March 25, 1958 L. M. STRUNK 2,827,932

CHAIN SAW CONSTRUCTION

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Fig. 1

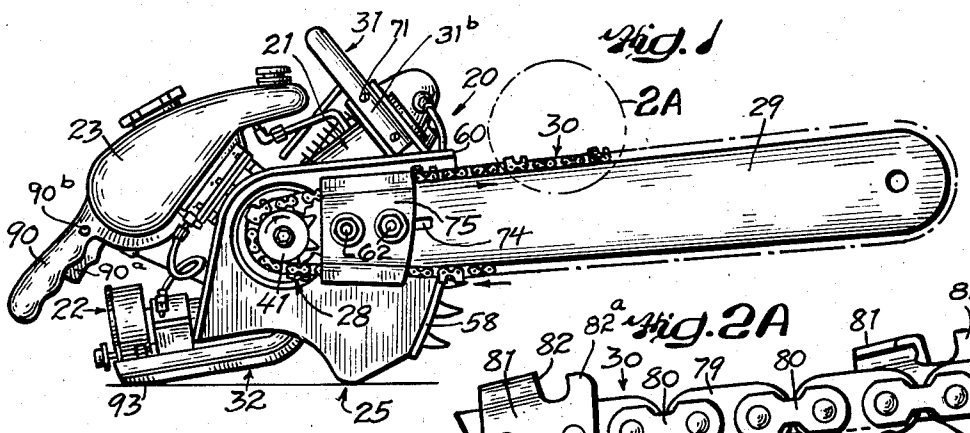


Fig. 2A

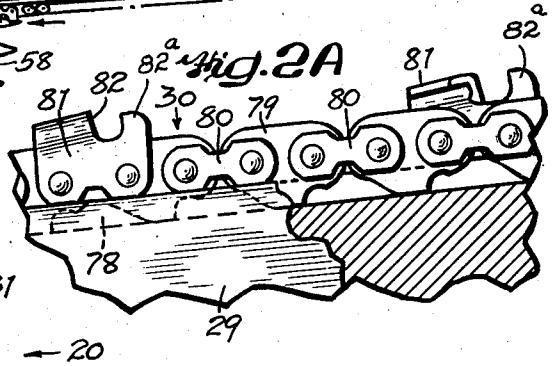


Fig. 2.

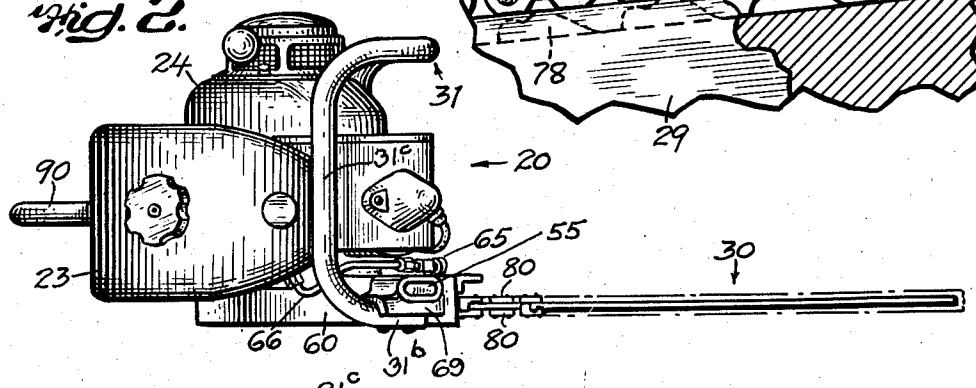
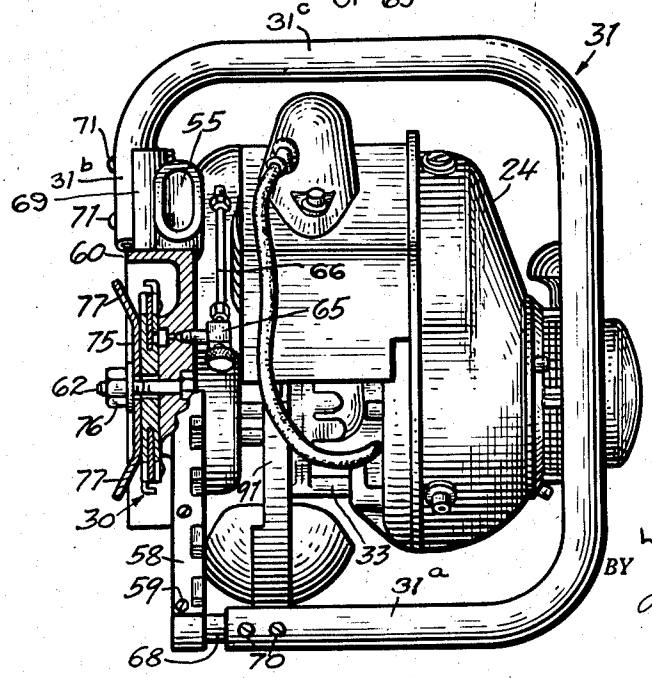


Fig. 3.



