No. 864,424. PATENTED AUG. 27, 1907.

C. A. JUENGST.

MACHINE FOR SAWING METAL.

APPLICATION FILED JUNE 4, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

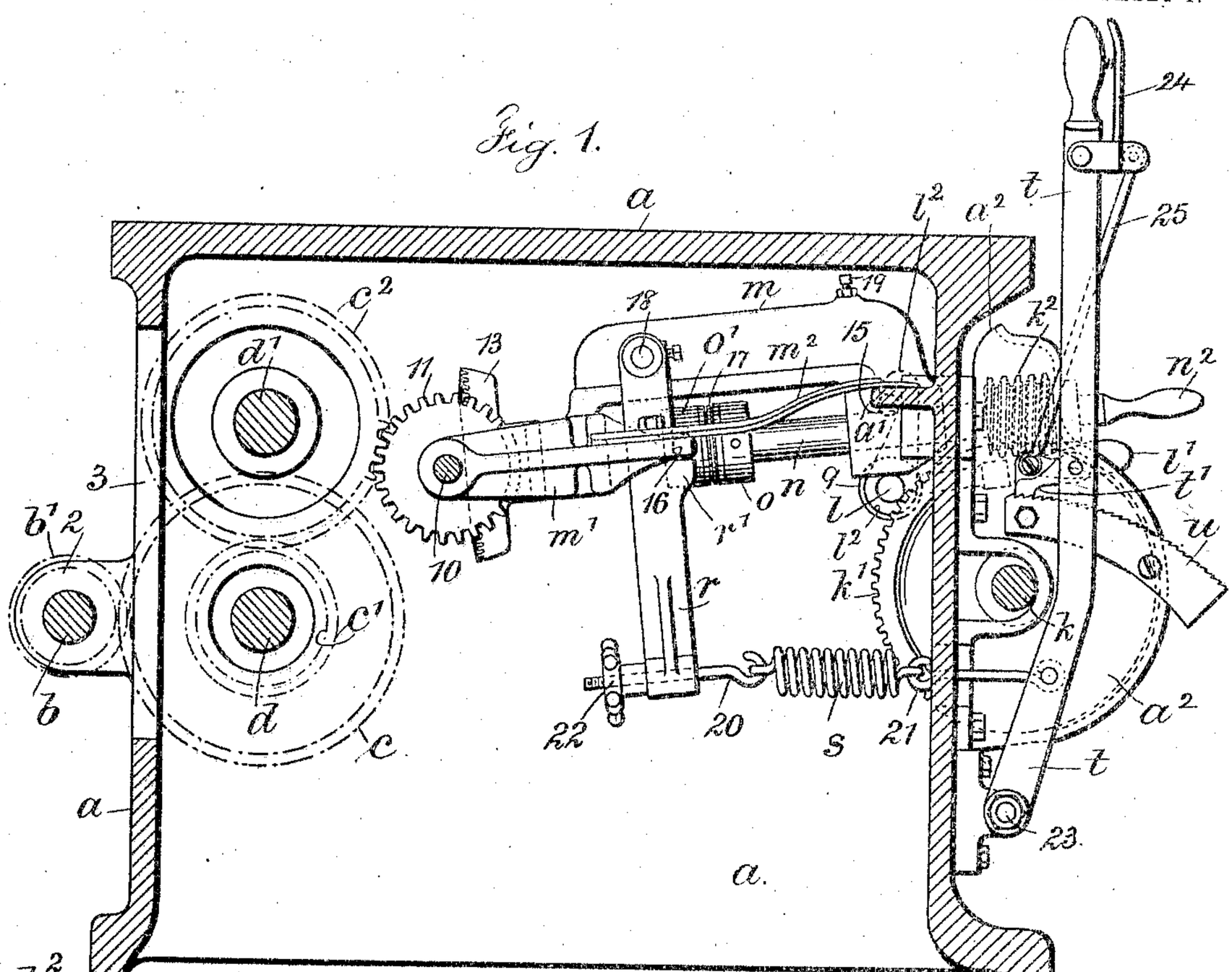

Fig. 2.

