R. L. MUIR.

ENDLESS CHAIN SAW.

APPLICATION FILED NOV. 11, 1910.

1,123,783.

Patented Jan. 5, 1915.

3 SHEETS—SHEET 1.

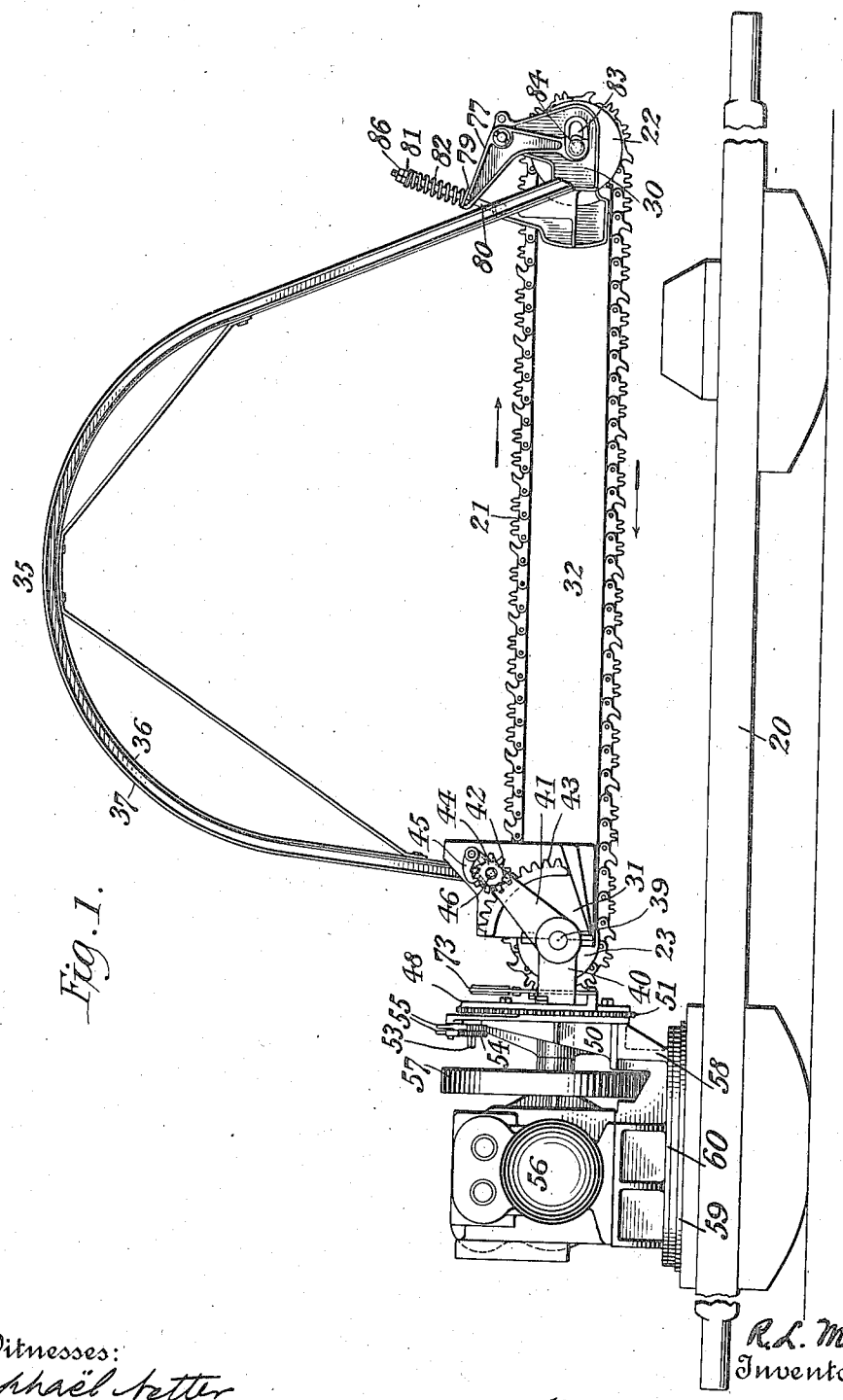



Fig. 1.

