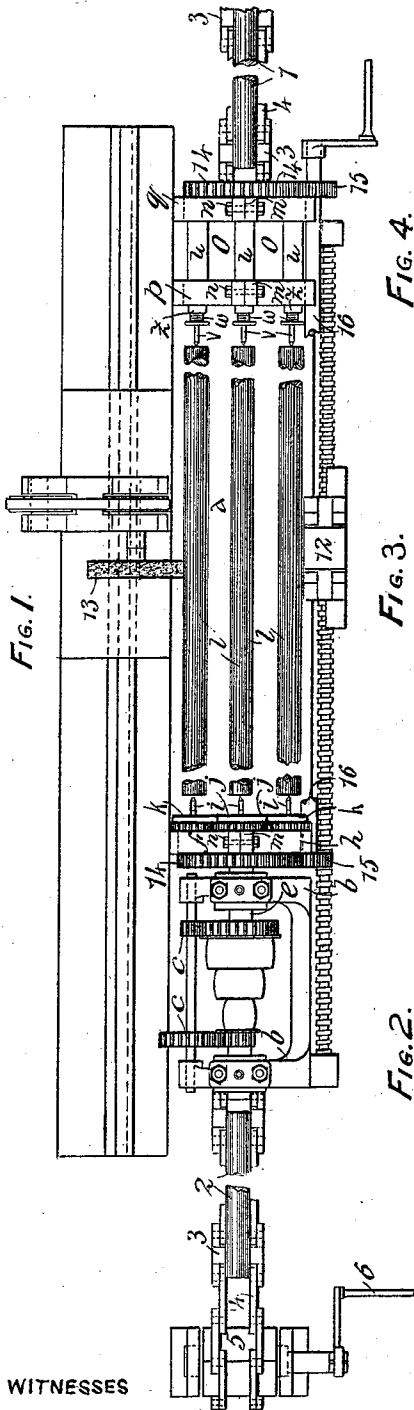


A. MACDONALD.
 MACHINE FOR GRINDING, TURNING, AND FINISHING SHAFTING, &c.
 APPLICATION FILED JUNE 4, 1908.

979,976.

Patented Dec. 27, 1910.

3 SHEETS—SHEET 1.



WITNESSES

William Abbe
 M. E. Keir

Fig. 4.

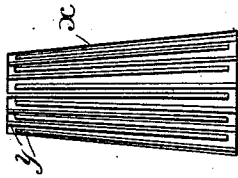


Fig. 3.

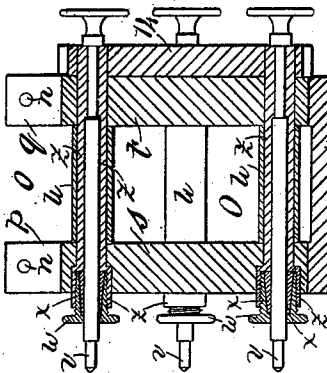


Fig. 5.



Fig. 8.

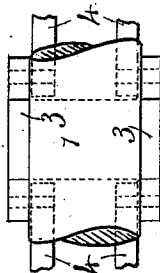


Fig. 2.

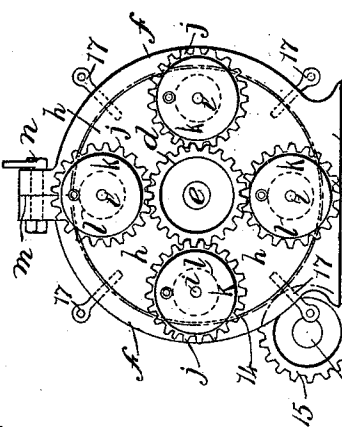


Fig. 6.

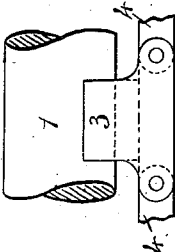
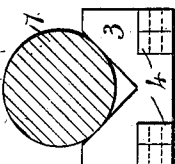


Fig. 7.