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2 SHEETS—SHEET 2.

Fig. 3.

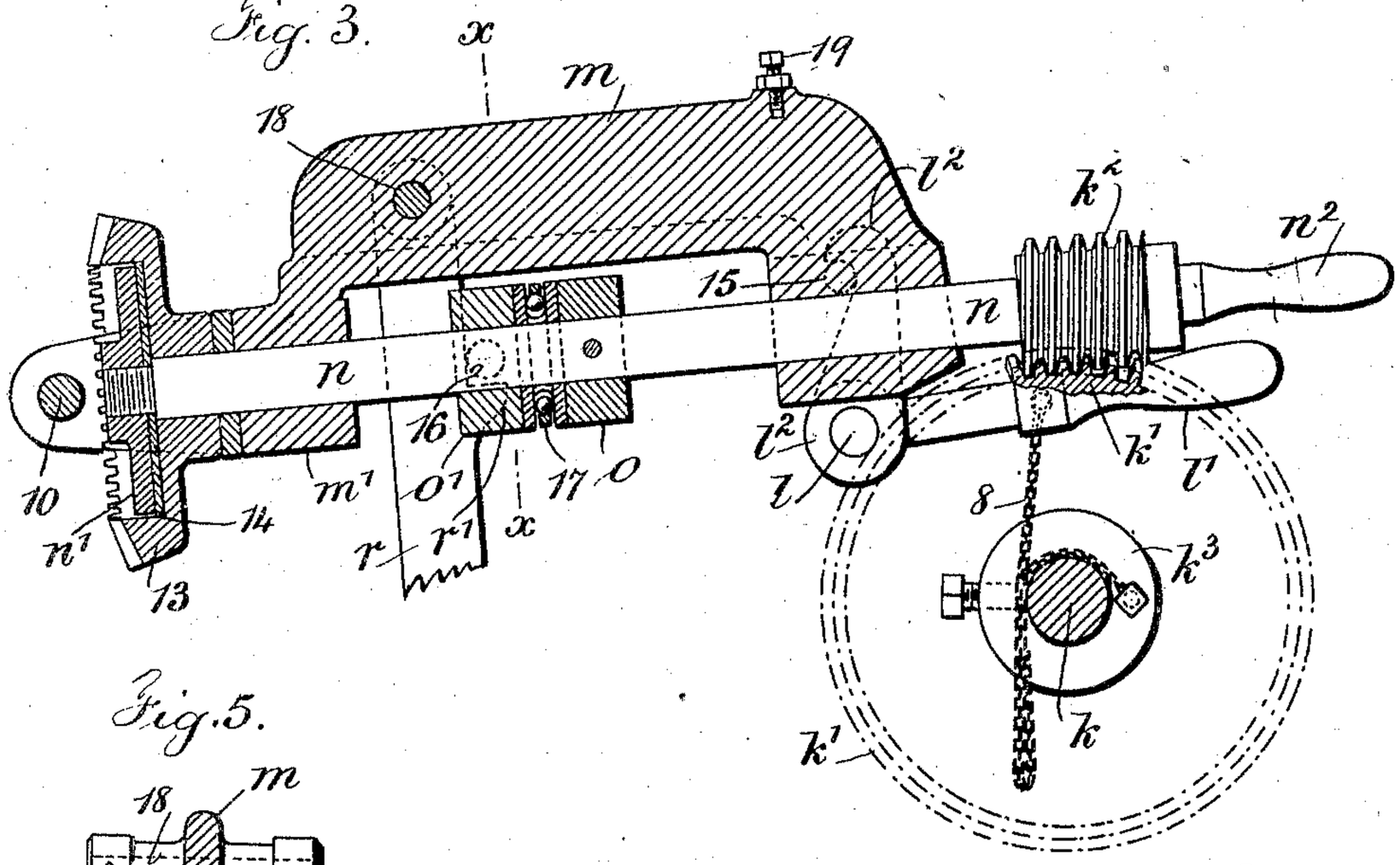


Fig. 5.

