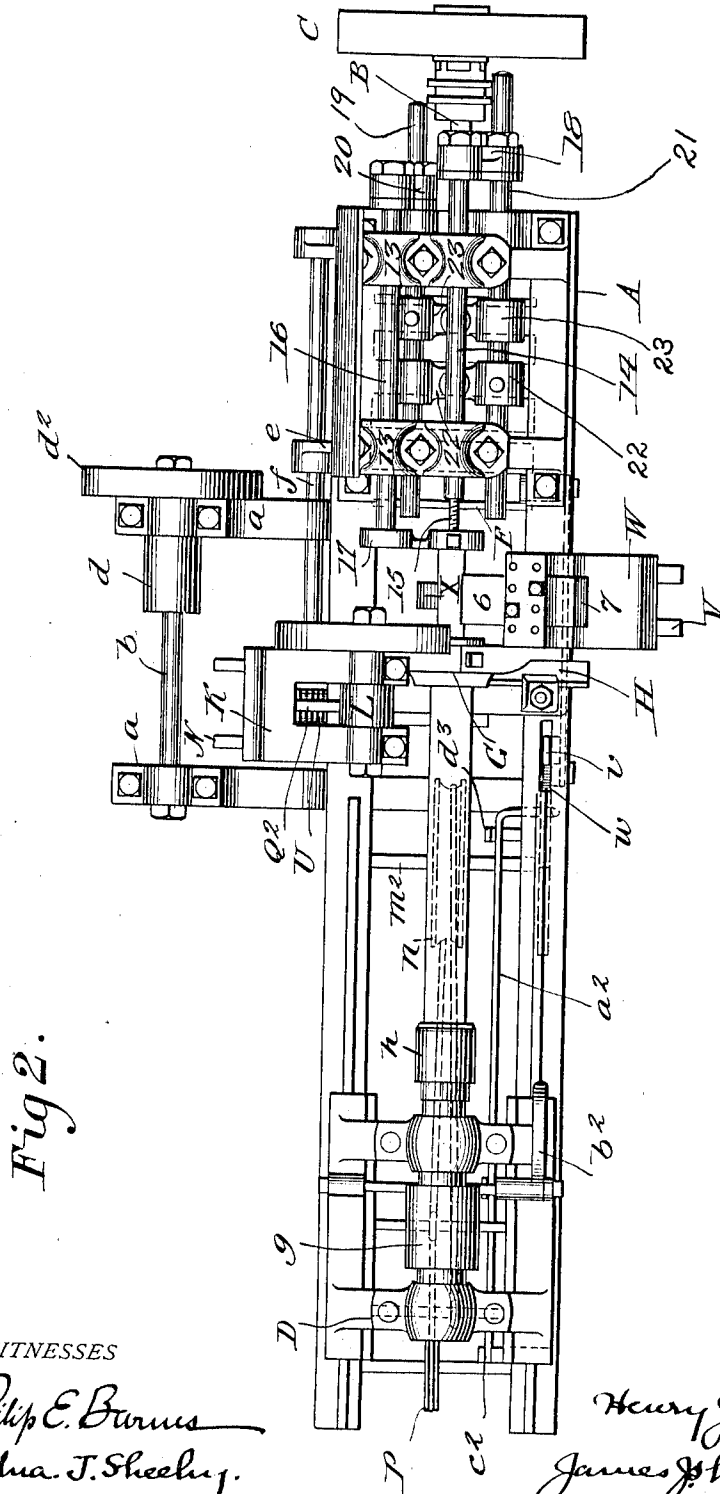


Fig 2.