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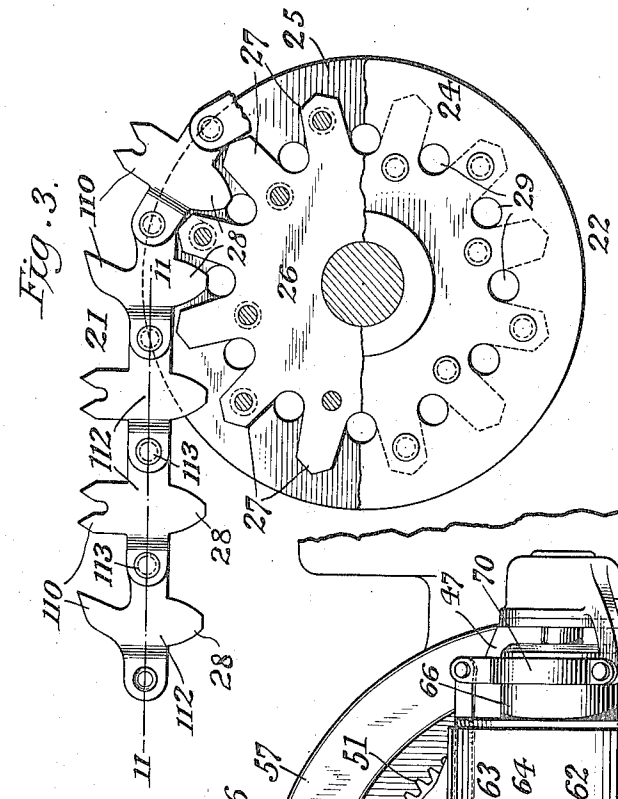


Fig. 3.

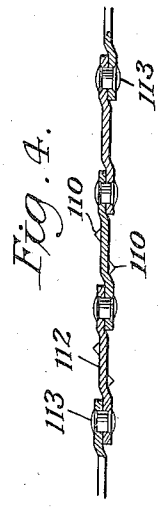


Fig. 4.

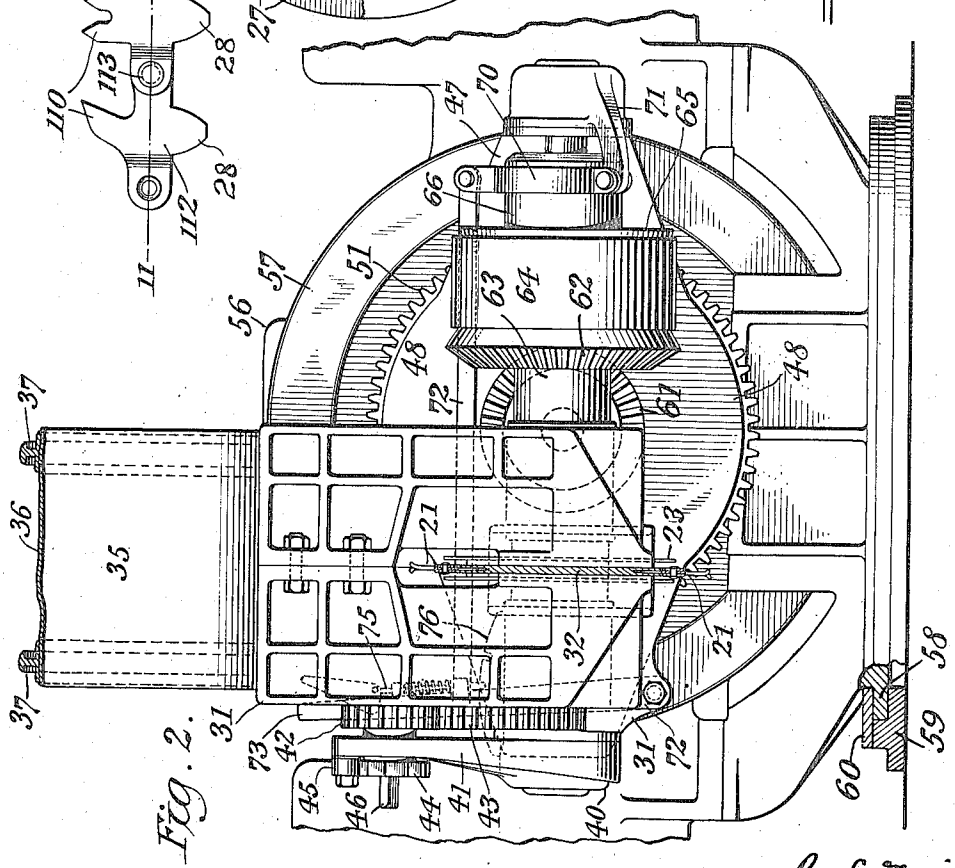


Fig. 2.

