J. K. CULLEN.

DRIVING MECHANISM FOR WHEEL LATHES.

APPLICATION FILED JULY 23, 1920.

1,424,754.

Patented Aug. 8, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

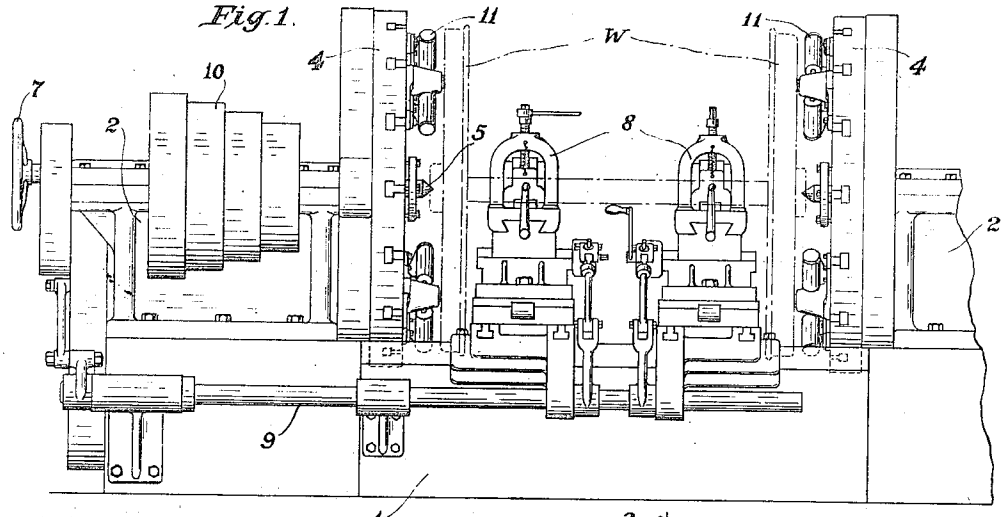


Fig. 2.

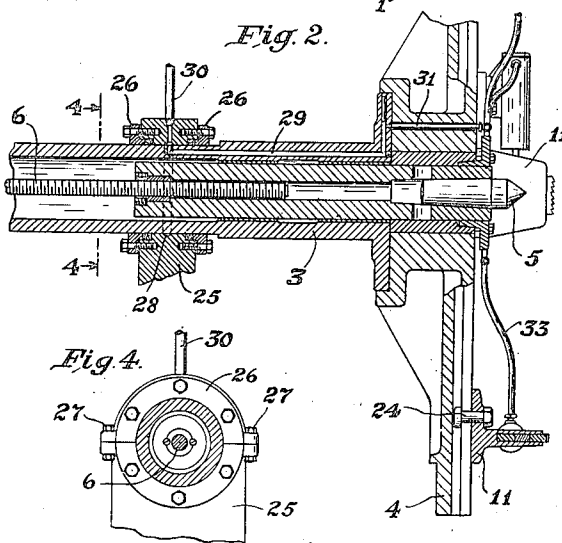


Fig. 3.

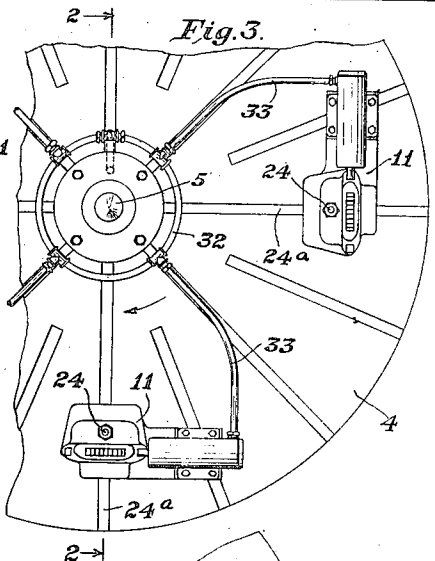


Fig. 4.

Fig. 5.