WITNESSES

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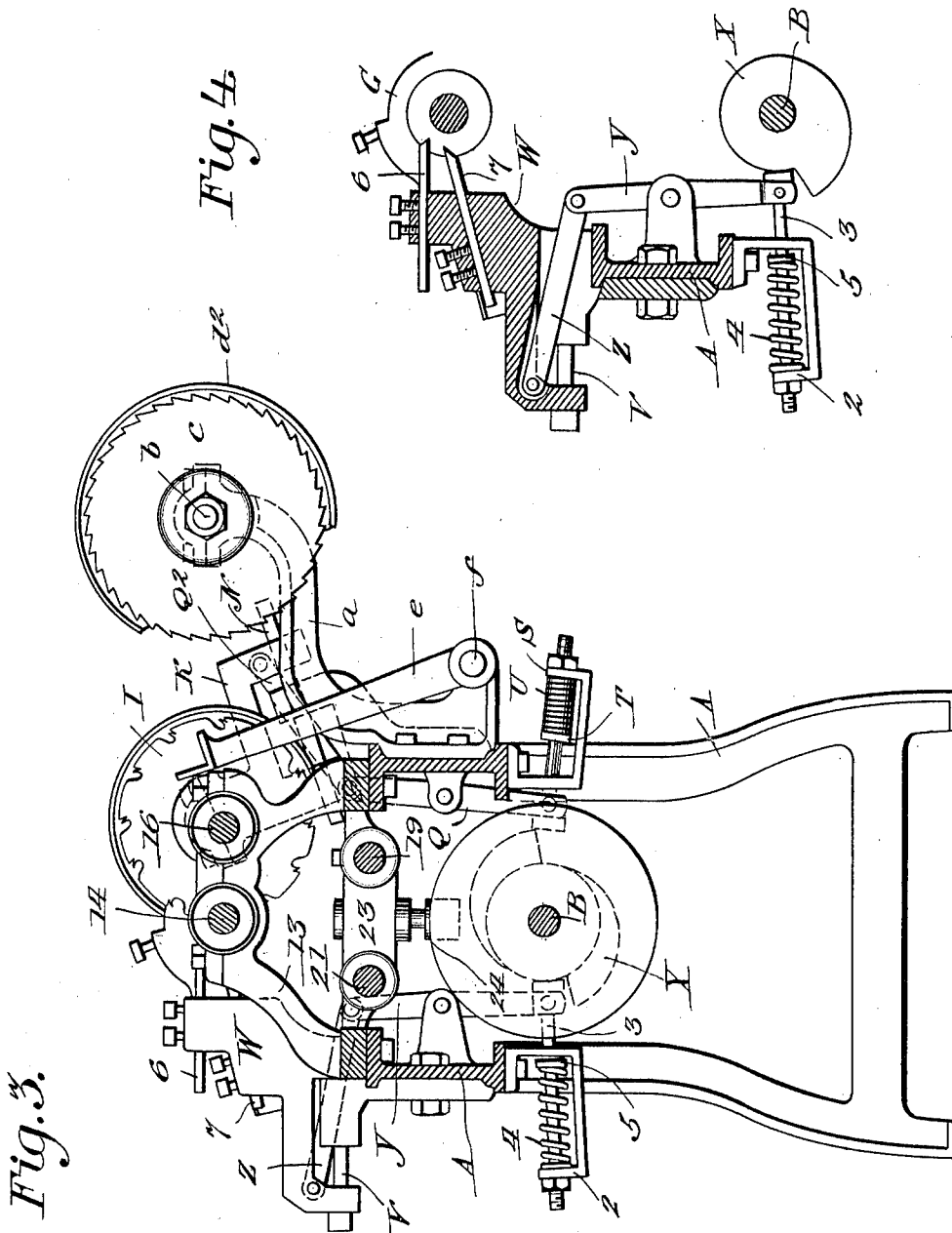
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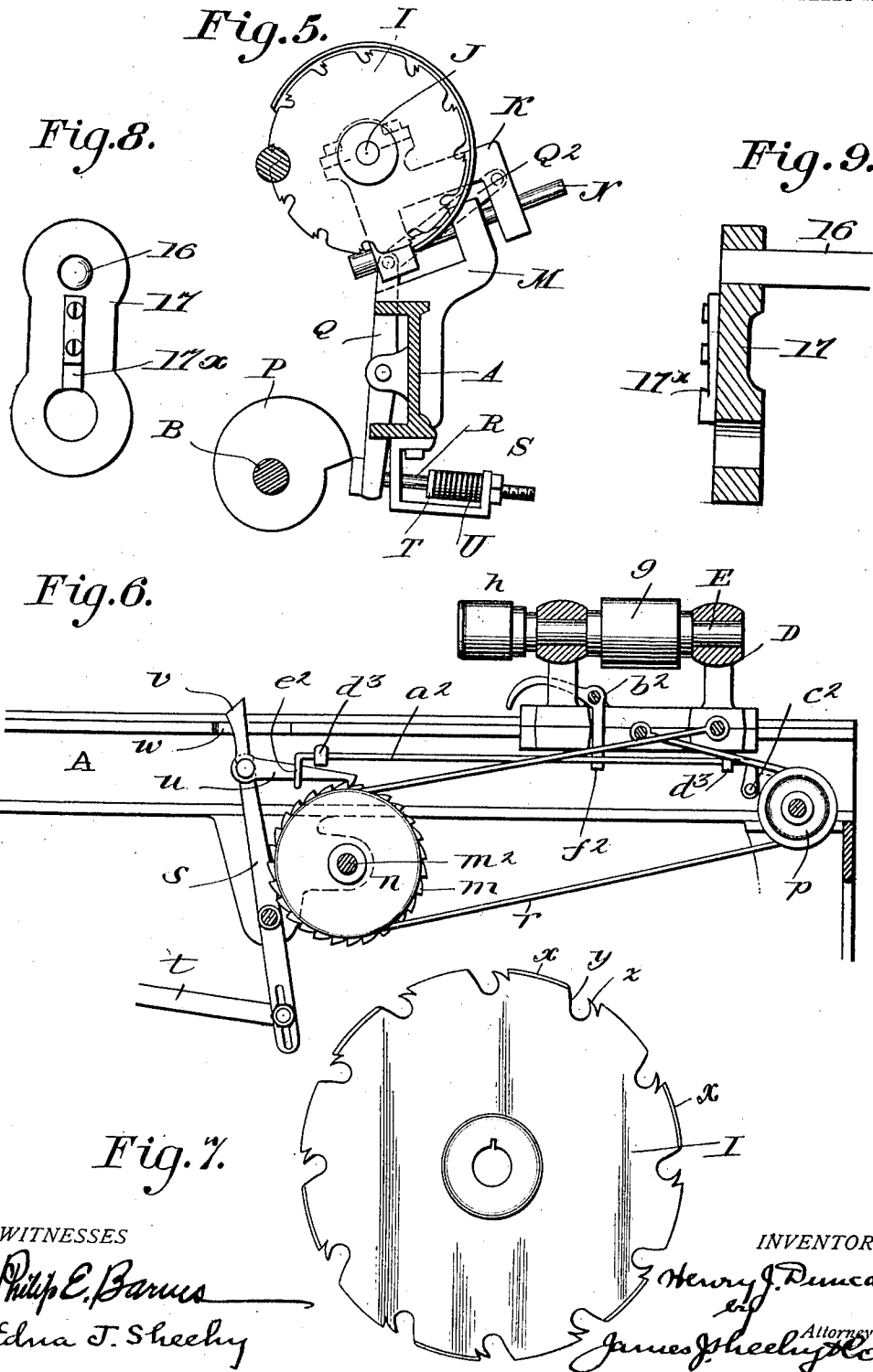
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4 SHEETS-SHEET 4.