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3 SHEETS—SHEET 3.

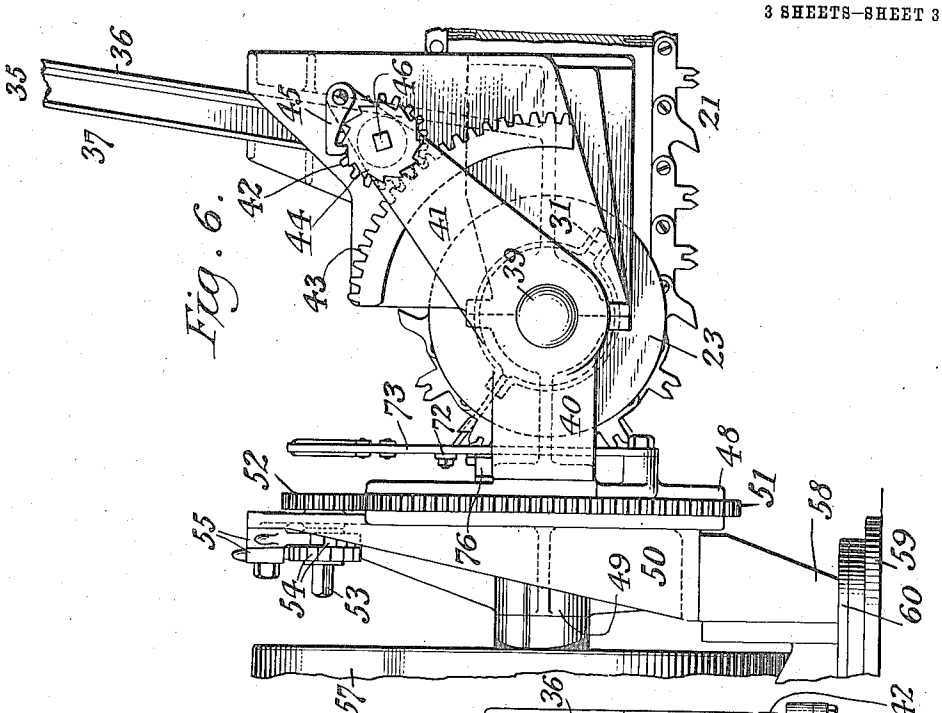


Fig. 6.

