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PATENTED JAN. 8, 1907.

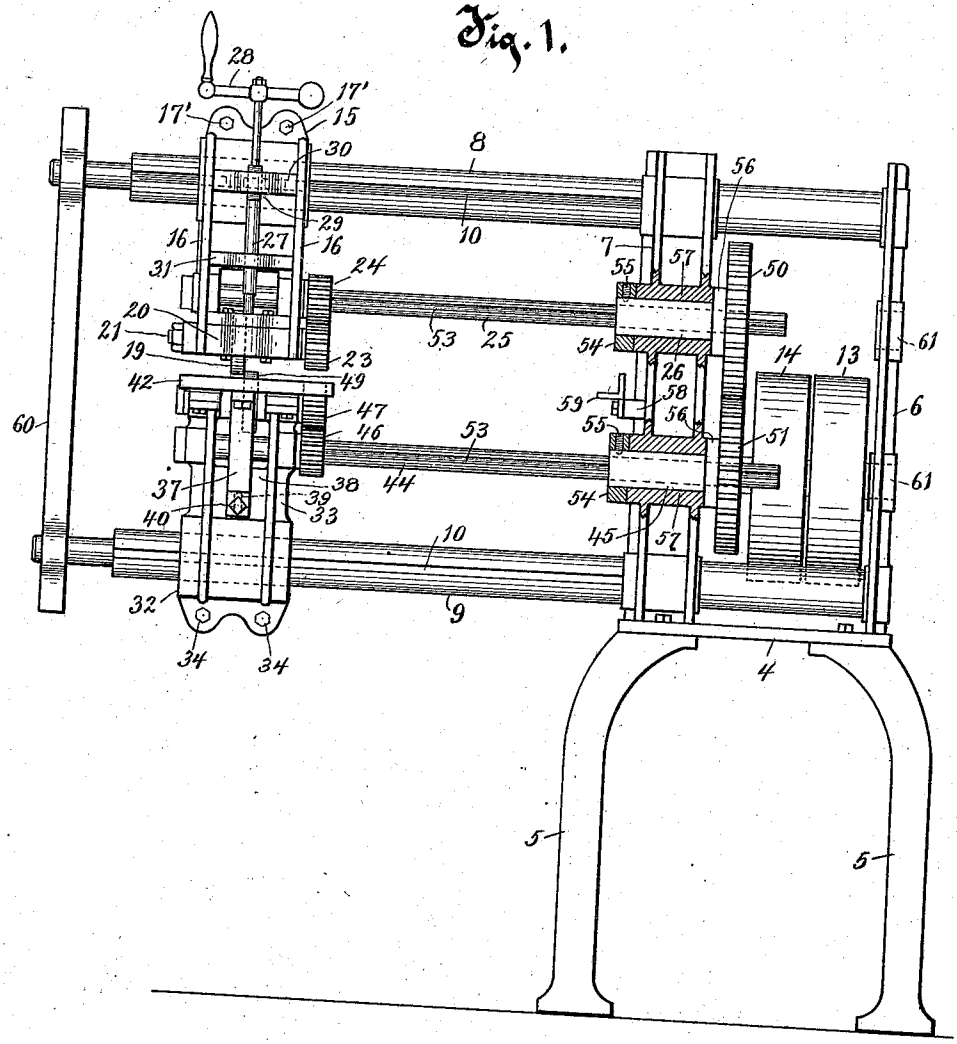
J. JUNGERS & F. KESSL.

ROTARY SHEARS.

APPLICATION FILED APR. 11, 1904.

2 SHEETS—SHEET 1.

Fig. 1.



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ROTARY SHEARS.

APPLICATION FILED APR. 11, 1904.

2 SHEETS—SHEET 2.

Fig. 3.