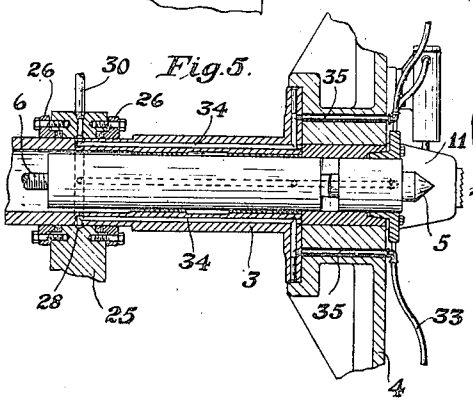
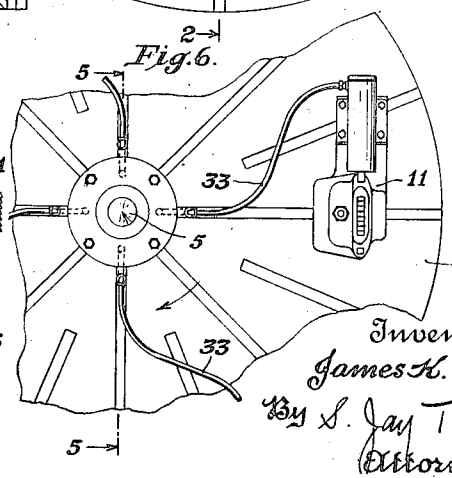


Fig. 6.



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2 SHEETS—SHEET 2.

Fig. 7.

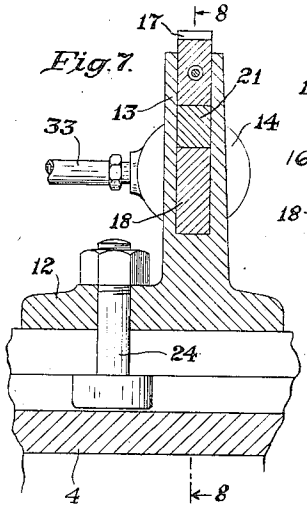


Fig. 8.

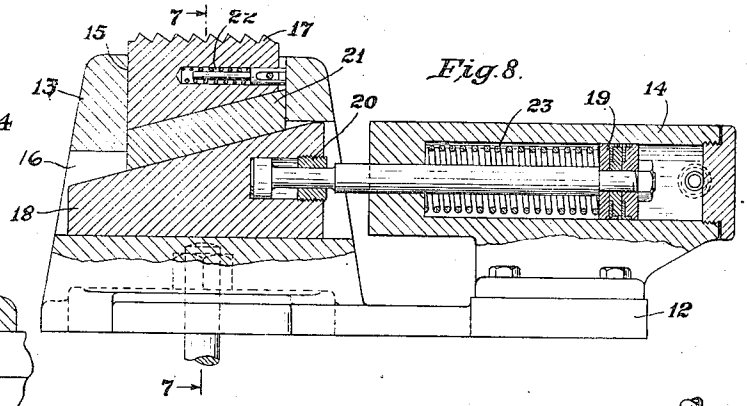


Fig. 9.

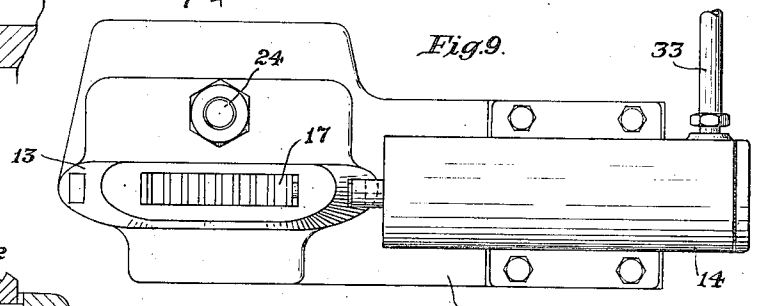


Fig. 10.

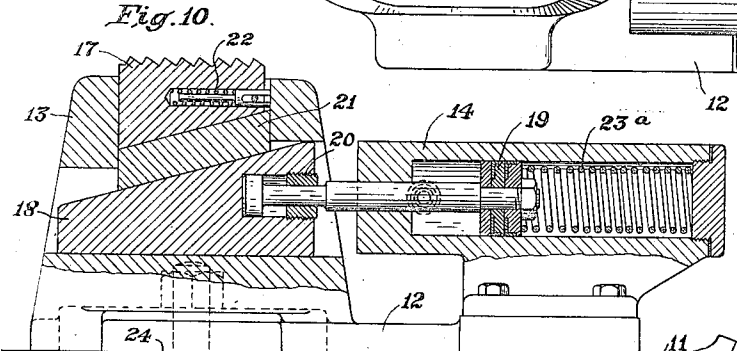


Fig. 11.