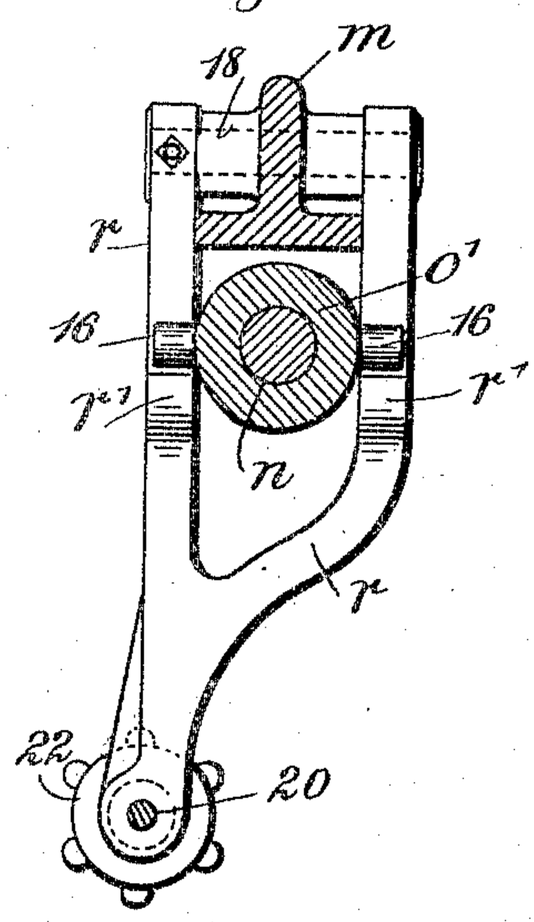
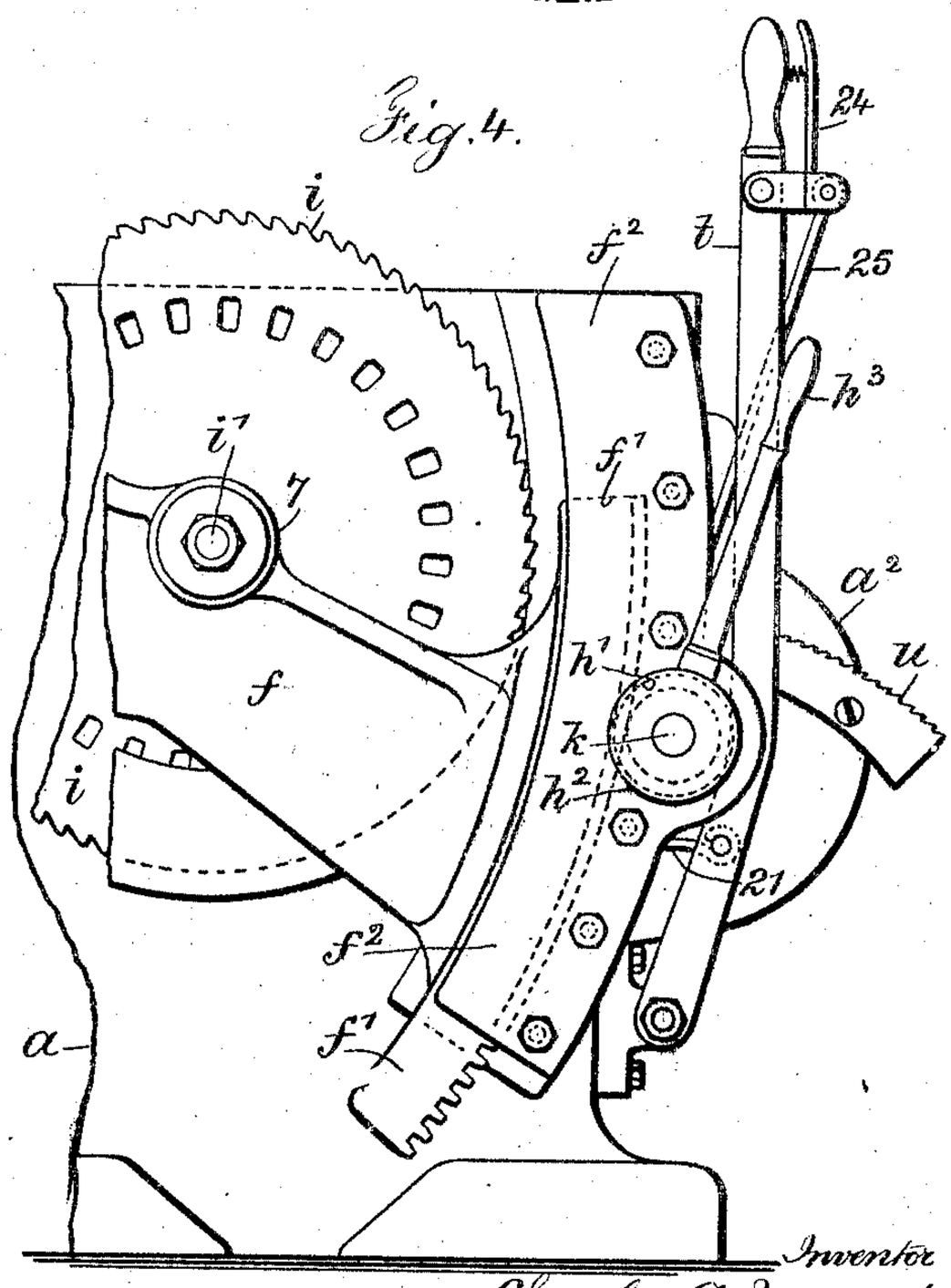