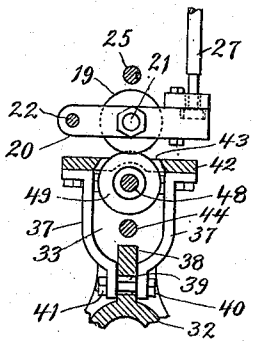
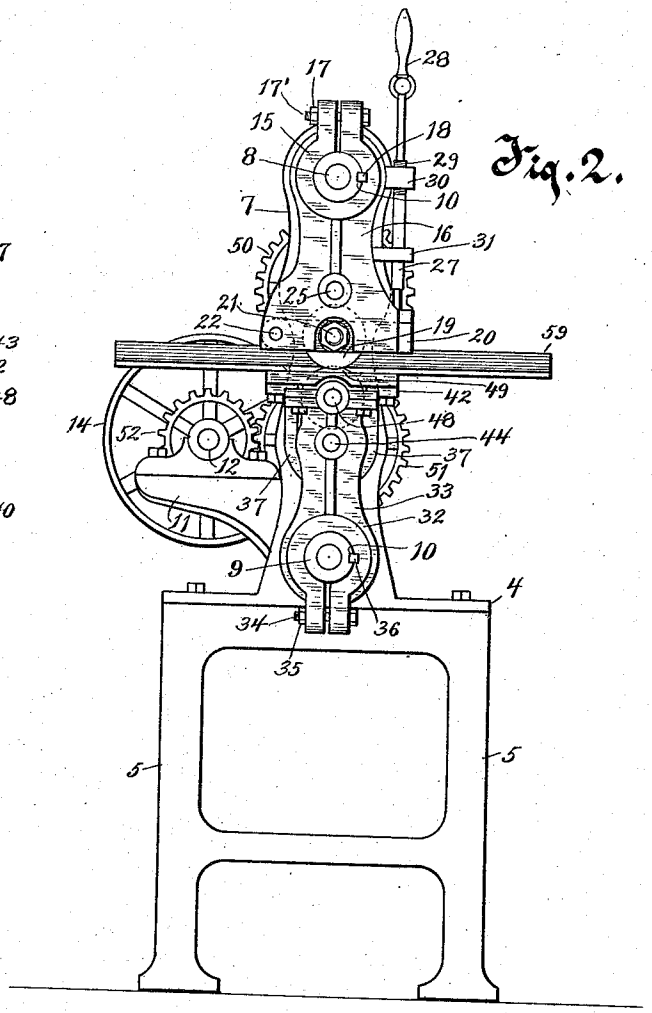


Fig. 2.



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ROTARY SHEARS.

No. 840,698. Specification of Letters Patent. Patented Jan. 8, 1907.

Application filed April 11, 1904. Serial No. 202,508.

To all whom it may concern:

Be it known that we, JOHN JUNGERS and FRANZ KESSL, residing in Cedar Grove, in the county of Sheboygan and State of Wisconsin, have invented new and useful Improvements in Rotary Shears, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

Our invention has relation to improvements in rotary shears adapted for cutting sheets of metal.

In the use of shearing-machines for cutting metal it frequently happens that sheets of metal of varying thicknesses are required to be cut, and where a sheet of considerable or augmented thickness is cut the strain on the frame of the machine is necessarily very materially increased. In rotary shears as now commonly constructed, so far as we are aware, no means have been provided for increasing the resistance of the frame or bearings when a thick sheet is cut, and hence the mechanism under such circumstances is subjected to very great and damaging strain.

It is therefore the primary object of our invention to provide for compensating for the increased strains arising when metal of augmented thickness is cut by providing a novel means for increasing the resistance to such strains.

Our invention further contemplates as an object an improved arrangement of the mechanism, whereby simplicity, cheapness, and other desirable ends are attained.

With the above and other incidental objects in view the invention consists of the devices and parts or their equivalents, as hereinafter set forth.

In the accompanying drawings, Figure 1 is an elevation of a rotary shear of our improved construction. Fig. 2 is an elevation at right angles to Fig. 1. Fig. 3 is a detail view of the shear-adjusting mechanism, parts being in section.

Referring to the drawings, the numeral 4 indicates a bed or table supported by legs 5. Rising upwardly from opposite edges of the table are standards 6 and 7, respectively. These standards form means for supporting circular parallel rails 8 and 9, respectively, one arranged above the other and each provided with a groove 10. The two standards 6 and 7 are provided with projecting arms similar to 11, which form bearings for the ends of a driving-shaft 12. This shaft may be rotated in any desirable manner; but we prefer to mount thereon fast and loose pulleys 13 and 14. A shiftable belt (not shown) leading from a pulley on a line-shaft is adapted to extend around one or the other of the pulleys 13 and 14, the said belt being shifted to the fast pulley when it is desired that the shaft should be rotated.