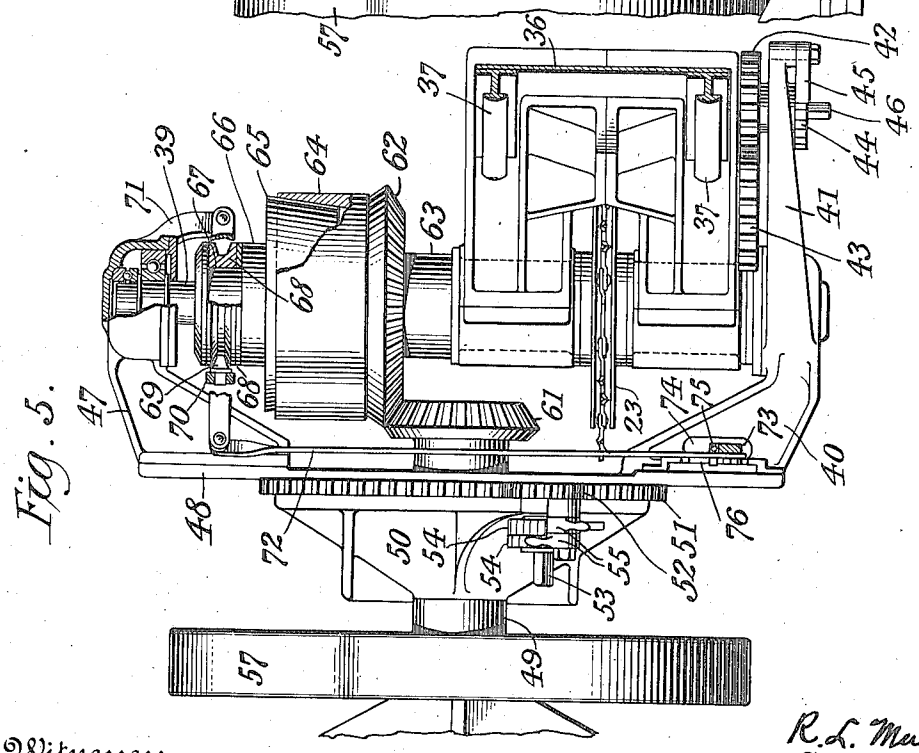


Fig. 5.

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# UNITED STATES PATENT OFFICE.

REGINALD LUCKOCK MUIR, OF SAN FRANCISCO, CALIFORNIA.

## ENDLESS CHAIN SAW.

1,123,783. Specification of Letters Patent. Patented Jan. 5, 1915.

Application filed November 11, 1910. Serial No. 591,822.

*To all whom it may concern:*

Be it known that I, REGINALD LUCKOCK MUIR, a citizen of the United States, residing at the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Endless Chain Saws, of which the following is a full, clear, and exact description.

This invention relates to sawing machines, more particularly "endless chain" saws, for wood, stone, ice, metal, etc. In saws of this type the teeth are carried by the links of a chain passing over sprocket wheels mounted in a suitable supporting frame. One or another of these sprockets is driven by a suitable motor, thereby causing the flexible chain-saw to travel at the desired speed over the sprockets.

One of the chief objects of the invention is to provide an improved mounting for saws of this kind, the mounting which I have devised being preferably "universal," that is, capable of such adjustment as to enable the saw to operate in practically any plane and at any desired angle.

To this and other ends the invention consists of the novel features of construction, arrangements of parts, and combinations of elements described hereinafter.

Of the various embodiments of which the invention is capable I have selected for illustration and specific description herein the structure which at the present time I consider to exhibit the different features of the invention in their most convenient and effective form. The structure referred to is illustrated in the accompanying drawings, in which—

Figure 1 is a side view of the complete machine. Fig. 2 is a front view of the universal mounting, the saw, saw-frame, and the carrier which supports the saw-frame being shown in cross section. Fig. 3 is a detail view of one of the sprockets over which the endless chain saw runs. Fig. 4 is a detail view, in longitudinal section, of a portion of the endless chain saw. Fig. 5 is a detail plan view of the universal mounting, showing also the clutch through which the power of the driving motor is transmitted to the driving sprocket. Fig. 6 is a detail side view of the universal mounting, showing also the mechanism provided for raising and lowering the saw frame on the shaft of the driving sprocket as a pivot.

The machine illustrated is of the portable type and is accordingly mounted on a suitable sled or carrying frame 20, and for the same reason the metal parts, so far as practicable, are made of some light metal, such as aluminum or an alloy thereof.

The endless chain saw 21 runs over a pair of sprocket wheels 22, 23, each comprising a pair of concentric guide disks 24, 25, (Fig. 3) spaced apart by an intermediate sprocket disk 26, the three being securely riveted together. The sprocket disk is provided with teeth 27, between which fit the inwardly extending lugs 28 on the chain saw as the latter travels. At the base of the depressions or notches between the sprocket teeth the guide disks are provided with apertures 29, to facilitate cleaning.

The sprockets are mounted in suitable bearing members 30, 31, at the ends of the long, narrow saw-frame 32, each of said members being composed of two parts firmly secured to the saw-frame or guide on opposite sides thereof. This frame preferably consists of a stiff plate having deep grooves 33, 34, in which the lugs 28, on the chain links, slide as the saw travels, the thickness of the plate being slightly less than the width of the cut made by the saw, which width is determined by the thickness of the saw teeth and the amount of their "set," as will be readily understood. Suitable means being provided for driving one of the sprocket wheels, it will be seen that the chain saw will travel in the plane of the frame and sprockets, being effectively guided by the frame. The latter also serves to keep the links, and hence the teeth, of the lower or working reach in proper alinement.