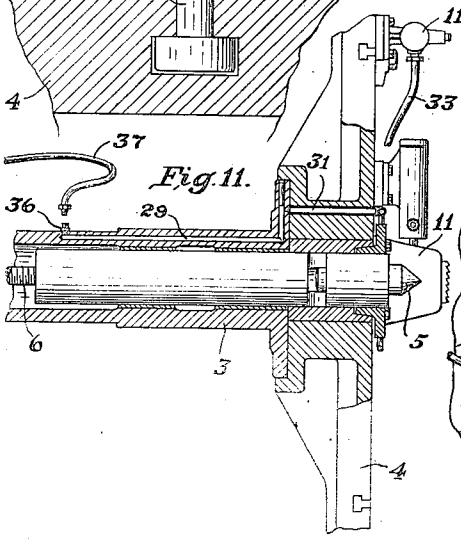
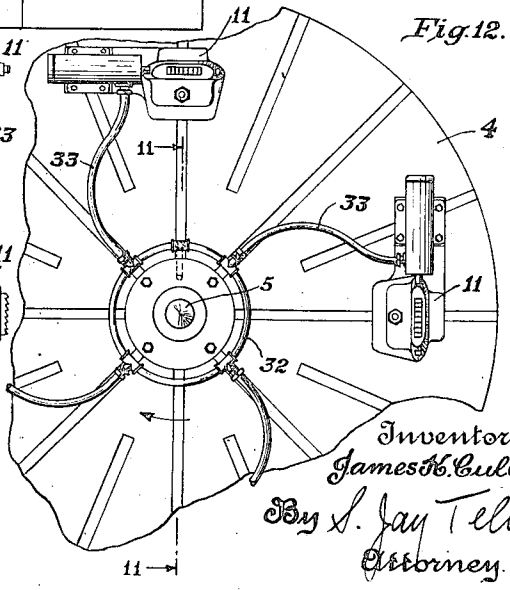


Fig. 12.



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UNITED STATES PATENT OFFICE.

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DRIVING MECHANISM FOR WHEEL LATHES.

1,424,754. Specification of Letters Patent. Patented Aug. 8, 1922.

Application filed July 23, 1920. Serial No. 398,472.

To all whom it may concern:

Be it known that I, JAMES K. CULLEN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Driving Mechanism for Wheel Lathes, of which the following is a specification.

This invention relates to metal turning machines and particularly to a driving mechanism for wheel lathes. In present machines used for this purpose the work drivers are moved into engagement with the work by means of screws operated by hand. In such constructions it is impossible to accurately adjust the screws with the same pressure against the work, and the operation of the screws with the attendant varying pressures tends to a distortion of the wheel, particularly during the turning operation. The present invention has for its principal object to provide a mechanism wherein the work drivers are all moved simultaneously into engagement with the work and with an equal pressure against the work, thus avoiding any tendency to distort the work. Another object of the invention is the provision of wedge means for operating the work drivers, such means preferably being operated by fluid pressure and the construction being such that any back slipping of the work during the boring operation will tighten the driving devices more securely into engagement with the work. Other objects of the invention will become apparent as the description proceeds.

Referring to the figures of the drawings:

Figure 1 is a fragmentary front elevation of a wheel lathe illustrating the present invention applied thereto.

Fig. 2 is a longitudinal section through one of the work spindles and face plates taken on the line 2—2 of Fig. 3.

Fig. 3 is a fragmentary elevation of the face plate.

Fig. 4 is a cross section through the spindle taken on the line 4—4 of Fig. 2.

Fig. 5 is a longitudinal section taken on the line 5—5 of Fig. 6, similar to Fig. 2 but showing a modified construction.

Fig. 6 is a fragmentary elevation of the face plate shown in Fig. 5.

Fig. 7 is a sectional view through one of the work-engaging jaws taken on the line 7—7 of Fig. 8.

Fig. 8 is a longitudinal sectional view of one of the work-engaging devices taken on the line 8—8 of Fig. 7.

Fig. 9 is a plan view of the construction shown in Fig. 8.

Fig. 10 is a view similar to Fig. 8 but showing a modified construction.

Fig. 11 is a longitudinal section taken on the line 11—11 of Fig. 12 through the spindle and face plate showing a modified form of the invention.

Fig. 12 is a fragmentary elevation of the face plate shown in Fig. 11.