INVENTOR
 BY Alfred Macdonald

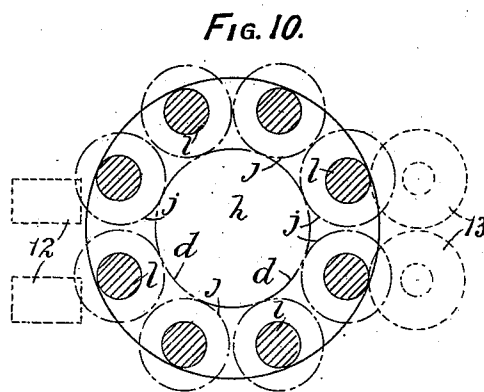
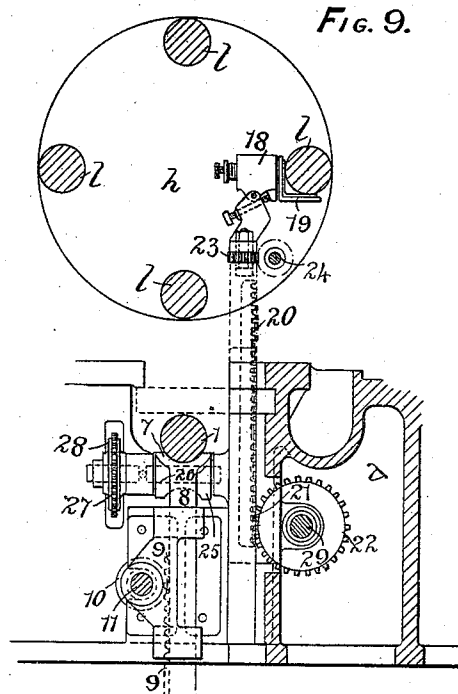
Horner and Horner
 ATTORNEYS

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3 SHEETS—SHEET 2.



WITNESSES

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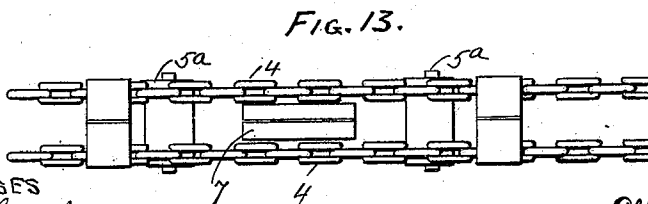
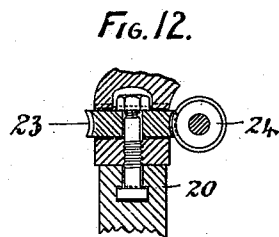
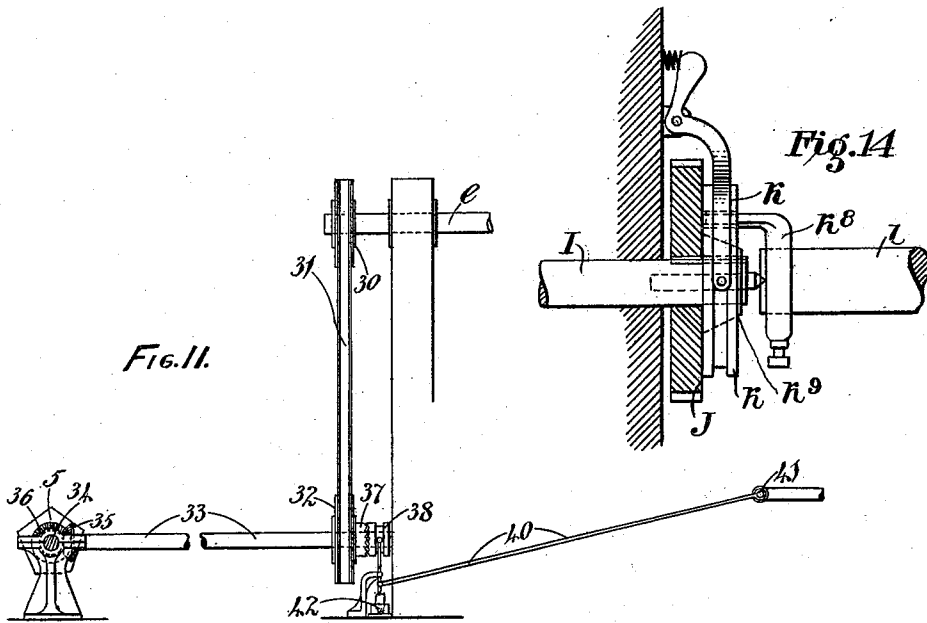
Howell and Howell
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