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CHAIN SAW CONSTRUCTION

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Fig. 4.

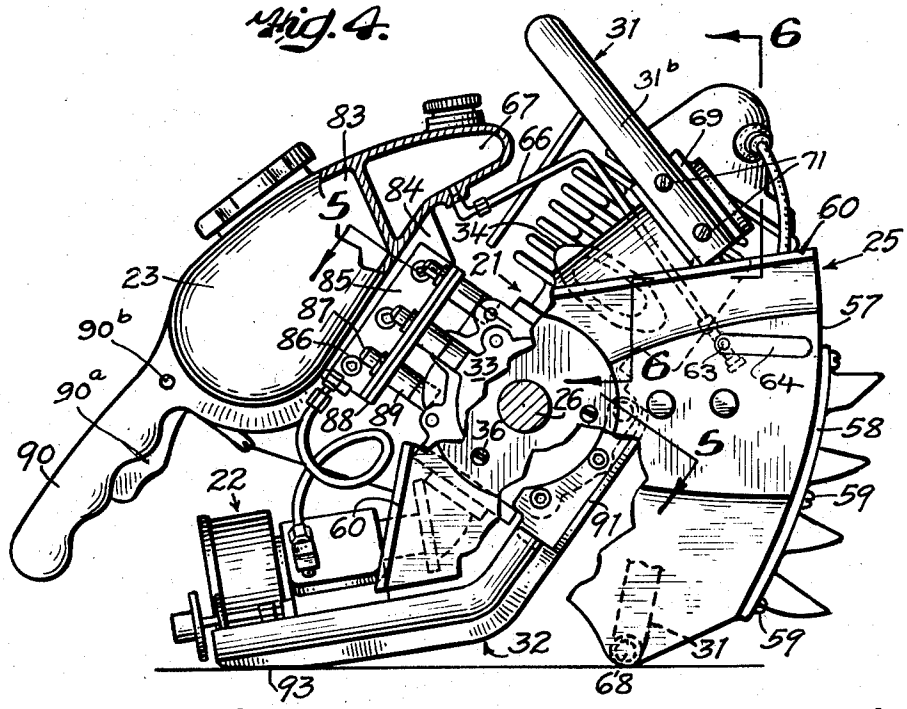


Fig. 5.

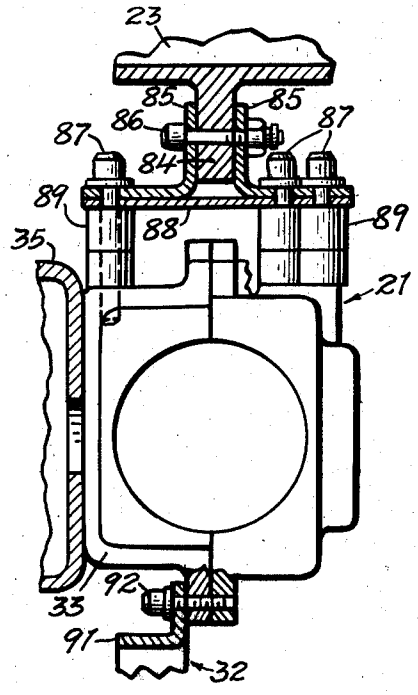
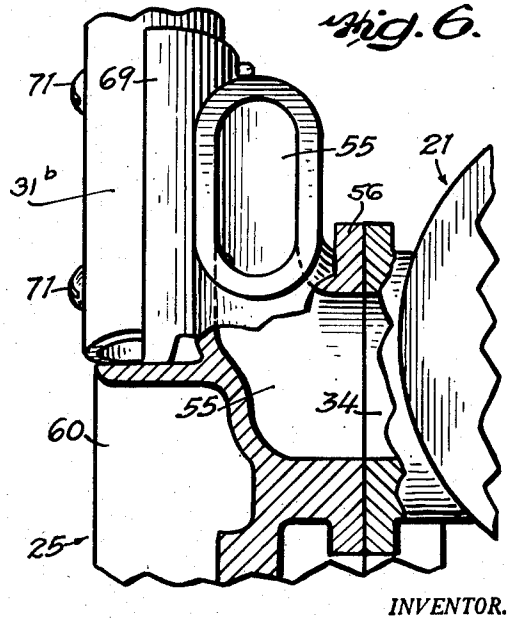


Fig. 6.