In accordance with the present invention, I mount a plurality of work-driving elements on each face plate of the machine and operate each set of drivers by a common power means. As illustrated, each driver is operatively connected to the piston of a fluid pressure operating means, the driver and its operating means, including a cylinder and piston, being secured to the face plate of the machine. In the preferred form of the invention the driving elements are forced to the operating or driving position by means of fluid pressure and the movement in the unclamping direction is accomplished either by fluid pressure or spring means. However, in certain types of machines it may be desirable to perform both operations by fluid pressure or the clamping operation by spring means and the unclamping operation by fluid pressure means, as illustrated in Fig. 10. It will, however, be understood that the disclosure in the drawings is illustrative of the invention and that such modifications as come within the scope of the appended claims may be made without departing from the spirit of the invention.

Referring to the drawings by reference characters, 1 designates the base and 2 the headstocks of a turning lathe having a pair of work spindles 3 and face plates 4 mounted thereon. The work W, comprising a pair of car wheels and axle, is shown in dot-and-dash lines in Fig. 1 as mounted between the face plates. The work is engaged by a center 5 extending from each spindle and face plate, a screw 6 provided with an operating wheel 7 serving to move the center longitudinally within its spindle. A pair of tool holders 8 are controlled by a shaft 9. The face plates may be rotated from the step pulley 10 and the usual shaft connecting the two face plates. Since the inven-

tion herein lies particularly in the work drivers and their operating mechanism and not in the machine as a whole, further description of the latter is unnecessary.

The work-engaging and driving means herein comprises a plurality of devices 11 mounted on each face plate. Each of these devices comprises a base 12 supporting a work jaw holder 13 and a fluid pressure cylinder 14 thereon. Two relatively transverse openings 15 and 16 are formed in each jaw holder and support therein a serrated clamping jaw 17 and a jaw-operating wedge 18 respectively. The wedge is operatively connected to the piston 19 operating within the cylinder 14, this connection preferably being loose, as illustrated at 20, whereby a hammer blow may be had to loosen the wedge. The wedge has a longitudinal sliding movement relative to the jaw and the jaw has a longitudinal sliding movement relative to the wedge, and in order to prevent such sliding movement of either of these elements from having any effect upon the other element, I place a block 21 between such elements. Each jaw is preferably provided with a spring and pin means 22 adapted to normally keep each jaw at the lowest position on the wedge. During the operation of driving the work the driving pressure tends to slide the jaw up the incline of the block 21 against the spring 22 whereby the jaw is moved toward and into tighter engagement with the work. As illustrated in Fig. 8, the jaw is operated in the clamping direction by fluid pressure and in the unclamping direction by a spring 23, while in Fig. 10 is illustrated a mechanism operated in the clamping direction by a spring and in the unclamping direction by fluid pressure.

Referring particularly to the construction shown in Figs. 2 to 4, it will be seen that four driving devices 11 are mounted on the face plate 4 by means of bolts 24 engaging in the T-slots 24ª. In this form of driving mechanism the fluid pressure serves to hold the work-engaging jaws in working position and therefore the fluid pressure must be on the cylinder and pistons during the rotation of the face plate. To convey the fluid pressure to the cylinders during the rotation of the spindle and face plate I mount a member 25 loosely on the spindle and provide packing glands 26 at opposite sides thereof, this structure preferably being made in halves and secured together by the bolts 27, as illustrated in Fig. 4. The bore of the member 25 is provided with a circumferential port or conduit 28 therein communicating with a port or conduit 29 in the spindle wall, the port 28 also being in communication with the fluid supply pipe 30. The port 29 and port 31 through the face plate connect with a circular pipe 32 surrounding the face plate center and branch flexible pipes 33 connect the circular pipe to the cylinders.

It will be understood that the means for conveying the fluid pressure to the cylinders may be widely varied and in Figs. 5 and 6 I have illustrated a structure slightly different from that shown in Figs. 2 to 4. In this construction I provide ports 34 and 35 through the spindle wall and face plate directly connecting the circular port 28 in the member 25 with each flexible pipe 33 to its cylinder.

In Figs. 10, 11 and 12 is illustrated a modified form of the invention wherein fluid pressure is on the clamping mechanism only for the purpose of releasing and holding the jaws in released position, the spring 23ª normally serving to hold the wedges 18 in the work-securing position. This construction is otherwise similar to that illustrated in Figs. 2 and 3 except that the member 25 on the spindle is eliminated. When it is desired to release the clamping jaws from work-engaging position, the plug 36 is removed from the port 29 in the spindle wall and the air or fluid hose 37 screwed therein. As shown in Fig. 10, in this construction the fluid connection is to the front of the cylinders and the fluid pressure at the front side of the piston therein withdraws the wedge from its jaw-clamping position. In operation the hose 37 is disconnected and the springs 23ª hold the wedges in the work-securing position during the operation of the machine.