ALFRED MACDONALD, OF WHITEINCH, SCOTLAND.

MACHINE FOR GRINDING, TURNING, AND FINISHING SHAFTING, &c.

979,976.

Specification of Letters Patent.

Patented Dec. 27, 1910.

Application filed June 4, 1906. Serial No. 320,144.

To all whom it may concern:

Be it known that I, ALFRED MACDONALD, engineer, a subject of the King of Great Britain and Ireland, and a resident of Whiteinch, Lanarkshire, Scotland, have invented certain new and useful Improvements in Machines for Grinding, Turning, and Finishing Shafting and the Like, of which the following is a specification, and for which a patent has been applied for in Great Britain, No. 26,203, dated December 16, 1905.

This invention has reference to improvements in machines for grinding, turning and finishing shafting and the like, and whereby turning, grinding, loading and unloading is performed at one time, thus permitting the operator to handle say four, five, or other number of shafts, according to the number of centers in the machine. And in order that my said invention and the manner of carrying same into practice may be properly understood I have hereunto appended three sheets of explanatory drawings in which—

Figure 1 is a longitudinal plan view, (broken away,) of the machine which embody my improvements for grinding, turning and finishing shafting and the like. Fig. 2 is an end view of the headstock mechanism and Fig. 3 a sectional elevation of the tailstock mechanism. Figs. 4 and 5 are detached plan and end views respectively of one of the conical slotted pieces used in connection with the tailstock spindles. Figs. 6, 7 and 8, are a front elevation, transverse view, and plan respectively of part of the chain and V blocks which carry the shafting. Fig. 9 is a transverse section through the center part of Fig. 1, showing the lifting mechanism. Fig. 10 is a diagrammatic view of the disk as carrying 8 operating spindles. Fig. 11 is a diagrammatic elevation of the conveyer chain drive and automatic stop mechanism. Fig. 12 is a cross section of the swiveling mechanism for the turning tools, and Fig. 13 is a plan view of the conveyer chain and lifting V blocks. Fig. 14, is a fragmentary elevation, partly in section, illustrating in detail, means for driving one of the blanks.

Referring to these drawings:—The bed part *a* is made suitable for carrying, turning and grinding, loading and unloading mechanism. The headstock *b* is composed of two parts one of which is similar to that of an

ordinary lathe, being preferably fitted with single and double gears *c* and carries a wheel *d* on the front end of its spindle *e*. In front of this head *b* there is a large cast iron ring *f* with flat base *g* which is fitted to the bed *a* of the machine, and bored out to receive a very thick disk *h* which is capable of revolving through an entire circle or part thereof. Through the center of this disk *h* passes the headstock spindle *e* already described, carrying the gear wheel *d* in front of disk *h*. In this disk *h* there are fitted four spindles *i* to receive lathe centers, and to act as lathe spindles. On each of these spindles *i* is a gear wheel *j* fitted with an ordinary clutch *k* to a loose driving plate *k* on the outer ends of the spindles *i* the shafts *l* being revolved for turning and grinding purposes by means of dogs *k* connecting them with said plates in the well known manner. Motion to these pinions *j* is received from the gear wheel *d* on the end of the headstock spindle *e* previously described. Suitable means such as a split *m* in the ring *f* and an adjusting screw *n* are provided in this part of the machine for avoiding shake and reducing vibration while turning and grinding.

