No. 676,156. Patented June 11, 1901.

A. SCHÄRFL.

SHEARING MACHINE.

(Application filed Apr. 14, 1900.)

(No Model.) 3 Sheets—Sheet 1.

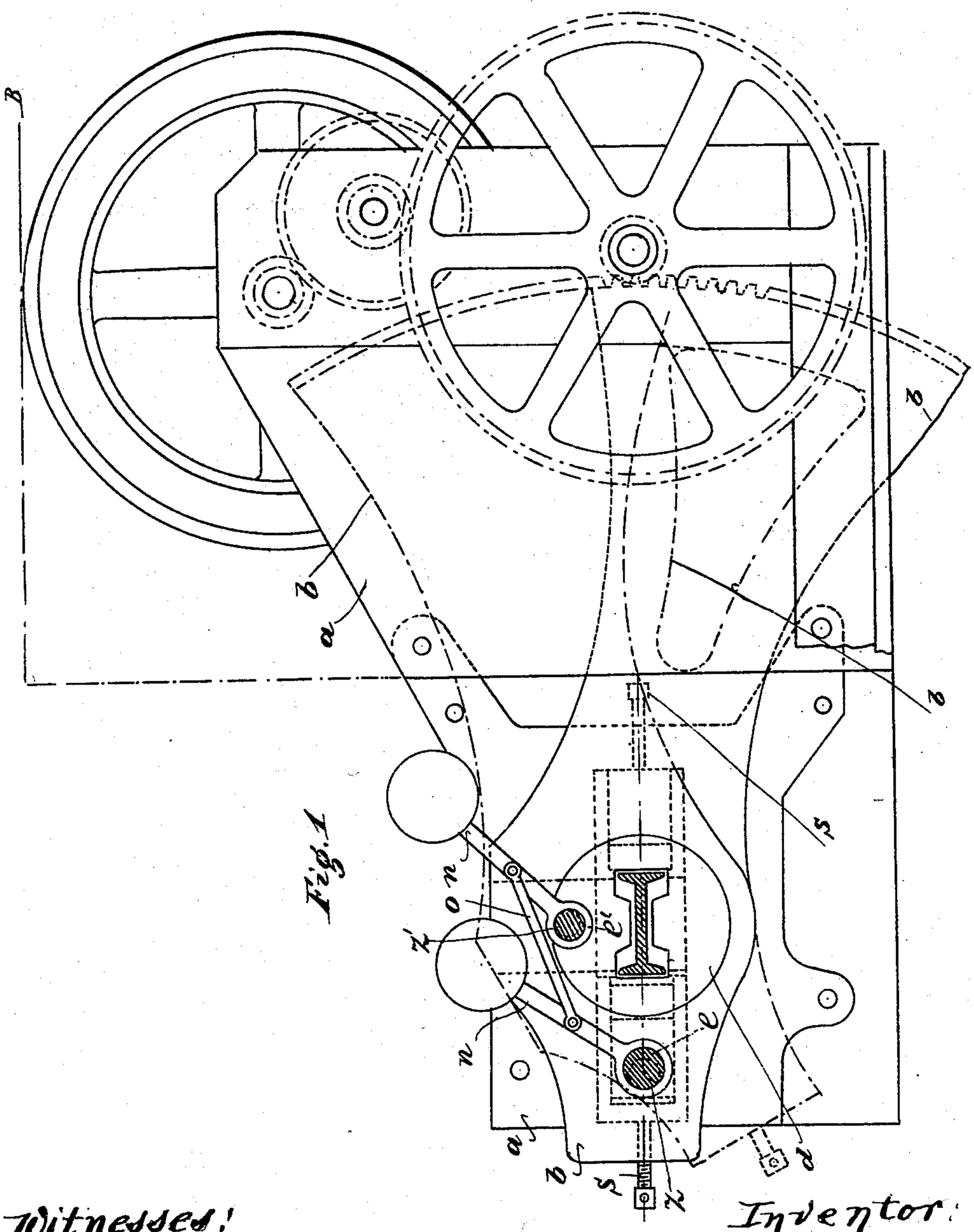

Fig. 1.

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3 Sheets—Sheet 2.