Fig. 4.



Witnesses
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UNITED STATES PATENT OFFICE.

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MACHINE FOR SAWING METAL.

No. 864,424. Specification of Letters Patent. Patented Aug. 27, 1907.

Application filed June 4, 1904. Serial No. 211,106.

To all whom it may concern:

Be it known that I, CHARLES A. JUENGST, a citizen of the United States, residing at Croton Falls, in the county of Westchester and State of New York, have invented a new and useful Improvement in Machines for Sawing Metal, of which the following is a specification.

My invention relates to the class of metal sawing machines especially adapted for small work, and the object of my improvement is the production of a regulatable frictional feed for progressively advancing the saw through the work.

I employ in combination with suitable devices of a well known construction for rotating the saw and for swinging the saw frame and saw, a manually operated device adapted to be held as set and which actuates a longitudinally movable feed shaft and applies a regulatable frictional pressure to contacting surfaces in proportion to the effort demanded of the saw in the execution of its work, and which device is adapted to yield under sudden and excessive tension to prevent injury to the saw.

In the drawing Figure 1 is a vertical approximately central section longitudinally of the frame and parts of the machine. Fig. 2 is a sectional plan about on the line of the axis of the saw. Fig. 3 is a longitudinal section through the adjustable frictional feed devices. Fig. 4 is a side elevation at the end of the saw frame and part of the feed devices and Fig. 5 is a transverse section at the dotted line $x\ x$ of Fig. 3. Figs. 3 and 5 are in larger size for clearness.

I have not herein shown or described the devices upon the bed of the machine for holding the work as clamped or for feeding the same along progressively to the saw, as the same form no part of my present invention and may be of any desired construction or character.