The tailstock part *o* of the machine consists of two cast iron rings *p*, *q*, similar to that in front of the headstock *b* at a suitable spaced distance apart and joined at the base *r* and fitted to the bed *a* of machine. There is also a disk *s* and *t* fitted to each of these rings *p* and *q* and the disks are spaced by hollow cast iron pieces, *u*, in each of which is fitted a tailstock spindle *v*, all four spindles *v* being independent of each other. To compensate for wear and avoid shake there is fitted on these spindles *v* a cone shaped piece *x* slotted at *y* in a zig zag form from each end. The part *w* having a conical bore engages with its screw threaded cylindrical outer surface the interior thread of the hollow sleeve *z* and compresses the part *x* which is tapered the opposite way against the spindle *v*, thus insuring perfect alinement in the face of all or any wear. Suitable means *n* such as described in reference to the headstock are also provided for clamping both disks *s* and *t* firmly inside the cast iron rings *p* and *q* to overcome vibration.

The stock or material carrying device is arranged so that the rough stock *1* enters the tailstock end *o* of the bed *a*, while the

finished stock 2 passes out at the headstock end *b*. This operation is performed by means of V or wedged shaped blocks 3 carried by an endless chain or chains 4 that pass over rollers 5. These rollers 5 are preferably formed of pentagon shape, each side being the length of one chain link. Motion is given to these chains 4 by either a hand contrivance 6 or from the headstock *b*. In the latter case the conveyer may be arranged as shown in Fig. 11. On the headstock spindle *e* is mounted a sprocket wheel 30 which, by means of the chain 31, drives a similar wheel 32 loosely mounted on the shaft 33. The other end of the shaft 33 drives the roller-spindle 34 by means of bevel gears 35, 36.

In connection with the conveyer mechanism may be provided an automatic stop arrangement such as shown in this figure. A clutch 37 on the loose sprocket wheel 32 is adapted to cooperate with a clutch 38 mounted on the shaft 33 and attached to the rod 40. An arm 41 is offset at right angles to the rod 40 and lies in the path of the rough stock 1 in such a position that when the latter is directly under the headstock centers it strikes the arm 41 and thus throws the clutch 38 out of gear with the clutch 37 and stops the conveyer mechanism. When the rough stock has reached this position the finished stock is clear of the machine. The clutches are shifted into gear again by hand when desired. They are kept in the out of or in gear positions by means of the usual spring mechanism 42. Instead of a chain 4, as shown in Fig. 9, rollers 25 mounted on spindles 26 in the bed part *a* of machine may be substituted, these rollers being rotated by a chain 27 passing over a wheel 28, and over a wheel at the headstock driving end of machine. The method of lifting these bars from the V blocks 3 into the machine or vice versa as shown particularly in Figs. 9 and 13 is by means of smaller V blocks or grippers 7 supported on vertical slides 8, geared with racks 9 and pinions 10 to a shaft 11 extending along the internal part of the bed *a*, motion being given to said shaft 11 by any suitable known mechanism.

A suitable turning saddle and tool box or boxes 12 are provided for turning purposes, while the grinding mechanism 13 is connected with the rear part of the bed *a* and provision would be made to swivel the upper part if necessary.

The various shafts and mechanism would be operated as follows:—When the shaft *l* has been secured in the bottom centers of the machine, the disks *h*, *s* and *t* are revolved a quarter turn thus lifting the rough shaft *l* in line with the turning tool 12, and thereby throwing the turned shaft *l* to the top, while the top shaft *l* is at the same opera-

tion lowered rearward in line with the emery wheel 13 in order to be finished by grinding while the other is being rough turned, the rough turning and grinding being arranged to be completed at the same time, while the unloading and loading takes place in the lowest centers during turning and grinding operations.