The ends of the saw-frame 32 are secured to the bearing members 30, 31, which are connected by an arched frame or bow 35 to give greater strength and rigidity and permit the saw to sink into the work as the cutting proceeds, the frame being composed of a long narrow plate 36 bent to form and strongly reinforced at its edges by longitudinal chords 37 resembling T-rails in cross section. The holes in the bearing members 30 through which the rivets, bolts, or screws pass to fasten said plate to the members 30, 31, are preferably slight elongated and curved, as shown at 38, so as to permit slight adjustment of the parts to bring them accurately to the desired alinement before being fastened.

The shaft 39, on which the inner sprocket

23 is mounted, passes through a bracket 40, so that the saw can be raised and lowered about the axis of said shaft as a pivot. For this purpose the bracket 40 is provided with an upwardly and forwardly inclined rigid arm 41, carrying at its forward or upper end a pinion 42 meshing with an arc-shaped rack 43 on the bearing member 31. The pinion shaft carries a ratchet 44, controlled by a pawl 45 mounted on said arm. It will therefore be seen that by rotating the pinion, as by means of a suitable crank applied to the squared end 46 of said shaft, the saw can be given a pivotal adjustment about the axis of shaft 39, and can be locked in any desired position of adjustment by the ratchet and pawl 44, 45.

The bracket 40, and a similar bracket 47 on the other side of the saw, are mounted on or formed integrally with a plate 48 rotatably mounted on the engine shaft, passing through an upright supporting member or standard 50. Fixed to the plate 48 is a gear 51, meshing with a pinion 52 mounted in the said standard, and on the pinion shaft 53 is a pair of ratchets 54, having their teeth oppositely directed, and coöperating with the oppositely extending arms of a double pawl 55. Hence, by means of a crank applied to the squared end of the pinion shaft the saw can be adjusted pivotally about the axis of the engine shaft, so as to cut in a plane at any desired angle to the horizontal.

For the purpose of driving the saw any suitable motor may be used, for example an explosion engine, as indicated at 56, the flywheel of which is shown at 57. This engine is supported on a suitable turn-table comprising the circular base plate 58, (which carries the standard 50), rotatably mounted in a base 59 and held therein by a removable ring 60, so that the entire apparatus can be turned in a horizontal plane through any desired angle.

From the foregoing description it will be seen that the mounting illustrated is universally adjustable, so that the machine can be used to cut standing timber, in which case the saw is adjusted about the engine shaft as a pivot, making the cutting plane horizontal or placing it at any desired angle thereto, or to cut felled timber, in which case the cutting plane will ordinarily be approximately vertical but may take any angle thereto, as may be required to cut square across. In any case the machine can be swung around on its swivel base, to bring the saw to the work, as may be necessary or desired. When the cutting plane is vertical or approximately so the weight of the saw and the parts immediately associated therewith feeds the saw into the work. In cutting in a horizontal plane the saw can be fed into the work by pressure on the bow 35 or other convenient part, as will be readily understood.

The endless chain saw is driven by the engine 56, through the following instrumentalities: The engine shaft is provided at its end with a bevel gear 61, meshing with a bevel gear 62 fixed to a sleeve 63 which is rotatable on the sprocket wheel shaft 39, so that said sleeve will be continuously driven so long as the engine is running. The gear 62 is rigidly connected to the female element 64 of a suitable friction clutch, of which the male element, 65, is feathered, or otherwise suitably mounted, on the shaft 39 so as to rotate therewith but at the same time be capable of axial movement with respect to the element 64. It will therefore be seen that when the two clutch elements are engaged the sleeve 63 becomes in effect an integral part of the shaft 39, thereby causing the said shaft to rotate with the gear 62. The sprocket wheel 23, which is rigidly mounted on the shaft named, is thus driven, and with it the endless chain. For the purpose of shifting the clutch element 65 into and out of engagement with the other, the hub 66 of the first named member is provided with a circumferential groove 67 in which is fitted a grooved annulus 68, engaged by one or more studs 69 on a ring-shaped lever 70, fulcrumed in an arm 71 on the bracket 47. This ring-shaped lever is connected to one end of a transversely extending link 72, the other end of which is connected to a hand lever 73, fulcrumed at its lower end on the plate 48 and extending upwardly through a slot 74 in the bracket 40. This lever is provided with the usual locking bolt 75, coöperating with notched segment 76, so that the lever can be locked with the clutch elements engaged or disengaged.