The frame a of the machine comprises sides, ends and a top or bed. At one end of this frame there are bearings 2 for a power shaft b and a recess 3 in the end through which gears extend and mesh. On this power shaft b there is a pinion b' and adjacent to the end of this shaft there is a pulley b^2 and a clutch lever structure b^3 adapted to operate the pulley and suitable devices usually employed in this art for coupling up the power shaft b with a prime mover. I employ a gear c in mesh with the pinion b' and secured upon a shaft d which passes across through the machine in suitable bearings provided therefor. On this shaft d is a gear c' in mesh with a gear c^2 on a shaft d' located above the shaft d in a plane parallel therewith, and also in suitable bearings in the frame of the machine. Surrounding this shaft d' on one end and in one of the said bearings is a bearing sleeve e, one end of which sleeve is threaded for a nut 4 which holds the sleeve in its position in the bearing. The saw frame f is connected to and mounted upon this bearing sleeve e, and is adapted to swing thereon.

On the end of the shaft d' there is a bevel pinion g meshing with a bevel wheel g' on the shaft h. This shaft h is in suitable bearings 5 & 6 of the saw frame, and the saw i is mounted upon an arbor i' in a bearing 7 of the saw frame. Upon the end of the shaft h there is a sprocket g^2, the teeth of which engage the apertures of the saw for revolving the same. The edge of the saw frame f distant from its connection with the shaft d' is provided with a tooth segment f' covered and protected by a case f^2 secured to the frame of the machine; and a shaft k passes through suitable bearings of the frame of the machine in the end opposite to the portion containing the shafts $d\ d'$. Upon this shaft k there is a pinion h' in mesh with the tooth segment f' of the saw frame, and a hub h^2 on the outer end which hub is provided with a handle h^3 by which the shaft may be rotated with the pinion h' so as to raise the saw and the saw frame up to the work. On the shaft k there is also a worm wheel k', and a hub k^3 on the opposite end, to which hub is connected one end of the chain 8.

In a bearing 9 in the frame of the machine there is a short shaft l on the outer end of which is a handle l' to which is secured the other end of the chain 8, while on the inner end of the shaft l there is a hook device l^2. I employ a bridge frame with a central longitudinal portion m and a yoke end m'. This is preferably an integral struction, the central portion having bearings for a shaft n and the yoke end having bearings for a short shaft 10, the respective ends of which shaft are in bearings in the machine frame. In connection with this bridge frame I employ a spring m^2 secured to the yoke portion of said frame at one end and at its other end adapted to bear upon a bracket a' of the machine frame, said spring and bracket normally supporting said bridge frame in an elevated position.

On the short shaft 10 there is a gear 11 meshing with the gear c^2 and a bevel pinion 12. On one end of the shaft n there is a hollow bevel wheel 13, while on the opposite end of said shaft there is a worm k^2 adapted when the shaft n is depressed to mesh with the worm wheel k' upon the shaft h and this shaft n preferably terminates in a handle n^2. The end of the shaft n adjacent to the hollow bevel wheel 13 is reduced and threaded, and firmly connected to this threaded end of the shaft is a friction disk n' agreeing in dimensions with the inner surface of the bevel wheel 13 and I prefer to employ a disk 14 of leather or other suitable material coming between the juxtaposed surfaces of the friction disk n' and bevel wheel 13.

The parts hereinbefore enumerated and described generally have, most of them, been heretofore employed in similar machines in this art.

The power for feeding the saw as rotated into and through the work to be cut is supplied from the power shaft b through the gears b' and c, shaft d, gears c' c^2 and shaft d' to the gear 11, bevel pinion 12, bevel wheel 13 and from this bevel wheel through the friction disk n' to the shaft n. In proportion to the frictional contact there is in evidence between the friction disk n' and the inner surface of the bevel wheel 13 the rotation of the shaft n by these devices actuates the worm k^2, the worm wheel k', shaft k, pinion h' and tooth segment f' to raise the saw frame and saw, so that it may move progressively through the work, and for the purpose of engaging the worm k^2 with the worm wheel k', the handle n^2 is grasped by the operator to depress the bridge frame against the action of the spring m^2, and when this frame is thus depressed, the handle l' is raised to bring the hook l^2 into engagement with a pin 15 on one side of the bridge frame (see Fig. 3) so as to hold down this frame and keep the worm and worm wheel in engagement.