The disks are revolved as follows:—On the outer side of each of the two outer disks *h* and *t* is fitted a gear wheel 14 and these gears are fitted to pinions 15 secured to a horizontal shaft 16. Taper pins 17 fitted in the cast iron rings *f* *p* and *q* pass into the disks *h*, *s* and *t* at four points insuring perfect alinement of the various centers of the machine with regard to the turning tool 12 and the emery wheel 13. These pins 17 are controlled by the operator.

To enable the grinding rests 18 carrying the V blocks 19 to be swung around and lowered when revolving the disks *h* *s* and *t* to take out the finished shaft, vertical slides 20 would carry the V blocks 19 in which the shaft lies, and these slides 20 would be raised and lowered by a rack 21 and pinion 22 mounted on a longitudinal shaft 29 and the V blocks 19 would be swung around horizontally by means of gearing 23 from a secondary longitudinal shaft 24.

In the arrangement shown in Fig. 10, eight operating shafts are employed and it is intended that the turning tools 12 operate on two shafts at one time, and the emery wheels 13 perform a similar action on the two rear shafts. This is accomplished by arranging the centers in the large round disks *h*, *s* and *t*, so that when the latter are turned around, the two front shafts will come into position with their centers in the same vertical line; while the two rear shafts will be in a similar position for grinding. The two shafts finding their position at the top will have the center line in the same horizontal plane; while the lower centers will locate themselves in a similar position. The turning tool boxes 12 situated on front of machine are arranged above one another in different planes so that the cutting points of the tools will coincide with the centers already described. The emery wheel slides 13 will be arranged in a similar manner suitable to operate on both rear shafts at same time.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent is:—

1. In a machine of the character described, the combination of a frame, a series of pairs of dead centers for supporting a plurality of blanks, means for rotating said blanks on a common axis, means for rotating one or all of the blanks independently on their individual axes, a device having a tool capable of acting on a blank, a rest for the blank

operated on, and means for adjusting the position of said rest so as to render possible the rotation of the blanks on a common axis.

5 2. In a machine of the character described, the combination of a frame, a series of pairs of dead centers for supporting a plurality of blanks, means for rotating said blanks on a common axis, means for rotating one or
10 all of the blanks independently on their individual axes, a device having a tool capable of acting on a blank, a rest for the blank operated on, and means for adjusting the position of said rest both to swing it horizon-
15 tally and to move it vertically in order to prevent its interference with the revolution of the blanks about a common axis.

3. In a machine of the character described, having a longitudinally open bed portion, head and tail stocks supported thereon,
20 means in connection with the latter for carrying a plurality of blanks, means for rotating the same on a common axis, and means for rotating the same on their individual
25 axes, in combination with a movable support for lifting and lowering a blank through the opening in said bed portion to and from its position in the head and tail stocks, and means to actuate said support.

30 4. In a machine of the character described, a frame, a headstock and a tail stock supported thereon, in combination with a conveyer arranged and operative below the head and tail stocks of the machine, means to actu-
35 ate said conveyer and means to raise and lower a blank to and from said conveyer

to its position between the head and tail stocks.

5. In a machine of the character described, a frame, a head stock and a tail stock sup- 40
ported thereon and provided with centers for supporting a plurality of blanks, a tool or tools for operating on certain of the blanks, and a lifter placed to deliver a blank to or
45 remove a blank from certain of the centers while a blank carried by others of the centers is being operated on by a tool.

6. In a machine of the character described, the combination of a frame having a head stock and a tail stock provided with means 50
for simultaneously carrying a plurality of blanks, a tool on one side of the machine for rough cutting one of the blanks, and a tool on the opposite side of the machine for
55 simultaneously finishing another blank previously operated on, said apparatus including means whereby a plurality of blanks may be turned about a common axis so as
to remove one blank from the roughing tool and to present it to the finishing tool, with
60 a substantially horizontal conveyer, and a lifter capable of receiving a blank from said conveyer and delivering it to the blank supporting means adjacent the rough cutting
65 tool.

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

ALFRED MACDONALD.

Witnesses:

R. C. THOMSON,
WM. RUTHERFORD.