The frame in which the upper cutter is mounted is provided with an upper circular clamping-head 15 and depending side flanges 16 16. The upper clamping-head is provided with an opening surrounding the upper rail 8, and said head is split upwardly from the opening to form clamping-jaws. The frame is held in adjusted position on the rail by means of nuts 17, turned onto the threaded ends of bolts 17′ 17′, extending through the clamping-jaws of the head, the nuts being turned up tightly on the bolts. In order to adjust this cutter-frame on the rail 8, the nuts are loosened, and the frame is then free to be slid along the rail to the desired extent, the head being provided with a feather 18, which engages the groove 10 of the rail. The upper cutter 19 is disposed at the lower end of the upper cutter-frame. This cutter is preferably of disk form and is also, preferably, disposed in a slot formed in an arm 20. It is mounted on a short shaft 21, intersecting the said slot. The arm 21 is pivoted to the frame at one end on a pin 22, so that the opposite or free end thereof may be capable of an up-and-down movement. The outer end of the short shaft 21 has mounted thereon a pinion 23, which meshes with a pinion 24, mounted fast on an upper shaft 25. One end of the shaft 25 is mounted slidably in a bearing 26, the said bearing being an extension from the hub of a gear-wheel, hereinafter referred to. The opposite end of shaft 25 is journaled in the side flanges 16 of the upper cutter-frame. The raising and lowering of the free end of the pivoted arm 20, and consequently the raising and lowering of the cutter 19, is effected in any desirable manner; but we prefer to employ the means shown in the accompanying drawings, which consist of an upright spindle 27, engaging at its lower end with the free end of the pivoted arm, and provided at its upper end with a suitable handle 28 for convenience in turning it. The spindle at a point between its ends is formed with threads 29, which engage a threaded opening in a lug 30, projecting outwardly

from the upper cutter-frame, the lug acting as a stationary nut, through which the spindle is turned, and thereby either raised or lowered, in accordance with the direction of turning. The spindle is also shown as passing freely through an opening in a guide-arm 31. The lower cutter-frame is provided at its lower end with a head portion 32, and extending upwardly from this head portion are side flanges 33 33. The head portion 32 is provided with an opening, through which the lower rail 9 passes. From this opening the head is split downwardly to form clamping-jaws, which are normally held close together by means of bolts 34 34, having nuts 35 35 turned tightly onto the threaded ends thereof. When the nuts are loosened, the lower cutter-frame is capable of lateral movement, the head of said frame sliding on the rail 9 and having a feather 36 engaging the groove 10 of rail 9.

Adjacent to the outer faces of the respective flanges 33 are yoke-arms 37 37. These arms terminate at their lower ends in straight extensions, which lie adjacent to opposite faces of a web 38, connecting the two side flanges 33. This web is provided with a vertically-elongated slot 39, and a short bolt 40 passes through the straight extensions of the yoke-arms and through this elongated slot. One end of the bolt is headed, and the opposite end is provided with threads to receive a nut 41. The upper ends of the yoke-arms are connected by a plate 42, which is provided with an opening 43. A lower rotatable shaft 44 is journaled at one end in a bearing 45, formed by the hub of a gear-wheel, hereinafter referred to, and the opposite end of said shaft passes through and is journaled in the flanges 33 of the lower cutter-frame. On the shaft 44 is mounted fast a pinion 46, which gears into a pinion 47, mounted on the end of a short shaft 48, said short shaft having its bearings in the side flanges 33. Mounted on and rotatable with the short shaft is a lower cutter 49, preferably of disk form and having its periphery extending into the opening 43 of the top connecting-plate 42.

Any desirable means for rotating the shafts 25 and 44 may be employed; but we prefer to accomplish the rotation thereof by means of intermeshing gears 50 and 51 on corresponding ends of the respective shafts, the lower gear 51 being driven by a pinion 52, mounted on the drive-shaft 12. The gears 50 and 51 are so mounted on the shafts 25 and 44 as to permit of said gears rotating with the shafts, but at the same time allowing for longitudinal movement of the shafts through the gears. This is accomplished by providing the hubs of the gears with feathers, which are adapted to fit grooves 53 53, extending longitudinally of said shafts. The bearings 26 and 45 for the shafts 25 and 44 are formed by extensions from the hubs of the gear-wheels 50 and 51, and the said shafts are capable of being moved freely through said bearings and through the gears, so that no matter to what adjustment the shafts 25 and 44 are moved longitudinally the meshing engagement of the gears 50 and 51 is maintained. The said gears are prevented from being carried to the right with the shafts 25 and 44 by reason of the employment of collars 54 54, surrounding the ends of the bearings 26 and 45 and secured to said bearings by means of screws 55 55. The gears 50 and 51 are also prevented from moving with the shafts 25 and 44 toward the left by reason of the bosses 56 56 on the inner faces of said gears abutting against the ends of the openings 57 57 of the standard 7, in which the bearings 26 and 45 are fitted.