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Fig. 7.

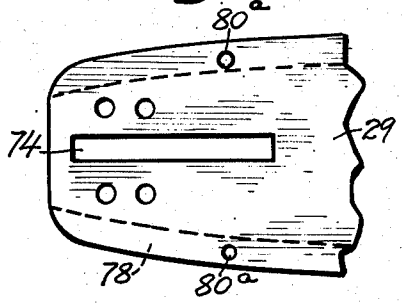


Fig. 8.

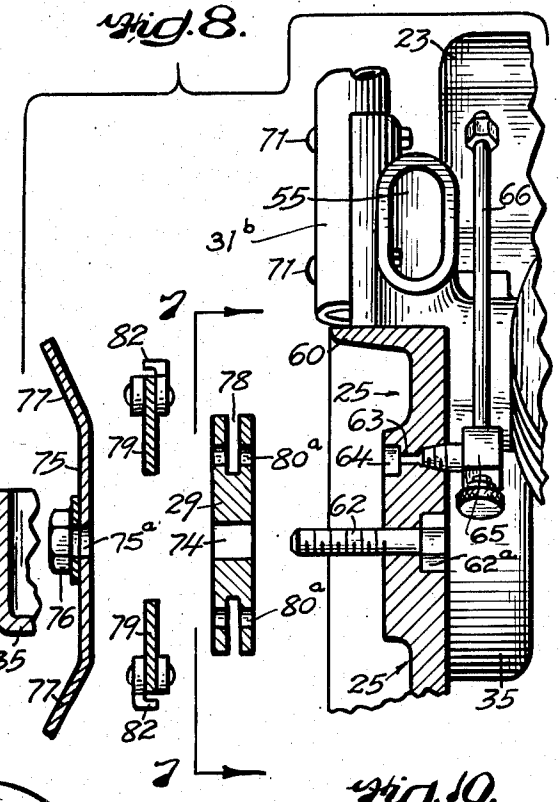


Fig. 11

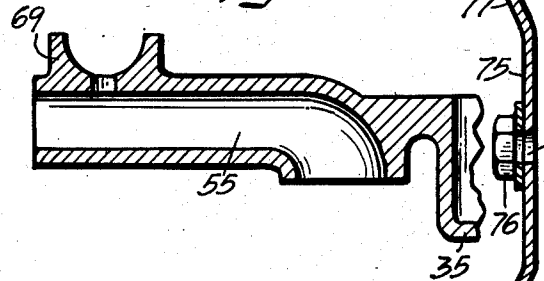


Fig. 9.

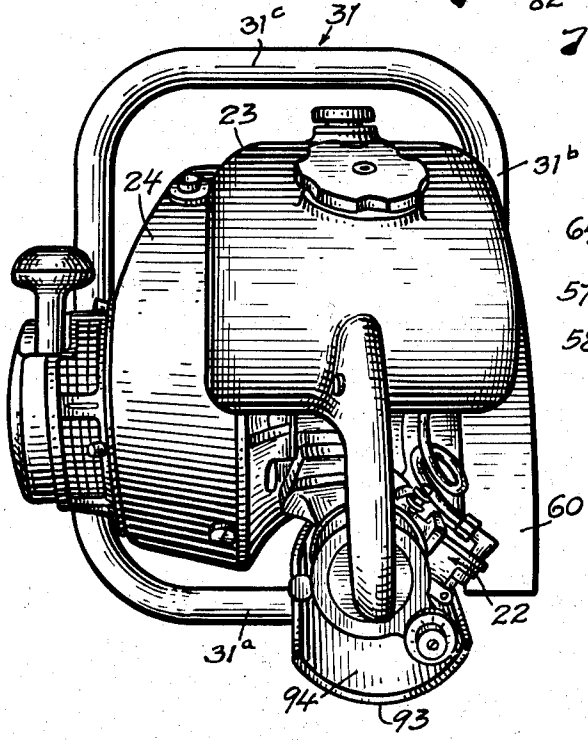
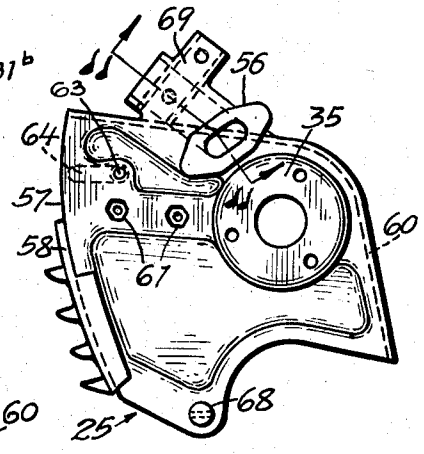


Fig. 10.