What I claim is:

1. In a metal working machine, the combination of a rotary work holder, a plurality of driving elements mounted thereon, a wedge movable relative to each driving element for forcing the elements against the work, a separate power means for operating each wedge, and means for rotating the holder.

2. In a metal working machine, the combination of a rotary work holder, a plurality of driving elements mounted thereon, means movable relative to each driving element for forcing the elements against the work, a fluid pressure device for operating each of the first named means, and means for rotating the holder.

3. In a metal working machine, the combination of a rotary work holder, a plurality of driving elements mounted thereon, a wedge movable relative to each driving element for forcing the elements against the work, a fluid pressure device for operating each wedge, and means for rotating the holder.

4. In a metal working machine, the combination of a rotary work holder, a plurality of driving elements mounted thereon, a separate means movable relative to each driving element for forcing the elements against

the work, a fluid pressure device comprising a cylinder and a resiliently operated piston therein for operating each of the said means, and means for rotating the holder.

5. In a metal working machine, the combination of a rotary work holder, a plurality of driving elements mounted thereon, a wedge movable relative to each driving element for forcing the elements against the work, a fluid pressure device comprising a cylinder and a resiliently operated piston therein for operating each wedge, and means for rotating the holder.

6. In a metal working machine, the combination of a rotary work holder, a plurality of driving elements mounted thereon, a wedge movable relative to each driving element for forcing the elements against the work, power means for operating each wedge comprising a cylinder having a piston therein operated in one direction by a spring and in the opposite direction by fluid pressure, and means for rotating the holder.

7. In a metal working machine, the combination of a rotary work holder, a plurality of driving elements mounted thereon, a wedge movable relative to each driving element for forcing the elements against the work, power means for operating each wedge comprising a cylinder having a piston therein operated in the clamping direction by fluid pressure and in the unclamping direction by a spring, and means for rotating the holder.

8. In a metal working machine, the combination of a rotary work holder, a plurality of driving elements mounted thereon, fluid pressure operated means for operating the driving elements simultaneously and with equal pressure, the driving elements and the said operating means therefor being of such construction that any slipping of the work due to the reaction of the tool thereon and relative to the said means will automatically tighten the driving elements directly against the work, and means for rotating the holder.

9. In a metal working machine, the combination of a rotary spindle and a work holder mounted on one end thereof, a driving device mounted on the work holder and comprising a work-engaging element, means movable relative thereto for forcing the element against the work and a cylinder having a resiliently operated piston therein for operating the first means, a conduit extending through the spindle and communicating with the cylinder, and means for rotating the holder.

10. In a metal working machine, the combination of a rotary spindle and a work holder mounted on one end thereof, a plurality of driving elements mounted on the work holder, means movable relative to each driving element for forcing the elements against the work, power means comprising a cylinder having a resiliently operated piston therein for operating each of the first means, means comprising a conduit extending through the spindle and into communication with the cylinders for providing fluid pressure thereto, and means for rotating the holder.

11. In a metal working machine, the combination of a hollow rotatable spindle, a work holder mounted on one end thereof and a work supporting center therein, a plurality of driving elements mounted on the work holder, means movable relative to each driving element for forcing the elements against the work, power means comprising a cylinder having a resiliently operated piston therein for operating the first means, conduit means extending through the spindle wall and into communication with the cylinders for providing fluid pressure thereto, and means for rotating the holder.

12. In a metal working machine, the combination of a hollow rotatable spindle, a work holder mounted on one end thereof and a work supporting center therein, a plurality of driving elements mounted on the work holder, means movable relative to each driving element for forcing the elements against the work, power means for operating the first means comprising a cylinder having a resiliently operated piston therein, a conduit extending through the spindle wall and communicating with the cylinders for providing fluid pressure thereto, and means for rotating the holder.

13. In a metal working machine, the combination of a hollow rotatable spindle, a work holder mounted on one end thereof and a work supporting center therein, a plurality of driving elements mounted on the work holder, a wedge movable relative to each driving element for forcing the elements against the work, power means comprising a cylinder having a resiliently operated piston therein for operating each wedge, conduit means extending through the spindle wall and into communication with the cylinders for providing fluid pressure thereto, and means for rotating the holder.