The devices which especially compose my invention comprise the following: Upon the shaft n there are sleeves o o'. The sleeve o is pinned to the shaft and the sleeve o' is loose upon the shaft, but is provided with trunnions 16 on opposite sides. Between these sleeves and surrounding the shaft n there is an intervening anti friction ball bearing 17. The yoke frame r shown in elevation Fig. 5 is at its upper free ends pivotally mounted upon the bridge frame by a pin 18, and is adapted to swing upon said pin. This yoke frame is provided with shoulders r' coming below the trunions 16, thereby preventing the loose sleeve o' turning upon the shaft n. At the lower end of the yoke frame there is a hook rod 20 which passes through the yoke frame and is provided with an adjusting nut 22. A spring s is at one end connected to the hook rod 20, and at its other end to a second hook rod 21. A lever t is connected by a pivot 23 to a bracket secured to the end of the frame of the machine, the hook rod 21 being pivotally connected to the lever t. To this lever t is pivotally connected a pawl t' adapted to engage the teeth of the segment rack u, which rack is secured to one side of the gear case a^2 of the machine, and which case covers the worm wheel k'. A rod 25 is connected at one end to the pawl t' and at its other and upper end to the hand grip device 24 pivoted to the upper end of the lever, which, at the upper end of the lever, has a small spring for keeping the handle of the lever and the hand grip separated.

The operation of feeding the saw to and through the work is as follows, bearing in mind the fact that the hollow bevel wheel 13 is loose upon the shaft n while positively in engagement and mesh with the bevel pinion 12 connected to the gear 11, and the further fact that the gears c^2 and 11, the bevel pinion 12 and the bevel wheel 13 are continuously running. The hand of the operator engages the handle h^3 turns the shaft k and the pinion h' to raise the tooth segment f', the saw frame and saw up to the work, after which the operator moves down the bridge frame and connects the same with the hook device l^2, coupling k^2 and k'. The lever t is then grasped and pulled away from the machine straining the spring s, swinging the yoke frame r, slightly moving the shaft n longitudinally and bringing the friction disk n' into forcible contact with the bevel wheel 13, thus causing the rotation of the bevel wheel 13 to be communicated through the friction disk n' to the shaft n by the shaft n to the worm k^2, from the worm k^2 to the worm wheel k', the shaft k, pinion h' and segment f' to progressively continue the swinging movement of the saw frame and saw, advancing the saw into the work. The friction applied by this movement of the lever t between the surfaces of the bevel wheel 13 and friction disk n' is regulatable and may be increased at the pleasure of the operator in proportion as the spring s is put under tension by the outward movement of the lever t, said lever being held to the position which is drawn by the pawl t' thereof engaging the segment rack. The application of this holding friction is to be governed entirely by the character of the work to be cut and whether the metal is hard or soft, because the softer the metal the less frictional contact will be required to drive the saw, and necessarily the harder the metal, the greater frictional contact will be required to drive the saw and force the same through the metal, and it will be apparent that the hand grip 24 may be operated at a moment's notice to release the pawl t' and simultaneously move in the lever t towards the frame of the machine and relieve or entirely disconnect this friction.

The chain 8 is employed as in machines heretofore devised by me in this art for automatically disconnecting the parts at the end of the saw cut, because, as the shaft k is turned, the chain 8 is wound upon the shaft and its slack taken up, and at the time that the slack is entirely taken up it will draw down the handle n^2 and swing the latch device l^2 on the shaft l disengaging the same from the pin 15, at the moment of which disengagement the spring m^2 will come in evidence to raise the bridge frame m m' and separate the worm k^2 from the worm wheel k' and consequently stop the feed movement. The operative length of the chain 8 can be adjusted according to the extent of the cut to be made by the saw through the work.