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CHAIN SAW CONSTRUCTION

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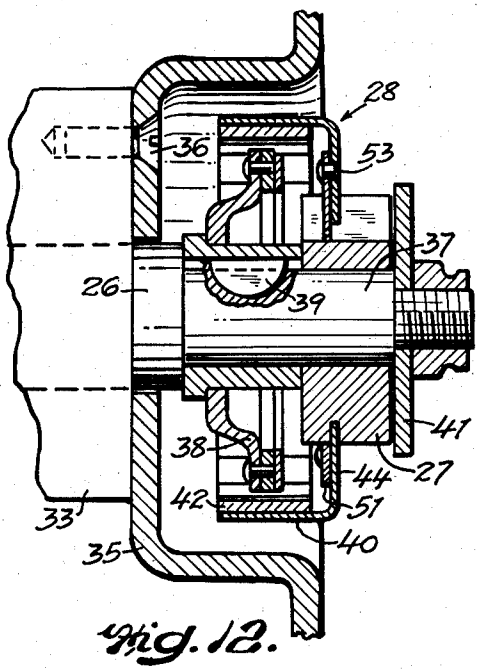


Fig. 12.

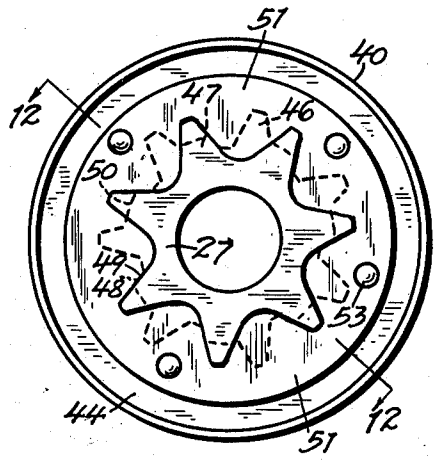


Fig. 13.

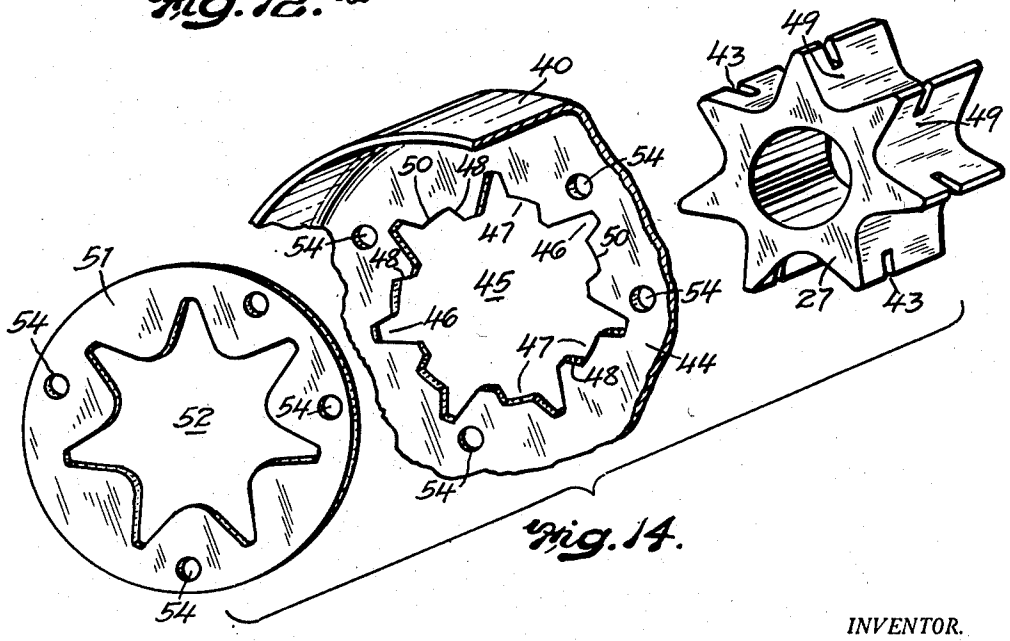


Fig. 14.