14. In a metal working machine, the combination of a hollow rotatable spindle, a work holder mounted on one end thereof and a work supporting center therein, a plurality of driving elements mounted on the work holder, a wedge movable relative to each driving element for forcing the elements against the work, power means for operating each wedge comprising a cylinder having a piston therein operated in one direction by a spring and in the opposite direction by fluid pressure, means comprising a conduit extending through the spindle wall and into communication with the cylinders for providing fluid pressure thereto, and means for rotating the holder.

15. In a metal working machine, the combination of a hollow rotatable spindle, a work holder mounted on one end thereof and a work supporting center therein, a plurality of driving elements mounted on the work holder, a wedge movable relative to each driving element for forcing the elements against the work, power means for operating each wedge comprising a cylinder having a piston therein operated in the clamping direction by fluid pressure and in the unclamping direction by a spring, means comprising a conduit extending through the spindle wall and into communication with the cylinders for providing fluid pressure thereto, and means for rotating the holder.

16. In a metal working machine, the combination of a hollow rotatable spindle, a work holder mounted on one end thereof and a work supporting center therein, a plurality of driving elements mounted on the work holder, means movable relative to each driving element for forcing the elements against the work, power means comprising a cylinder having a resiliently operated piston therein for operating the first means, means comprising a conduit extending through the spindle wall and into communication with the cylinders for providing fluid pressure thereto, a two piece member loosely mounted on the spindle and having a port therein in communication with the spindle conduit and the fluid supply pipe, and means for rotating the holder.

17. In a metal working machine, the combination of a rotary work holder, a plurality of driving elements mounted thereon, a wedge movable relative to each driving element for forcing the elements against the work, power means for operating each wedge, the power means having a lost motion connection with each wedge whereby to secure a hammer blow to release the wedge, and means for rotating the holder.

18. In a metal working machine, the combination of a rotary work holder, a plurality of driving elements mounted thereon, a wedge movable relative to each driving element for forcing the elements against the work, power means comprising a cylinder having a resiliently operated piston therein for operating each wedge, the piston having a lost motion connection with each wedge whereby to secure a hammer blow to release the wedge, and means for rotating the holder.

19. In a metal working machine, the combination of a rotary work holder, a plurality of serrated driving elements mounted thereon, a wedge movable relative to each driving element for forcing the elements against the work, a block interposed between each wedge and element and provided with an inclined surface on which the element is adapted to slide, power means for operating the wedges simultaneously and with equal pressure, and means for rotating the holder.

20. In a metal working machine, the combination of a rotary work holder, a plurality of serrated driving elements mounted thereon, a wedge movable relative to each driving element for forcing the elements against the work, a block interposed between each wedge and element and provided with an inclined surface on which the element is adapted to slide, a spring engaging each element for normally holding the same in the lowest position on the said inclined surface, power means for operating the wedges simultaneously and with equal pressure, and means for rotating the holder.

21. A work driving device comprising the combination of a base adapted to be secured to the face plate of a lathe, a work-engaging jaw holder mounted thereon, a fluid pressure cylinder also mounted on the base, a work-engaging jaw in the holder, and means operated from and in the axial line of the fluid pressure cylinder for operating the jaw.

22. A work driving device comprising the combination of a base, a work-engaging jaw holder mounted thereon, a fluid pressure cylinder also mounted on the base, a serrated work-engaging jaw in the holder, a wedge for operating the jaw, a piston within the cylinder, and a piston rod coaxial of the piston and operatively connecting the wedge to the piston whereby to operate the jaw.

23. A work driving device comprising the combination of a base, a work-engaging jaw holder mounted thereon, a fluid pressure cylinder also mounted on the base, a serrated work-engaging jaw in the holder, a wedge for operating the jaw, a piston within the cylinder, a piston rod operatively connected to the wedge and adapted to operate the jaw, and a spring surrounding the piston rod within the cylinder for operating the piston in one direction, the piston being operated in the opposite direction by fluid pressure.

24. A work driving device comprising the combination of a base, a work-engaging jaw holder mounted thereon, a fluid pressure cylinder also mounted on the base, a serrated work-engaging jaw in the holder, a wedge for operating the jaw, a piston within the cylinder, a piston rod operatively connected to the wedge and adapted to operate the jaw, and a spring surrounding the piston rod within the cylinder on one side of the piston for operating the piston in the work-releasing direction, the piston being operated in the work-engaging direction by fluid pressure.

In testimony whereof, I hereto affix my signature.

JAMES K. CULLEN.