I provide a set-screw 19 in the upper part of the bridge frame m, m' adapted when the bridge-frame is raised to come up against the under surface of the machine frame to limit the upward movement of the bridge frame so as to adjustably insure the full separation of the worm k^2 from the worm-wheel k'.

The devices herein described are adapted to yield under sudden and excessive tension to prevent injury to the saw. This is effected by the retarded movement or back lash of the saw in hard material lessening the speed of rotation of the shaft k and worm-wheel k' against the forward motion or advancing action of the shaft n and worm k^2 in which the said shaft n and worm k^2 travel faster than the worm-wheel k' is driven, causing a backward or unscrewing movement to the shaft n, against the tension of the spring s, consequently a separation of the friction surfaces of the wheel 13 and friction-wheel n' and an arrested movement of said parts.

I claim as my invention

1. In a machine for sawing metal and in combination, a saw carriage, a feed shaft therefor adapted for longitudinal movement, a worm secured to said shaft and suitable devices connecting the worm with the saw carriage, a friction clutch driving mechanism on said shaft adapted to be clutched or un-clutched by the longitudinal move-

ment of said shaft, a hand lever, devices extending therefrom and connecting the lever to the said shaft for effecting its longitudinal movement, a member of which has a yielding function and a regulatable device for holding the lever as set in the desired position.

2. In a feed mechanism including a carriage, a longitudinally movable shaft and a worm secured thereto, suitable devices connecting the worm with the said carriage, a pivoted frame in which the shaft is journaled and longitudinally slidable, by which it is supported, a gear loose on the shaft and bearing against the frame, driving gear in mesh with said loose gear, a friction clutch element secured to the shaft and arranged to engage one face of the loose gear and a tension device arranged to hold the last named elements in engagement.

3. In a machine for sawing metal, the combination with a revoluble and longitudinally movable shaft, means for rotating the saw and means for swinging the saw frame and saw, of devices connecting the revoluble shaft with the latter means, a longitudinally movable and frictional device upon the revoluble shaft connecting the same with the devices supplying power, a manually operated lever device, means for holding the same in position as set, and means operated thereby for longitudinally moving said shaft.

4. In a machine for sawing metal, the combination with a revoluble and longitudinally movable shaft, a saw frame, a saw, and means for swinging the saw frame and saw, of devices including a frictional contact, a shaft and other co-related devices connecting the revoluble shaft with the means for swinging the saw frame and saw, a swinging yoke frame, a pivoted hand operated lever, a yielding connection between the lever and the free end of the yoke frame, means for holding the hand lever in the position to which it is moved and means associated with the yoke frame and said shaft for imparting to the shaft a longitudinal movement with the movement of said hand lever.

5. In a machine for sawing metal, the combination with a revoluble and longitudinally movable shaft, a saw frame, a saw and means for swinging the saw frame and saw, of devices including a frictional contact, a shaft and other co-related devices connecting the revoluble shaft with the means for swinging the saw frame and saw, a swinging yoke frame, a pivoted hand operated lever, a yielding connection between the lever and the free end of the yoke frame, means for holding the hand lever in the position to which it is moved, a fast and loose sleeve upon said latter shaft, an anti friction ball bearing between the sleeves, trunnions upon the loose sleeve, shoulders upon the yoke frame coming beneath the trunnions, whereby with the movement of the hand lever and the yoke frame pressure is applied by the loose sleeve and ball bearings to the fast sleeve to move said shaft longitudinally and apply the necessary operative friction.