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LATHE.

1,061,459.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HENRY J. DUNCAN, a citizen of the United States, residing at Alpena, in the county of Alpena and State of Michigan, have invented new and useful Improvements in Lathes, of which the following is a specification.

My present invention pertains to lathes such as are designed more particularly for use in the art of woodworking; and it consists in the peculiar and advantageous lathe hereinafter described and particularly pointed out in the claims appended.

In the accompanying drawings which constitute part hereof: Figure 1 is a longitudinal vertical section of my novel lathe, with some of the parts shown in elevation. Fig. 2 is a plan of the same. Fig. 3 is an enlarged transverse section of the lathe. Fig. 4 is a transverse section showing the transversely movable tool slide and the means through which the same is moved. Fig. 5 is a detail transverse section showing the combined knife and saw and the means through which it is moved transversely of the machine. Fig. 6 is a detail view showing the manually operated means for holding the pawl out of engagement with the ratchet wheel during backward movement of the head stock. Fig. 7 is an enlarged side elevation of my novel combined knife and saw *per se*. Figs. 8 and 9 are enlarged detail views showing the knife-holder 17 and the knife 17^x.

Similar letters and numerals of reference designate corresponding parts in all of the views of the drawings.

The main frame A of the machine may be of the construction illustrated or of any other construction consonant with the purpose of my invention without departure from the same as claimed, and in said frame is journaled a longitudinal shaft B, equipped with a band pulley C, Fig. 2, which is preferably driven from an overhead shaft through the medium of a band, said overhead shaft and band not being shown.