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CHAIN SAW CONSTRUCTION

Leonard M. Strunk, Coatesville, Pa.

Application September 2, 1954, Serial No. 453,811

7 Claims. (Cl. 143—32)

The present invention relates generally to power-driven hand-supported chain saws used primarily for felling and bucking trees and is more particularly concerned with an improved construction and mode of operation affording certain functional advantages.

It is among the principal objects of the invention to provide a direct-drive internal-combustion-engine-powered hand-supported chain saw wherein the chain driving sprocket is adapted to be driven at full engine speed, as distinguished from saws having gear reduction drives wherein the chain-driving sprocket is rotated at less than engine speed.

Another important object of the invention is to provide a direct drive saw as above set forth wherein the chain driving sprocket and the operating clutch therefor are operatively disposed in novel manner and wherein the driven part of the clutch is effectively secured to the sprocket.

A further object of the invention is to provide a direct drive saw as above set forth having a side frame casting of such formation and so disposed relatively to the engine block that the saw is of simpler and more rugged construction, is lighter, is of reduced width, has less operating parts and is better able to withstand the constant pounding action to which these saws are subjected when in operation.

It is a further object of the invention to provide a cutting chain for use with a direct drive power saw wherein the cutter teeth are spaced in a particular manner to provide for maximum cutting power and speed with minimum load on the cutter chain and its driving engine.

It is a still further object of the invention to provide a side frame casting for a power saw having certain functional advantages in connection with the engine exhaust; the saw handle; the chain guide plate; the sprocket operating clutch; the lubrication of the cutting chain; and the work bumper bracket.

It is an additional object of the invention to provide a novel mounting for a compartmented fuel and oil tank and for a rear supporting third leg, the latter being adapted to protect the engine carburetor from dirt and chips and the like.

Still another and important object of the present invention is to provide an improved and more effective securement of the chain-driving sprocket to the driven member of a centrifugal clutch which is operatively associated with the engine and which insures efficient and maximum power-delivering operation of the saw when the speed of the operating engine is at or above a predeterminedly established minimum, below which minimum speed of engine operation the clutch is ineffective to operate the cutting chain.

Other objects and advantages of the invention, such as those relating to details of design and construction to provide for most efficient operation of the saw as well as to provide for most economical manufacture thereof, will appear more fully hereinafter, it being understood that the present invention consists substantially in the combination, construction, location and relative arrangement of parts, all as described in detail in the following specification, as shown in the drawings and as finally pointed out in the appended claims.

In the accompanying drawings, which are illustrative of a preferred construction of chain saw embodying the principles of the present invention:

Figure 1 is a side elevational view of the saw showing the cutting chain side thereof;

Figure 2 is a plan view of the saw shown in Figure 1;

Figure 2A is an enlarged side elevational view of that portion of the chain and chain guide plate encircled by the dot and dash line circle A2 of Figure 1 with the chain guide plate partly broken away to show the particular spacing of the cutter teeth;

Figure 3 is a front elevational view of the saw with the improved side frame casting and associated parts in section showing the arrangement for lubricating the chain;

Figure 4 is an enlarged side elevational view, partly broken away and partly in section, of the cutting chain side of the saw, showing certain of its constructional features;

Figure 5 is a cross sectional view through the engine body showing the crankcase mounting for the compartmented fuel and oil tank and for the third leg, as taken on the line 5—5 of Figure 4;

Figure 6 is an enlarged cross sectional view through the side frame casting and a portion of the cylinder block showing the frame exhaust passage for the engine exhaust fumes, as taken on the line 6—6 of Figure 4;

Figure 7 is a side elevational view of the rear portion of the chain guide plate showing the chain lubricating oil feed holes, as taken on the line 7—7 of Figure 8;

Figure 8 is an exploded view showing the relative disposition of the side frame casting, the chain guide plate, the chain and the plate locking member, wherein the parts are sectioned as in Figure 3;

Figure 9 is a rear elevational view of the chain saw showing the cradle-like formation of the third leg and the protective disposition of the carburetor therein;

Figure 10 is a side elevational view of the inner face of the side frame casting showing, among other features, the exhaust passage for the engine fumes and the handle supports, all integrally formed in said casting;

Figure 11 is a cross sectional view through the exhaust passage of the side frame casting, as taken on the line 11—11 of Figure 10;

Figure 12 is a cross sectional view through the engine power shaft and the coaxial shaft-mounted centrifugal clutch and chain sprocket, showing particularly the manner of securing the driven drum portion of the clutch to the chain driving sprocket, the drum and sprocket being illustrated as taken on the line 12—12 of Figure 13;

Figure 13 is an interior view of the drum portion of the clutch, showing the chain-driving sprocket secured in unitary assembly with the driven drum of the clutch by means of a locking disk; and

Figure 14 is an exploded view showing the relative disposition of the component parts of the clutch drum and sprocket assembly unit.