It is to be noted that means is provided for keeping the saw chain at a suitable tension, thereby increasing its efficiency. The tension means herein shown comprises a bell crank lever fulcrumed on top of the bearing member and composed of two parts 77, 78, connected at the rear end by a cross plate 79. Extending through this cross plate or abutment is a rod or stem 80, pivotally connected at its lower end to the top of the bearing member 30, and on the threaded upper end of the stem is a nut 81 against which one end of a coil spring 82 bears, the other end of the spring being seated on the plate 79. By means of the nut 81 the tension of the spring can be regulated, to vary the force with which it presses downwardly on the rearwardly extending arm of the lever. The lower arms of the lever are formed with forwardly open recesses 83, embracing the projecting ends of the shaft 84 on which the sprocket 22 is mounted. This shaft extends through horizontal slots 85 in

the member 30, and it will therefore be seen that the effect of the coil spring is to urge the shaft and the sprocket yieldingly outward or forward, thereby putting the chain saw unler tension, the force of which tension is determined by the adjustment of the nut 81 on the stem 80. When this nut is properly adjusted it is secured in position by a lock nut 86.

In the chain illustrated in Figs. 1, 3 and 4, the teeth 110 and lugs 28 are integral with the links 112, and are formed preferably by stamping out of sheet metal. The ends of the links are offset, as shown in Fig. 4, and are pivotally connected by rivets 113, the teeth having sufficient "set" to make the cut wide enough to admit the rivets and the saw frame as the cutting proceeds.

The operation of the various parts and mechanisms having already been described, further explanation thereof is deemed unnecessary. In cross-cutting felled timber the skid 20 is preferably placed parallel to the log or stick, in which case the saw is swung on the turn-table to a plane at right angles to the plane of Fig. 1. This position enables the saw, in operation, to sink well below the horizontal without striking any part of the skid. The travel of the saw is in the direction of the arrows in Fig. 1, and hence it tends to pull the log toward the machine, against the skid or other suitable stop, making it unnecessary to employ holding dogs or other devices as in sawing machines of other types. Moreover, the saw is fed into the work, by its own weight when cutting felled timber, so that in no case is it necessary to provide work-feeding devices.

The apparatus herein specifically illustrated is thoroughly effective in practice, and is the form preferred, but it is to be understood that the invention is capable of other embodiments without departure from its proper spirit and scope as defined by the appended claims.

I claim:

1. The combination of a supporting standard, a driving shaft extending therethrough, a supporting plate rotatably adjustable on the driving shaft, a gear loose on the shaft between the standard and the supporting plate and fixed to the latter, a pinion mounted on the standard and meshing with the gear to rotatively adjust the gear and the plate, means for locking the pinion against rotation with the plate in any position of adjustment, and a saw carried by said plate and connected with the said shaft for actuation thereby.

2. The combination of a driving shaft, a supporting plate 48 rotatively adjustable thereon, forwardly extending arms 40, 47, extending forwardly from said plate on opposite sides of the shaft, a transverse shaft 39 journaled in the arms, a saw-frame pivotally mounted by one end on the transverse shaft, an arc-shaped rack 43 concentric with the transverse shaft and carried by the saw-frame adjacent to the arm 47, a pinion 42 journaled in the last-named arm and meshing with said rack to adjust the same and the saw frame rotatively about the axis of the transverse shaft, and a saw carried by the saw frame and driven from the driving shaft.

3. The combination of driving shaft having a bevel pinion on its forward end, a supporting plate rotatively adjustable on the shaft in rear of the pinion, supporting arms extending forwardly from the shaft on opposite sides of the pinion, a short transverse shaft journaled in the arms, an axially movable clutch 65 on the transverse shaft next to one of said arms, an axially stationary sleeve 63 rotatable on the transverse shaft, a bevel gear 62 fixed to one end of the sleeve and meshing with the bevel pinion on the driving shaft, a clutch element 64 fixed to said bevel gear for coöperation with the first named clutch element, a rotary saw-driving device fixed to the transverse shaft between the sleeve and the other supporting arm, and a saw-supporting member pivotally mounted on the transverse shaft and straddling the said saw-driving device.

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

REGINALD LUCKOCK MUIR.

Witnesses:
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S. S. DUNHAM.