Fixed to and extending laterally from the main frame are brackets a, and journaled in said brackets is a shaft b on which are fixed a saw c and a pulley d, the latter for a band (not shown) from an overheated shaft (also not shown). A guard d² is arranged on the brackets a and over the outer

portion of the saw c; and in order that stock may be conveniently presented to said saw so as to be cut into lengths, a swinging support e, Fig. 3, is provided; the said support being hinged at f to the fixed brackets a 60 and being designed to be moved by the lathe attendant toward and from the edge of the saw, as occasion demands.

Suitably mounted on the main frame A to be moved longitudinally thereof is a head stock D, and in said head stock is journaled a spindle E that carries a pulley g and a chuck h, the pulley being for the connection of a band (not shown) from an overhead shaft (also not shown), and the chuck h 70 being interiorly shaped and threaded to hold one end of a length of stock in such manner as to assure rotation thereof by and with the spindle E.

Fixed on the shaft B is a cam F from 75 which the head stock E is moved longitudinally inward through the medium of the mechanism clearly shown in Figs. 1 and 6. The said mechanism comprises a vertically swinging lever i, hinged at j to the main frame A and having an anti-friction roller k 80 disposed in the groove l of cam F, a ratchet wheel m fixed on the same transverse shaft m² as a circumferentially-grooved wheel n, Figs. 2 and 6, a sheave p supported on the 85 main frame adjacent one end thereof, a cable r connected at its ends to the head stock D and passed around the wheel n and the sheave p, a vertically-swinging lever s fulcrumed on a depending portion of the 90 main frame, a link t connecting the lower portion of the lever i with the lower arm of the lever s, and a gravitating pawl u carried by the upper arm of the lever s and arranged to seat in the interdental spaces of 95 the disk m.

It will be manifest from the foregoing that rotation of the shaft B and the cam F in the direction of the arrow in Fig. 1 will be attended by oscillation of the lever i in 100 the direction of the length of the machine, and that the accompanying oscillation of the lever s and movement of the pawl u will cause the latter to rotate the disk m step by step in the direction indicated by arrow, 105 whereupon through the wheel n and the cable r the head stock D will be gradually moved inward lengthwise of the machine. The pawl u is provided with an arm v that reaches upward through a slot w, Figs. 2 110

and 6, in the main frame. Said arm v enables the head stock D when it reaches the end of its inner traverse to lift the pawl u out of engagement with the ratchet wheel m , and thereby automatically stop the inward movement of the head stock before the chuck h brings up against the die G, herein-
 5 after described.

For the purpose of enabling the machine attendant to raise and hold the pawl u out of engagement with the ratchet wheel m and at the same time move the head stock outward or away from the die G, I provide the vertically swinging rod a^2 and the lever b^2 , clearly shown in Figs. 2 and 6. The rod a^2 is pivoted at c^2 to the main frame A, and is normally supported in the position shown in Fig. 6 by rests d^2 . At its inner end the said rod a^2 is provided with a hook e^2 disposed under the pawl u . The lever b^2 is fulcrumed on the head stock D and is provided with an upper or handle arm and a depending arm, the latter carrying a lateral portion f^2 disposed under the rod a^2 and movable in such position longitudinally of the machine and independently of said rod a^2 . The machine attendant is enabled by depressing the upper arm of the lever b^2 to raise the rod a^2 , and through the same the
 10 pawl u , and the attendant with the hand on said lever can then move the head stock D outward, the depression of the upper arm of the lever b^2 during the outward movement of the head stock serving to retain the
 15 pawl u out of engagement with the ratchet wheel m . I would also have it here understood that when desired the pawl u may be held out of engagement with the ratchet wheel m while the head stock D is manually
 20 moved inward, and then the pawl may be released so that the further inward movement of the head stock will be accomplished by the mechanical means described. It follows from the foregoing that the head stock
 25 can be moved by the machine attendant with his hand on the upper arm of the lever b^2 , outward or inward to the extent best suited to the length of the piece of stock, and when the head stock is positioned as desired the
 30 attendant has only to release the upper arm of the lever b^2 in order to reestablish the inward feed of the head stock by the ratchet mechanism. It will also be appreciated that the restoration of the ratchet feed is brought
 35 about by gravitation of the rod a^2 and the pawl u and does not require the assistance of a spring or any other means that is liable to get out of order after a short period of
 40 use.

The die G is fixed on the main frame A and arranged in longitudinal alinement with the chuck h , and is provided with a knife H, Fig. 2, that extends into the bore of the die. The chuck h serves on the inward movement
 45 of the head stock D to feed the length of

stock through the die, and incidental to such operation the die knife H serves to rough-dress the length of stock—*i. e.*, reduce it to circular shape in cross-section.