6. In a machine for sawing metal, the combination with a bridge frame comprising a central longitudinal portion and a yoke portion, of a shaft upon which the bridge frame is mounted, a shaft n passing longitudinally through the bridge frame, gears and friction devices for rotating said shaft, a yoke frame r pivoted to the bridge frame, shoulders r' upon said yoke frame, a hand lever t, a spring and hook rods connecting and extending between the free end of the yoke frame and the hand lever, a pawl device and segment gear for locking the hand lever in position, a fast sleeve o and a loose sleeve o' upon the shaft n, trunnions 16 upon the loose sleeve o' coming above the shoulders r' of the yoke frame and a ball bearing surrounding the shaft n between the two sleeves, substantially as specified.

7. In a machine for sawing metal, the combination with a revoluble shaft, of a bridge frame with longitudinal bearings therein for said shaft, means for pivoting said frame to the frame of the machine, a worm k^2 on the free end of said shaft, a shaft k placed transversely to the aforesaid shaft and a wormwheel k' on said shaft with which the worm k^2 may be brought into mesh, a hub upon the shaft k, a shaft l, a handle and a hook mounted upon said shaft, a pin 15 on the bridge frame m adapted to be engaged by said hook, and a chain 8 connecting the aforesaid handle with the hub on the shaft k.

8. In a machine for sawing metal, the combination with a revoluble shaft, of a bridge frame with longitudinal bearings therein for said shaft, means for pivoting said frame to the frame of the machine, a worm k^2 on the free end of said longitudinally movable shaft, a shaft k placed transversely to the aforesaid shaft, a worm-wheel k' on said shaft with which the worm k^2 may be brought into mesh, a pinion h' on the shaft k, a hub h^2 and handle h^3 also on the same shaft, a toothed segment f' meshing with the pinion h' and a saw frame f supporting the saw and connected to said toothed segment, said parts operating to initially and then progressively move the saw frame and saw.

9. In a machine for sawing metal, the combination with a longitudinally movable shaft, a clutch operatively effected thereby, and a bridge frame having central longitudinal bearings in which said shaft is journaled, of a yoke frame r and pivot 18 connecting the same with said bridge frame, a lever t pivoted to the frame of the machine, a tension spring s, and means connecting the same to the lever and yoke frame, and a device for locking the said lever in the position to which it may be manually placed.

10. In a machine for sawing metal, the combination with a longitudinally movable shaft, a clutch operatively effected thereby, and a bridge frame having central longitudinal bearings in which said shaft is journaled, of a yoke frame r and pivot 18 connecting the same with said bridge frame, a lever t pivoted to the frame of the machine, a tension spring s, means connecting the same to the lever and yoke frame, a segment rack u connected to the frame of the machine, a pawl pivoted to the said lever, a spring actuated hand grip and a rod therefrom to said pawl, substantially as set forth.

11. In a metal sawing machine, the combination with an inclosing frame, a shaft and inclosed pivoted swinging frame in which said shaft is journaled, of a pin on the side of said swinging frame, a shaft journaled in the frame of the machine and extending within and outside of said frame, a hook mounted on said shaft within the frame for engaging said pin and holding down the pivoted frame, and a handle also on the journaled shaft and outside the frame for swinging said shaft and moving the hook away from engagement with the pin.

12. In a metal sawing machine, the combination with a shaft and a pivoted swinging frame in which said shaft is journaled, of a pin on the side of said frame, a shaft journaled in the frame of the machine, a hook for engaging said pin and holding down the pivoted frame, a handle for moving the hook, a shaft k, an adjustable collar thereon and a chain at its ends connected respectively to the said handle and collar.

13. In a metal sawing machine, the combination with a shaft and a pivoted swinging frame in which said shaft is journaled, of a bracket a' on the frame of the machine, a spring m^2 secured at one end to the said swinging frame and at its other end resting on said bracket to maintain the initial position of the frame and shaft and means for holding said frame and shaft in an opposite position against said spring.

Signed by me this 12th day of May, 1904.

CHAS. A. JUENGST.

Witnesses:
GEO. T. PINCKNEY.
S. T. HAVILAND.