Supported by a lug 58, projecting from the standard 7, is an angular support and stop 59 for the sheet of metal to be cut.

In the use of our invention if a sheet of metal of more than ordinary thickness is to be cut the cutter-frames are adjusted toward the standard 7, and this is accomplished by loosening the nuts 17 and 35, respectively, on the bolts 17′ and 34. This will unclamp the cutter-frames from the rails 8 and 9 and permit said frames to be slid in the direction stated. The movement of the said frames will cause the shafts 25 and 44 to be moved through their bearings 26 and 45, while the gears 50 and 51 will remain in intermeshing engagement, as shown in Fig. 1, said gears not being affected by the movement of the shafts 25 and 44, as hereinbefore fully described. The sets of intermeshing pinions 23 and 24 and 46 and 47, however, are moved together and remain in meshing engagement under any adjustment of the cutter-frames on the rails 8 and 9. After the cutter-frames have been adjusted close enough to the standards 7 to resist the strain occasioned by the cutting of the thick sheet of metal the nuts 17 and 35 are again tightened up on the bolts 17′ and 34, and the cutter-frames thereby held at adjusted position. The main drive-shaft is now started, and by the system of gearing hereinbefore explained rotation is imparted to the shafts 25 and 44 and by these shafts is communicated to the rotary cutters 19 and 49, and this rotation of the cutters effects the cutting of the sheet of metal as said sheet is pushed through the machine. It will be noticed that the peripheral edge of one cutter just overlaps the other, so that a shearing cut is thereby effected. It is also desirable in order to further strengthen the parts in addition to adjusting the cutter-frames close to the standard 7 to provide an extra brace-arm 60, which arm connects the outer left-hand ends of the rails 8 and 9. Where this brace-arm is employed, however, the width of the

sheet of metal must be such as to permit said sheet of metal to be slid through the machine in the space between the angular support 59 and the brace-arm 60. Under ordinary conditions, or where very thick sheets of metal are not being cut, the arm 60 may be removed, so that sheets of metal of considerable width may be run through the machine. When the shafts 25 and 44 are adjusted toward the right of Fig. 1, if the adjustment is very great the right-hand ends of said shafts would strike against the upright 6, and thereby prevent further movement of the said shafts. To guard against this, we provide the upright 6 with openings 61 61, which are in line with the ends of the shaft.

The extent of the overlapping of the peripheral edges of the rotary cutters is regulated by means of the spindle 27. It is obvious that when said spindle is turned downwardly the upper cutter will be brought downwardly, and thereby, caused to overlap the edge of the lower cutter to a greater extent, and, on the other hand, when the spindle 27 is turned upwardly the overlapping will be decreased. By this adjustment the shearing cut is regulated.

It is also necessary in cutting sheets of metal of varying thicknesses that the peripheral edge of one of the cutters should be more or less exposed in order to prevent undue bending of the metal, which would arise in case of thin sheets of metal. For instance, in the case of ordinary sheets of metal a considerable portion of the lower roller may project upwardly, whereas in case of thin sheets of metal it is desirable that the extent of the upward projection of the lower roller should be limited. This is provided for by the provision of the adjustable yoke-arms 37, connected at their upper ends by the plate 42, which is provided with the opening 43, into which the lower cutter projects. By loosening the nut 41 on the bolt 40 the yoke-arms may be moved upwardly or downwardly to thereby increase or diminish the extent of the projection of the cutter above the plate 42. When the desired adjustment is obtained, the nut 41 is again tightened.

While we have herein shown and described certain details of construction, yet we do not wish to be understood as limiting ourselves specifically thereto, inasmuch as various changes may be made without departing from the spirit and scope of our invention. For instance, we do not desire to limit ourselves to any special construction for providing for the adjustment of the cutter-frames toward or from the upright 7 and maintaining the different gears in mesh under the different adjustments.

What we claim as our invention is—

1. In a shearing-machine, the combination of a shear-carrying frame, a suitable support therefor, an arm pivoted to the shear-carrying frame, a shear mounted in said arm, a spindle having one end engaging the free end of the pivoted arm, and adapted when raised or lowered to raise or lower said arm, and means for holding the spindle in adjusted position.

2. In a shearing-machine, the combination of a shear-carrying frame, a suitable support therefor, an arm pivoted to the shear-carrying frame, a shear mounted in said arm, and a spindle having one end engaging the free end of the pivoted arm, the said spindle also provided with threads engaging a threaded opening in the shear-carrying frame.