For the purpose of cutting off the rear end of the length of stock when the article being turned is finished and bored as hereinafter described, I provide the cutting disk I, best shown in Fig. 7, which disk properly may and will hereinafter be referred to as the
 50 combined knife and saw. The said combined knife and saw is circular, and is peculiar in that it has a plurality of equidistant peripheral knife blades x the alternate ones of which are beveled at one side and the others at the opposite side, peripheral
 55 notches y arranged in rear of said blades, and teeth z that project forward from the rear walls of the notches, with reference to the direction in which the device is rotated, and are slightly shorter than the blades
 60 x —*i. e.*, have their points disposed slightly within the perimeter of the device. By virtue of this it will be manifest that when the revolving knife and saw is presented to the
 65 revolving stock, the knife blades strike the stock ahead of the teeth z and make two fine cuts ahead of the teeth, and then the teeth remove the saw-dust. Hence the combined knife and saw is adapted to cut-off
 70 the finished article smoothly and expeditiously.

The combined knife and saw I is fixed on a shaft J, and the said shaft is journaled in a rectilinearly movable carriage K, best shown in Fig. 5, and is also equipped with a
 75 pulley L; the said pulley being designed to be connected through a band (not shown) with an overhead shaft. A bracket M is fixed to the main frame A, and in said
 80 bracket M are fixed two parallel bars N, Figs. 2 and 5. These bars are disposed transversely of the machine and are inclined downwardly and inwardly as appears in
 85 Fig. 5. On the bars N, the carriage K is mounted to slide inward and downward and outward and upward. By virtue of this when the carriage K, shaft J and combined
 90 knife and saw I are moved inward, the last named band, through which rotary motion is transmitted to the combined knife and saw, will be rendered taut, while when the
 95 carriage K, shaft J and combined knife and saw are moved outward, the said band will be rendered loose and hence strain will be taken off the same.

The carriage K is moved inward and outward through the medium of the mechanism best shown in Fig. 5; the mechanism for moving the carriage inward comprising a
 100 cam P fixed on shaft B, and a lever Q fulcrumed at an intermediate point of its length on the main frame A and having its upper arm connected through a link Q² with the carriage K and its lower arm arranged
 105

to be engaged by the cam P. The mechanism for moving the carriage K outward is made up of a rod R connected to the lower arm of the lever Q and extending outward and loosely through an abutment S fixedly connected with the main frame A and having an abutment T at an intermediate point, and a spring U that surrounds the rod R and is interposed between the fixed abutment S and the rod abutment T. Manifestly when the lower arm of the lever Q is moved outward by the cam P, the spring U will be compressed, while when the cam P permits inward movement of said lower arm, the spring will expand, and so move the lower arm of the lever and thereby move the carriage and the elements carried thereby outward.

It will be gathered from the foregoing that the inward and outward movements of the combined knife and saw I are rectilinear movements as contradistinguished from swinging movements, and that therefore the said combined knife and saw on its inward movement will be positively and expeditiously moved to and through the stock.

V V, Figs. 2, 3 and 4, are parallel horizontal bars fixed to and extending outward at right angles from the main frame A, and W is a tool slide movable rectilinearly on the said bars toward and from the longitudinal center of the machine. The said slide W is moved inward by a cam X on the shaft B, through the medium of a lever Y fulcrumed at an intermediate point of its height on the main frame and having its lower arm arranged to be engaged by said cam, and a link Z interposed between and connecting the upper arm of the lever and the slide. When the cam X is in position to permit of the same, the tool slide W is moved outward by the means shown at the left of Fig. 3 and in Fig. 4, which means comprises an abutment 2 fixedly connected with the main frame A, a rod 3 pivotally connected to the lower arm of the lever Y and extending loosely through said abutment 2, and a coiled spring 4 surrounding the rod 3 and interposed between an abutment 5 fixed thereon and the fixed abutment 2. Manifestly when the slide W is positively moved inward by the cam X, the spring 4 will be compressed, and then when the cam X is in proper position, the spring will expand and move the slide W outward.

The slide W carries an upper horizontal knife 6 and a lower inclined knife 7. The upper knife or tool 6 projects inward beyond the lower knife 7 so as to permit the free escape of the shaving made by the lower knife through the space between the knives.