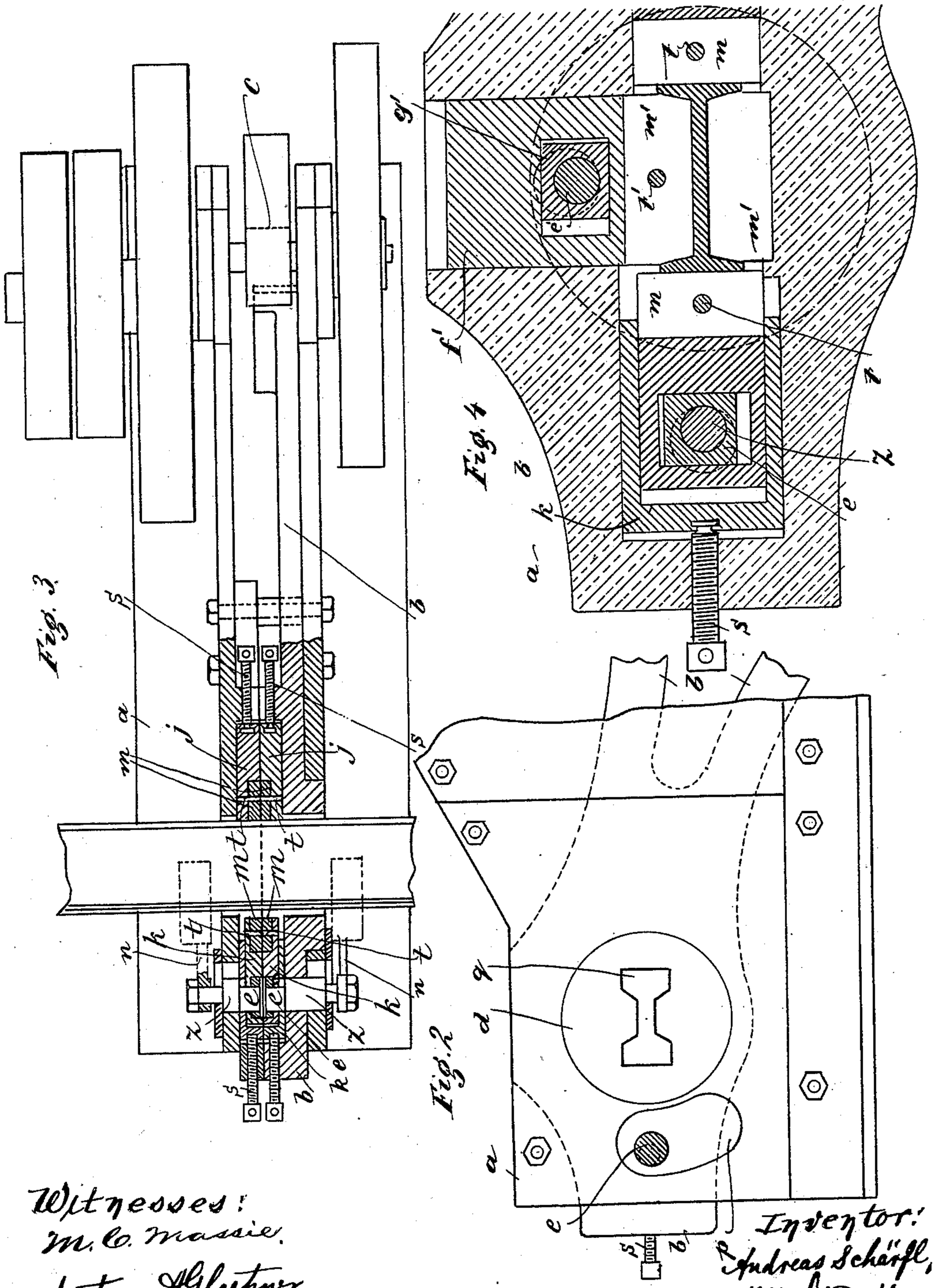

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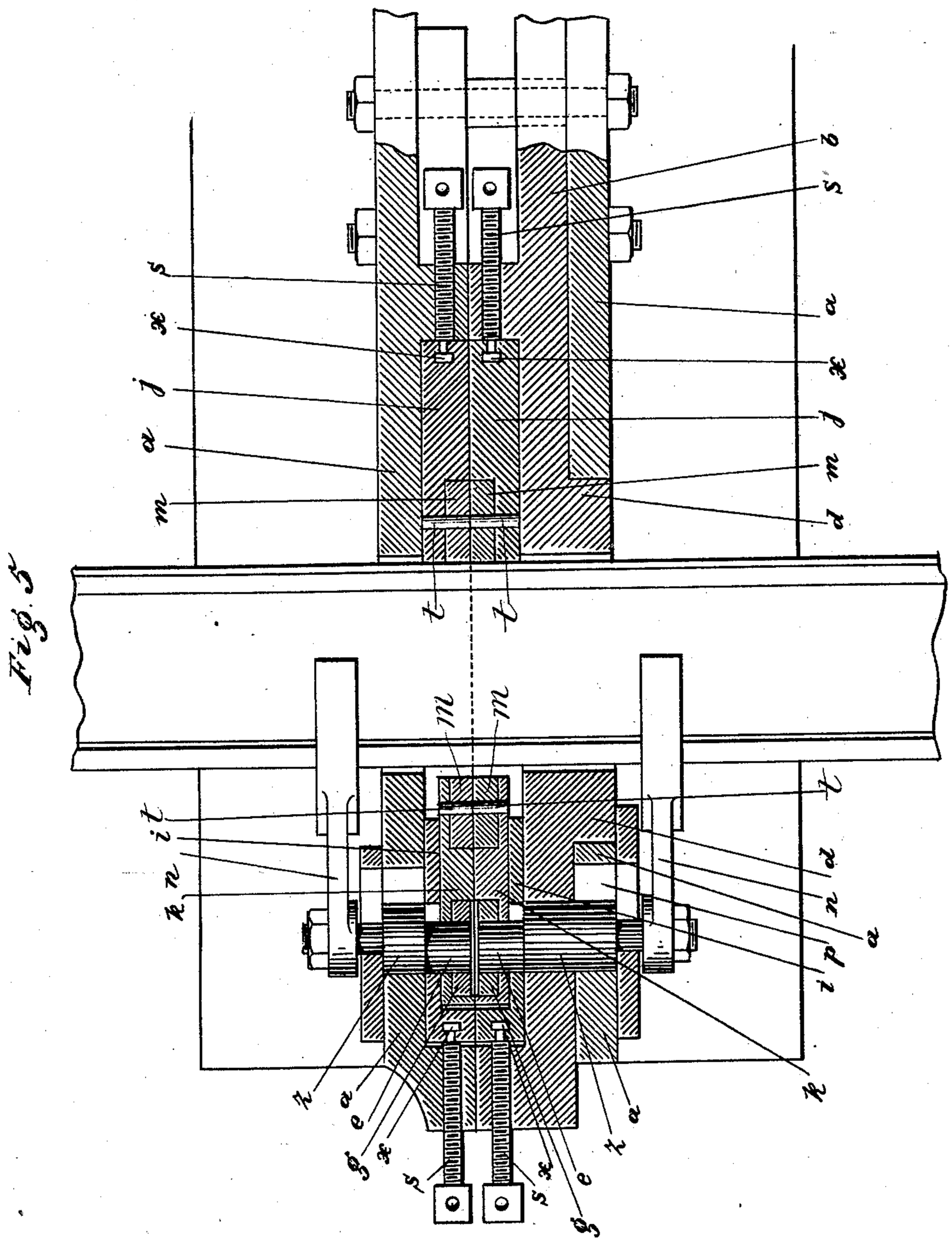
Fig. 5.



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UNITED STATES PATENT OFFICE.

ANDREAS SCHÄRFL, OF MUNICH, GERMANY.

SHEARING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 676,156, dated June 11, 1901.

Application filed April 14, 1900. Serial No. 12,839. (No model.)

To all whom it may concern:

Be it known that I, ANDREAS SCHÄRFL, a citizen of Germany, residing at Munich, Bavaria, Germany, have invented certain new and useful Improvements in Shearing-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to a contrivance for adjusting or advancing the movably-arranged knives of so-called "rotary shearing-machines." These shearing-machines are used for cutting shape-iron, angle-iron, and other shape-iron whereby rectilinear movement of both blades toward each other is avoided, and in which the shears, or rather one blade, moves or turns in such a direction that the center of motion always coincides with the middle of the shape-iron to be cut. Such shears are already known, without, however, a practical contrivance for enabling the separate knives to be adjusted as quickly as possible, so as to come into engagement immediately upon one blade being turned.

The object of the present invention is to obviate this defect.

In order to render the present invention more easily intelligible, reference is had to the accompanying drawings, in which—

Figure 1 is a front elevation of the complete shearing-machine, partly in section. Fig. 2 is a side view of the frame and shearing-segment with all details omitted. Fig. 3 is a section along the line A B of Fig. 1. Fig. 4 is in a larger scale a vertical section of the cutting mechanism. Fig. 5 is the same section as Fig. 3, but in a larger scale and omitting the driving mechanism.