3. In a shearing-machine, the combination of a shear-carrying frame, a suitable support therefor, a shear carried by the shear-carrying frame, a bed-plate at one end of the shear-carrying frame, said plate provided with an opening into which the shear extends, and adjusting means for causing the shear to project to a greater or less extent through the opening of the bed-plate.

4. In a shearing-machine, the combination of a shear-carrying frame, a suitable support therefor, a shear carried by the shear-carrying frame, a bed-plate at one end of the shear-carrying frame, said plate provided with an opening into which the shear extends, and means for adjusting the plate so as to expose more or less of the peripheral edge of the shear.

5. In a shearing-machine, the combination of a shear-carrying frame, a suitable support therefor, a shear carried by the shear-carrying frame, a bed-plate at one end of the shear-carrying frame, said plate provided with an opening into which the shear extends, yoke-arms extending from the plate, a bolt passing through the yoke-arms and through an elongated slot in the shear-carrying frame, and a nut turned onto the threaded end of the bolt.

6. In a shearing-machine, the combination of shear-carrying frames, suitable supports therefor, shears carried by the shear-carrying frames in opposition to each other to effect a shearing cut, a bed-plate for one of the shear-carrying frames, said plate provided with an opening through which the shear carried by that frame projects, and an adjusting means for causing the latter shear to project to a greater or less extent through the opening of the bed-plate.

7. In a rotary shear, the combination of a supporting bed or table, an upright projecting therefrom, said upright provided with openings, rails extending from the upright, shear-carrying frames slidably and adjustably mounted on the rails so as to be brought closer to or farther away from the upright, rotary shears carried by the shear-carrying frames, the shafts or axes of the shears having pinions mounted thereon, and rotatable shafts mounted in the shear-carrying frames and having driving-pinions mounted thereon

in mesh with the pinions of the shears, the said shafts passing freely through the openings of the upright so as to be capable of moving therethrough.

8. In a rotary shear, the combination of a supporting bed or table, an upright projecting therefrom, said upright provided with openings, rails extending from the upright, shear-carrying frames slidably and adjustably mounted on the rails so as to be brought closer to or farther away from the upright, rotary shears carried by the shear-carrying frames the shafts or axes of the shears having pinions mounted thereon, other shafts mounted in the shear-carrying frames and having driving-pinions mounted thereon in mesh with the pinions of the rotary shears, the said shafts passing freely through the openings of the upright, and intermeshing gears mounted to rotate with the shafts but held against longitudinal movement therewith, whereby the said shafts when moved with the shear-carrying frames are adapted to pass freely through the gears, to thereby maintain the intermeshing engagement of the said gears.

9. In a rotary shear, the combination of a supporting bed or table, uprights projecting therefrom, said uprights provided with alined openings, rails extending from the uprights, shear-carrying frames slidably and adjustably mounted on the rails so as to be brought closer to or farther away from the uprights, rotary shears carried by the shear-carrying frames, the shafts or axes of the shears having pinions mounted thereon, other shafts mounted in the shear-carrying frames and having driving-pinions mounted thereon in mesh with the pinions of the rotary shears, the said shafts passing freely through the openings of the upright nearest to the shear-carrying frame, intermeshing gears mounted to rotate with the shafts but held against longitudinal movement therewith, whereby the said shafts when moved with the shear-carrying frames are adapted to pass freely through the gears, to thereby maintain the intermeshing engagement of said gears, and means for positively driving one of said gears.

10. In a rotary shear, the combination of a supporting bed or table, an upright projecting therefrom, said upright provided with openings, rails extending from the upright, shear-carrying frames slidably and adjustably mounted on the rails so as to be brought closer to or farther away from the upright, rotary shears carried by the shear-carrying frames, the shafts or axes of the shears having pinions mounted thereon, longitudinally splined or grooved shafts mounted in the shear-carrying frames and having driving-pinions mounted thereon in mesh with the pinions of the rotary shears, intermeshing gears having feathers engaging the splines or grooves of the shafts, the said gears provided with projecting hubs fitting in the openings of the uprights, and through which hubs the shafts pass freely, means for permitting the gear-wheels and their hubs to rotate with the shaft, but preventing longitudinal movement of the hubs in the openings of the uprights, and means for positively driving one of said gears.

11. In a shearing-machine, the combination of an upright support, rails extending therefrom, shear-carrying frames adjustable longitudinally along the rails toward or away from the upright support, and a removable brace-arm connecting the outer ends of the rails.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN JUNGERS.
FRANZ KESSL.

Witnesses:
HENRY KREMNAN,
WM. HOLLE.