The power saw of the present invention, being directly driven by the internal combustion engine, eliminates the reduction gearing of geared saws and the space occupied thereby and thus permits the side frame casting, upon which the projecting chain guide plate is mounted, to be secured directly to the engine body so that the chain saw, generally designated 20, is lighter in weight, is of smaller overall size and is of more rugged construction than conventional saws of comparable capacity. Referring more particularly to Figures 1, 2, 3, and 9 of the drawings, it will be observed that the saw 20 of the present invention generally comprises an internal combustion engine 21, a rearwardly positioned conventional carburetor 22 con-

nected to the engine, a top-mounted compartmented fuel and oil tank 23, a conventional magneto and engine starter within the housing 24 at one side of the engine, a side frame casting 25 at the opposite side of the engine through which the engine power shaft 26 extends, a sprocket 27 and a clutch 28 co-axially disposed on the power shaft, a projecting chain guide plate 29 supported by the side frame casting for supporting and directing the travel of a cutting chain 30 which is also trained over the sprocket, an encircling handle 31 and a rear supporting leg 32 disposed beneath the carburetor.

The engine 21, preferably of two cycle, single cylinder type having a crankcase body 33 and a flanged exhaust port 34 positioned on the chain side of the cylinder, is relatively so positioned in the saw that while its power shaft 26 extends horizontally in a direction normal to the chain guide plate 29, its cylinder is inclined forwardly of the saw. The power shaft 26, which is an extension of the engine crankshaft, extends through a centrally apertured well 35 formed on the inner or engine side of the side frame casting 25, the well base having suitably spaced holes formed therein through which screws 36 are adapted to pass for threaded engagement in the crankcase 33 to fixedly secure the frame 25 directly to the engine.

The shaft 26 has a reduced diameter terminal portion 37 upon which are coaxially mounted the clutch 28, which is of any conventional centrifugal type designed for automatic operation, and the chain-driving sprocket 27, the clutch 28 comprising a driving member 38 keyed to the shaft 26, as at 39, and an encircling drum-shaped driven member 40 to which is secured the sprocket 27, the sprocket being supported by the drum for rotation therewith about the shaft 26. The clutch 28 and the sprocket 27 may be retained on the shaft by a suitable retainer disk 41 bearing against a shoulder formed at the inner end of the threaded extension of the shaft 26 and held there by a suitable nut as shown. The sprocket 27 and the clutch drum 40 are freely rotatable on the shaft while the driving portion 38 of the clutch is adapted to rotate therewith, the arrangement being such that when the engine shaft reaches a predetermined speed, the centrifugally actuated driving clutch portion 38 is caused to engage the clutch lining 42 of the drum 40 and so imparts rotation thereto and to the sprocket 27 in consequence of which the latter rotates with the engine shaft at its effective operating speed.

The clutch drum 40, preferably of sheet metal, and the sprocket 27, are securely interlocked, as best shown in Figures 12, 13 and 14, to provide such a unitary assembly of the drum 40 and sprocket 27 as to render virtually nil any tendency for the sprocket to be sheared off or otherwise become disengaged from the clutch drum when the saw is operating under load. To this end, the sprocket 27 is provided, adjacent one of its faces, with a peripherally cut groove which forms grooves 43, of less than tooth depth, in each of the teeth and within which the inner peripheral edge of the centrally apertured web 44 of the drum 40 may be nested. In this connection it will be noted that the transverse web 44 of the drum is provided with a central aperture 45 the inner edge of which is provided with a plurality of circumferentially spaced notches 46 which respectively correspond in shape with that of the teeth of the sprocket 27, so that the several teeth of the sprocket may be interfitted with the several notches 46 of the clutch drum for nested assembly of the latter with the sprocket.