The frame *a* of the shearing-machine is formed of two plates kept at the desired distance apart by screw-bolts. The cutting mechanism is placed within the frame formed by these plates. The principal requirement for this kind of shearing-machine is the following: The shape-iron to be cut must be entirely surrounded in front as well as behind the point of section by a system of knives or cutters, a requirement which in the present case is met by two sets of four knives *m*, each knife corresponding to the respective side of the profile-iron, one set being embedded in one plate of the frame *a* in order to hold rigidly the profile-iron, while the other set is secured in a swinging segment *b* and is designed to cut away the shape-iron. In each set three of these four knives *m* are adjustable, while the fourth is stationary in the machine. The knives must be changed according to the shape-iron to be cut. The adjustable knives in one set are movable to and from the shearing axis in a direction transverse to the direction of movement of the knives in the other set—that is, in a direction substantially perpendicular to the movement of the other knives.

If the iron bar—for example, a girder—is to be cut, all adjustable knives after being properly adjusted must be so firmly pressed against the iron bar as to make the bar completely immovable, a requirement that may be brought about by correspondingly turning the screws *s*. This being done, the machine is started, whereupon the back part of the toothed segment *b*, which engages with the toothed wheel *c*, is raised, whereby the segment-piece, which is provided with a circular lateral projection *d*, pivotally disposed in a corresponding perforation or recess in the frame, makes a partial revolution, sufficient, however, to make the cut. Immediately after the segment is started all the knives disposed in the segment will come into engagement on the side corresponding with the sense of rotation—that is to say, they begin to cut at the same time. The arrangement of the driving mechanism is easily intelligible from the drawings and need not be further described.

As the pressing on of the single knives by means of screws would be too complicated and would require too much time for a profitable working, the system of knives mounted both on the frame and on the swinging segment is arranged as follows: Besides the lateral knives, which remain in position for all sizes of shape-iron, the upper and lower knives must be always changed for each size of the shape-iron. The lower of the knives is not adjustable, while the upper knife is suspended by means of pins *f'* to the slide *f'*, moved up and down by the eccentric *e'* in such a manner as to be still so far from the bar in the opened position that the latter may easily

pass through. The eccentric turns in a sliding piece or head g', guided in the slide or frame f'. By tilting the weight-lever n, secured to the shaft of the eccentric e', the latter makes a partial revolution, and by means of its sliding piece g' lifts or presses downward the slide f', according to the eccentricity. Thus the upper knife, secured to the slide f', can be pressed sufficiently against the shape-iron to bring the latter into contact with the three cutting edges of the upper and lower knives. The lateral knives are pressed against the shape-iron in a somewhat different manner. In this case neither a firmly-fixed knife nor the arrangement described for the upper knives is available, since the dimensions of the different girders require a too-great displacement of the knives. This is, however, not necessary in the case of the upper knives, as the variations in the thickness of the sizes of girders is so slight that it can be easily taken into account by varying the depth of the knives. For this reason the lateral knives are adjustably arranged, the inner ones being only adjusted with their slides j by a set of screws s, while the outer knives can be adjusted by a double slide and an eccentric. As shown in Figs. 4 and 5, the outer knives m are secured to slides k, movable in the outer slides i, and pushed to and from the girder by turning the eccentrics e, which are provided in the well-known manner with sliding pieces g, with aid of the weighted levers n, mounted on the eccentric-shafts z and connected by the bars o to the above-mentioned levers n, destined to move up and down by means of their eccentrics e' the upper knives, the two sets of knives being thus pressed simultaneously to the girder by tilting the lever systems n. As mentioned before, the inner slides k of the outer knives are movable in the outer slides i, embedded in the frame a and in the swinging segment b and adjustable by means of the screws s. This double adjustability allows, on the one hand, the knives to be quickly adjusted on the shape-iron being changed, whereas, on the other hand, the bar can be rapidly fixed and loosened. The outer slides i of the outer lateral knives are adjusted only when another size of shape-iron is to be cut. Otherwise all that need to be done for starting the shearing mechanism is to turn the four eccentrics e—two in the frame a and two in the swinging segment b—before or after each cutting in order to fix or loose at once the girder. Thus the manipulation of the machine is simplified.

The frame a or the side wall in which the swinging segment is pivoted has, besides the perforation for the projection d of the swinging segment, a further segment-shaped aperture p for the shaft z of the eccentric, in order to allow the swinging of the same. The projection d has also a peforation or aperture q, the size of which varies according to the profiles of the girder to be cut. If instead of girders other shape-iron is to be cut, it is only necessary to substitute suitable knives.

I claim—

1. In a rotary shearing-machine, a plate provided with two pairs of cutters, one of each pair of cutters being adjustable to and from the shearing axis, said adjustable cutters being arranged to move in a direction transverse to each other, whereby different sizes and forms of shape-iron may be operated upon.