10 is a double cam fixed on the shaft B and having grooves 11 and 12, Fig. 1.

13, 13 are standards fixed on the main frame A.

14 is a rod movable longitudinally through the standards 13 and having at its forward end a boring tool 15 that is alined with the chuck h and the bore of the die G. 16 is a second rod movable longitudinally through the standards 13, and 17 is a knife holder fixed on the inner end of the rod 16 and arranged as shown in Fig. 2 relative to the boring tool 15.

The knife-holder 17, Figs. 8 and 9, is provided adjacent its free end with an aperture, and is disposed with the aperture extending in the direction of the length of the machine. The knife 17* is bolted to the side of the holder. The knife is adapted to reduce the end of a piece of stock to the size desired.

The rod 14 is fixedly connected through a link 18, Fig. 2, with a lower, longitudinally-movable rod 21, and the rod 16 is fixedly connected through a link 20, Figs. 1 and 2, with a lower longitudinally movable rod 19. The lower rods 19 and 21 are parallel, and fixed on the rod 19 and movable on the rod 21 is a cross-head 23, while fixed on the rod 21 and movable on the rod 19 is a cross-head 22. The cross-head 22 carries an anti-friction roller 24 that is disposed in the cam groove 11, and the cross-head 23 carries an anti-friction roller 25 that is disposed in the cam groove 12. From this it follows that when the lathe is in operation the boring tool 15 will be moved longitudinally inward and outward by the groove 11 of the double cam 10, and the knife holder 17 will be moved longitudinally inward and outward by the groove 12 of said double cam.

In practice a length cut from stock by the saw c is placed between the rotating chuck h and the die G while the chuck is in proper position, and the pawl u is then permitted to drop into engagement with the ratchet wheel m. The head stock will then be mechanically moved toward the right in Figs. 1 and 2, whereupon the length of stock will first be secured in the chuck h so as to turn therewith, and will then be moved through the die G, whereupon the knife H of the die will rough-dress the length of stock or reduce it to circular form. Incidental to the inward movement of the head stock D, the boring tool 15 is moved inward and enabled to bore the length of stock. The said tool 15 is moved inward and outward by the groove 11 of the double-cam 10, and the knife holder 17 is moved inward and outward to perform its function by the groove 12 of the double cam 10. The tool slide W is moved inward to enable the knives 6 and 7 to cut the exterior of the article, and as the tool slide W is moved outward, the combined knife and saw I is moved inward to cut the finished article from the portion in the chuck h and die G.

It will be gathered from the foregoing that the rods on which the tool slide W is mounted and the rods on which the cross-

heads 22 and 23 are mounted, are not liable to be clogged by turnings or other debris; also, that the lathe as a whole is simple and strong, and is well adapted to withstand the rough usage to which machines of corresponding character are ordinarily subjected. It will be further gathered that one of the knives 6, 7 can be made to do part of the turning and the other knife another part.

The knife-holder 17 is advantageous when articles that are liable to split are to be turned inasmuch as said holder is calculated to preclude splitting of the articles.

The timing of the working parts is as follows: At the proper time, the combined saw and knife I starts inward to engage the revolving stick, and it cuts the article off as soon as the boring tool 15 is retracted, the knife holder 17 is retracted and the slide W is moved outward. After cutting off the article, the combined saw and knife I is moved outward and then the stick is moved forward, and the slide W, the boring tool 15 and the knife holder 17 are moved inward. When all of a stick is used up, the machine attendant presses down on the lever b^2 to raise pawl u, pushes the head stock D back, and inserts another stick, whereupon he releases the said lever b^2 and brings about a repetition of the operation described.

Having described my invention, what I claim and desire to secure by Letters-Patent, is:

1. A lathe comprising a head stock provided with a rotatable work holder, means for moving said head stock longitudinally inward, a fixed die having means for rough-dressing a length of stock, a boring tool arranged at the opposite side of the die, with reference to the work holder, and in alignment with said work holder and die and movable longitudinally, a knife holder movable longitudinally and arranged in alignment with the die and at the opposite side thereof, with reference to the work holder, a knife carried by said holder, transversely movable cutting-off means, a transversely movable slide, tools carried thereby and spaced apart, means for moving the cutting off means, means for moving the slide, means for moving the boring tool longitudinally inward and outward, and means for moving the knife holder longitudinally inward and outward.