It will be noted that the inner peripheral edge of the centrally apertured web 44 of the drum is additionally cut out on corresponding sides of each notch 46 to provide a plurality of supplemetal notches 47, each of which is defined by cut edges 48 and 50 forming an obtuse angle therebetween. The cut edges 50 are substantially coincident with the line of a circle disposed between the line of a circle coincident with the outermost points of the notches 46 and that coincident with the innnermost points thereof, or stated otherwise, in relation to the toothed sprocket 27, the cut edges 50 are coincident with the line of a circle of a diameter substantially equal to the pitch diameter of the toothed sprocket 27. The bottom edges of the grooves 43 peripherally cut into the teeth of the sprocket 27 are also disposed substantially in coincidence with the pitch line or circle of the sprocket, from which it will appear that when the sprocket and the clutch drum are assembled, as shown in Figures 12 and 13, with the drum web 44 in coplanar registry with the peripheral grooves 43 of the sprocket and the drum is then shifted angularly of the sprocket in chain driving direction, the edges 50 of the notches 47 of the drum web 44 will be respectively disposed in the sprocket grooves 43 and will seat upon the bottoms of said grooves to maintain the drum against any possible eccentric displacement thereof relatively to the sprocket and its drive shaft 37, while the edges 48 of said notches will be respectively disposed in position to bear against the side faces 49 of the sprocket teeth opposite those which engage the chain. Thus, upon rotation of the clutch drum 40 in chain-driving direction, it will bear against and so positively drive the sprocket 47 interlocked therewith.

In order to maintain permanent the interlocked engagement between the clutch drum and the sprocket, a locking plate 51 is employed. This plate, as is best shown in Figure 14, is centrally apertured, as at 52, to provide an opening which is shaped complementally to the shape of the toothed sprocket 47 and which permits the plate to be non-rotatably fitted upon the sprocket in flatwise engagement with the inner face of the clutch drum 40. The plate 51 is then secured, as by rivets 53 projected through suitable holes 54 provided therefor in the locking plate, or otherwise, to the web 44 of the clutch drum. It will be apparent from the foregoing that the plate 51 serves merely to hold the sprocket operatively interlocked with the clutch drum and that the driving torque is transmitted by the drum to the sprocket without any shearing load being imposed upon the lock-plate-securing rivets 53.

The side frame casting 25 referred to above as being mounted upon the drive shaft side of the engine 21 is of the shape and configuration best shown in Figures 8, 10 and 11, wherein it will be noted that this casting is integrally provided adjacent its upper edge with a part which forms a passage 55 for the engine exhaust. This passage 55, as most clearly shown in Figure 11, includes a main exhaust discharge portion which extends along a line inclined upwardly and forwardly of the saw when the latter is positioned, as shown in Figures 1 and 4, and with an angularly related rear portion having a flanged extremity 56. This flanged extremity 56 is shaped complemental to the flanged part of the engine exhaust port 34 and may be secured in suitable registry therewith to provide a continuous exhaust passage leading from the engine to and through the passage 55 formed in the casting 25.

The forward edge 57 of the casting 25 is preferably curved, as shown in Figure 10, and is fitted along its lower portion with a complementally curved bumper guard 58 having integrally formed thereon a plurality of forwardly presenting spurs which bear against the tree or other work being cut and hold the saw operatively in sawing position. This tooth bumper guard or bracket 58 is removably secured to the casting 25 by a plurality of screws 59.

Formed along the upper and rear edges of the casting 25 is a continuously extending, outwardly directed flange 60 of a depth sufficient to project across the operating plane of the cutting chain and so serve as a guard for the chain in the region of its rear driven end.

The plate 29 is secured to the drive shaft side of the engine 21 by means of a pair of spaced parallel studs

62, the latter being provided with enlarged non-circular heads 62ª (see Figure 8) which are respectively accommodated within correspondingly shaped recesses 61 formed in the casting 25 on the inner face thereof, the studs 62 having threaded end portions which project freely through the casting 25 and through an elongated slot 74 formed in the rear end of the chain guide plate 29 disposed flatwise against the flat outer face of the casting 25. Fitted against the outer face of the chain guide plate 29 to overlie the slot 74 thereof is a chain retainer plate 75, which is suitably apertured, as at 75ª, for projection of the studs 62 therethrough, the outer ends of which latter receive nuts 76 adapted to bear against the outer face of the chain retainer plate 75. Thus, the studs 62 and their respective nuts 76 serve to secure the chain guide plate 29 and the chain retainer plate 75 to the casting 25 whereby all of said parts are disposed in flatwise assembled relation against the drive shaft side of the engine 21.