2. In a rotary shearing-machine, the combination of a fixed and an adjacent rotary plate each plate being provided with two pairs of cutters, one of each pair of cutters being adjustable to and from the shearing axis, whereby different sizes and forms of shape-iron may be operated upon.

3. In a rotary shearing-machine, the combination of a fixed and an adjacent rotary plate each plate being provided with two pairs of cutters, one of each of said pairs of cutters being adjustable to and from the shearing axis, said adjustable cutters being arranged to move in a direction transverse to each other, whereby different sizes and forms of shape-iron may be operated upon.

4. In a rotary shearing-machine, the combination of a frame arranged to move toward and from the shearing axis, a cutter-head mounted in said frame and arranged to move therein in a direction toward and from the shearing axis, means for adjusting the position of said frame, and means for adjusting the position of said cutter-head in said frame.

5. In a rotary shearing-machine, the combination of a frame arranged to slide toward and from the shearing axis, a cutter-head mounted in said frame and arranged to slide therein in a direction toward and from the shearing axis, means for adjusting the position of said frame, and means for adjusting the position of said cutter-head in the frame.

6. In a rotary shearing-machine, the combination of a frame arranged to move toward and from the shearing axis, a cutter-head mounted in said frame and arranged to move therein toward and from the shearing axis, a pivoted lever, and means for causing the oscillation of the lever to adjust the position of said cutter-head relative to said frame.

7. In a rotary shearing-machine, the combination of a frame arranged to move toward and from the shearing axis, a cutter-head mounted in said frame and arranged to move therein toward and from the shearing axis, a pivoted lever, an eccentric connected with said lever and arranged to be actuated thereby, and means for causing the movement of said eccentric to adjust the position of said cutter-head relative to said frame.

8. In a rotary shearing-machine, the combination of a frame arranged to move toward and from the shearing axis, a shaft journaled in the said frame, a cutter-head mounted in said frame and having a slot therein, said cutter-head being arranged to move in said frame

toward and from the shearing axis, a block arranged to move in the slot in said cutter-head in a direction transverse to the direction of movement of said cutter-head, an eccentric mounted on said shaft and engaging the walls of an aperture in said block, and means for oscillating said shaft.

9. In a rotary shearing-machine, the combination of a frame arranged to slide toward the shearing axis, a shaft journaled in said frame, a cutter-head mounted in said frame and having a slot therein, said head being arranged to slide in said frame toward and from the shearing axis, a block arranged to slide in the slot in said cutter-head in a direction transverse to the direction of movement of said cutter-head, an eccentric mounted on said shaft, and engaging the walls of an aperture in said block, and a weighted lever connected to said eccentric.

10. In a rotary shearing-machine, the combination of a frame arranged to slide toward and from the shearing axis, a cutter-head mounted in said frame and arranged to slide therein in a direction toward and from the shearing axis, a knife secured to the said cutter-head, a second frame arranged to slide toward and from the shearing axis in a direction transverse to the direction of movement of said other frame, a cutter-head mounted in said latter frame and arranged to slide therein in a direction toward and from the shearing axis, and means for adjusting said cutter-heads simultaneously toward and from the shearing axis.

11. In a rotary shearing-machine, the combination of a frame arranged to slide toward and from the shearing axis, a shaft journaled in said frame, a cutter-head mounted in said frame and having a slot therein, said cutter-head being arranged to slide in said frame in a direction toward and from the shearing axis, a block arranged to slide in the slot in said cutter-head in a direction transverse to the direction of movement of said cutter-head, an eccentric mounted on said shaft and engaging the walls of an aperture in said block, a second frame arranged to slide toward and from the shearing axis in a direction transverse to the direction of movement of said other frame, a shaft journaled in said second frame, a cutter-head mounted in said second frame and having a slot therein, said second cutter-head being arranged to slide in said second frame in a direction toward and from the shearing axis, a block arranged to slide in the slot in said second cutter-head in a direction transverse to the direction of movement of said second cutter-head, an eccentric mounted on said shaft and engaging the walls of an aperture in said second block, a weighted lever mounted on each of said shafts, and a lever connecting said levers and arranged to cause them to act simultaneously and thereby move said cutter-heads toward and from the shearing axis simultaneously.

12. In a shearing-machine the combination of an inner slide *k* moved to and from the girder by means of an eccentric *e* with an outer slide *i* adjustable by a screw *s* for the purpose of an easy and quick adjustment of the knives according to the size of the girder substantially as described.

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

ANDREAS SCHÄRFL.

Witnesses:
FLORENCE J. MCDONALD,
ANDREAS SORG.