2. In a lathe, the combination of a main frame, rods fixed to and extending laterally from the same, a shaft, a cam thereon, a slide movable on said rods, cutting means carried by said slide, a lever fulcrumed at an intermediate point of its height and having its lower arm arranged to be engaged by said cam, a link connecting the upper arm of the lever with the slide, an abutment fixed with respect to the main frame, a rod connected to the lower arm of the lever and extending

through the abutment and having an abutment, and a spring interposed between the fixed abutment and the rod abutment.

3. The combination in a lathe of a main frame, a drive shaft, a bracket fixed to the main frame, downwardly and inwardly inclined rods fixed to said bracket, a carriage movable inward and downward and upward and outward on said rods, a shaft journaled in said carriage and provided with a band pulley, a cutting-off means fixed on said shaft, a lever fulcrumed at an intermediate point of its height, a link connecting the upper arm of the lever with the carriage, a cam fixed on the drive shaft and arranged to engage the lower arm of the lever, an abutment connected with the bracket, a rod connected with the lower arm of the lever and extending through said abutment and having an abutment of its own, and a spring interposed between the fixed abutment and the rod abutment.

4. In a lathe, the combination of a main frame, rods fixed to and extending laterally from the same, a shaft, a cam thereon, a tool slide movable on said rods, a lever fulcrumed at an intermediate point of its height and having its lower arm arranged to be engaged by said cam, a link connecting the upper arm of the lever with the tool slide, an abutment fixed with respect to the main frame, a rod connected to the lower arm of the lever and extending through the abutment and having an abutment, and a spring interposed between the fixed abutment and the rod abutment.

5. In a lathe, the combination of a main frame, a movable head stock, a ratchet wheel supported on the main frame, means intermediate the head stock and the ratchet wheel for moving the former inward by the latter, a shaft, a lever mounted at an intermediate point of its length on the main frame, means intermediate the shaft and the said lever for oscillating the latter, a pawl pivoted to the lever in position to engage the ratchet wheel and having an upstanding arm arranged in the path of and adapted to be engaged by the head stock during the completion of the inward traverse thereof, a vertically movable rod extending in the direction of movement of the head stock and pivoted at a point remote from the ratchet wheel to the main frame and having a hook disposed under the pawl, means on the main frame for supporting said rod in a position to enable the pawl to engage the ratchet wheel, and a lever fulcrumed on and carried by the head stock and having a lower arm provided with a portion disposed under and movable independently of the rod and also having an upper arm constituting a handle.

6. In a lathe, the combination of a main frame, a movable head stock, a ratchet wheel supported on the main frame, means inter-

mediate the head stock and the ratchet wheel for moving the former inward by the latter, a shaft, a lever mounted at an intermediate point of its length on the main frame, means
5 intermediate the shaft and the lever for oscillating the latter, a pawl pivoted to the lever in position to engage the ratchet wheel, a vertically movable rod extending in the direction of movement of the head stock and
10 pivoted at a point remote from the ratchet wheel to the main frame and having a hook disposed under the pawl, means on the main frame for supporting said rod in a position to enable the pawl to engage the ratchet
15 wheel, and a lever fulcrumed on and carried by the head stock and having a lower arm provided with a portion disposed under and movable independently of the rod and also having an upper arm constituting a handle.
20 7. In a lathe, the combination of a main frame, a movable head stock, a ratchet wheel supported on the main frame, means between the ratchet wheel and the head stock for moving said head stock inward, a pawl,
25 means pivoted to and adapted to actuate the pawl, a vertically movable rod extending in the direction of movement of the head stock and pivoted at a point remote from the ratchet wheel to the main frame and having

a portion disposed under the pawl, and a 30 lever fulcrumed on and carried by the head stock and having a lower arm provided with a portion disposed under and movable independently of the rod and also having an upper arm constituting a handle. 35

8. In a lathe, the combination of a main frame, a movable head stock, a ratchet wheel supported on the main frame, means intermediate the ratchet wheel and the head stock for moving said stock inward, a pawl, means 40 pivoted to and adapted to actuate the pawl, a vertically movable rod connected with the main frame and extending in the direction of movement of the head stock and having a portion disposed under the pawl, and 45 vertically movable means carried by the head stock and having a portion disposed under and movable independently of the rod and also having a portion constituting a handle. 50

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HENRY J. DUNCAN.

Witnesses:

DENNIS BRENNAN,
DAVID HALL.