The chain retainer plate 75 is provided along its upper and lower edges with outwardly inclined wing portions 77—77 which respectively project beyond the top and bottom edges of the chain guide plate 29 to form conjointly with the proximate face of the casting 25 a pair of open ended guideways for the upper and lower runs of the cutting chain 30 which extends about and is operatively associated with the chain guide plate 29 and the drive sprocket 27. It will be noted that the upper and lower guideways thus formed between the casting 25 and the winged portions 77—77 of the chain retainer plate 75 are located immediately in advance of the sprocket 27 and serve to prevent lateral displacement of the chain from the sprocket and the end of the chain guide plate 29 adjacent the sprocket.

The chain guide plate 29 is provided along its upper and lower longitudinally extending edges and along its rounded front edge with a continuously extending chain guiding groove or slot 78 (see Figure 8), which slot is of a depth sufficient to accommodate therein the chain guide wings conventionally provided on the inner edges of the chain links 79 and which guide wings are adapted to be engaged by the teeth of the sprocket 27 for driving of the chain about the chain guide plate 29 in work sawing direction, as indicated by the arrows in Figure 1. The adjoining ends of successive drive links 79 of the drive chain are secured together by paired link elements respectively disposed on opposite sides of the drive links by pivot pins, as best shown in Figure 2A. Certain of these paired links consist of a pair of identical elements 80—80, while others consist of one such element 80 and a cutter link 81, which cutter link may be of any conventional form having a cutting edge 82 and a depth gauge 82ª spaced in advance of the cutting edge. The cutter links 81 are alternately arranged on opposite sides of the chain so that successive cutter links respectively cut opposite sides of the kerf cut by the saw. It will be understood, of course, that in order to properly tension the linked chain and maintain it in operative engagement with its supporting guide plate 29, the latter may be extended forwardly or rearwardly of the casting 25 within the limits permitted by the slot 74 through which the securing studs 62 project by the simple expedient of loosening as required and then retightening the nuts 76 on the studs 62.

As appears most clearly in Figures 7 and 8, the chain guide plate 29 is provided adjacent its rear end with apertures 80ª extending through the side walls of the chain groove or slot 78, these apertures being provided in the upper run as well as in the lower run of this slot or groove 78 so that no matter which face of the guide plate 29 is disposed flatwise against the casting 25 one of said apertures 80ª will closely adjoin the face of the casting 25 in the region of the upper run of the chain slot or groove 78. Formed in the casting 25 for registry with the aperture 80ª located in the contacting side

wall of the chain slot or groove 78 of the guide plate 29 is an elongated recess 64 (most clearly shown in Figures 8 and 10), the base of which recess is in communication with a passage 63 extending through the casting 25 to the inner face thereof. The inner end of this passage 63 is internally threaded to receive a valved oil fitting 65, which in turn is connected by way of an oil line 66 to the bottom of the oil compartment 67 of the compartmented fuel and oil tank 23 which is suitably mounted above and to the rear of the engine 21 of the saw, as best shown in Figures 1 and 4.

The recess 64 formed in the outer face of the casting 25 is so located that when the chain guide plate 29 is operatively mounted upon the casting 25 by means of the supporting studs 62 and their nuts 76, the said recess 64 will be in registry with the aperture 80ª provided in the inner wall of the upper run of the chain guiding groove 78, in consequence of which lubricating oil may be supplied from the oil compartment 67 to the chain running in its groove 78 of the chain guide plate 29 by gravity flow, the amount of oil so supplied to the chain being controlled by suitable operation of the valved fitting 65. The recess 64 is, of course, elongated in a direction extending lengthwise of the chain guide plate 29 so that for any adjusted position of the latter within the limits permitted by the studs 62 projected through the slots 74, the said recess 64 will be in registry with the oil feeding aperture 80ª in the inner side wall of the chain groove 78.

The compartmented fuel and oil tank 23 includes, in addition to the oil reservoir 67 for supplying lubricating oil to the chain traversing the guide plate 29, a compartment 83 in which is stored fuel for the engine 21. As is most clearly shown in Figures 4 and 5, the tank 23 is mounted so that the oil compartment 67 thereof is elevated above the upper run of the cutting chain of the saw during all normal positions of use thereof so that oil for lubricating the cutting chain and its guideway 78 may be delivered by gravity flow as required through the valved fitting 65. To this end, the tank 23 is provided along its bottom with a longitudinally extending supporting rib 84 which is embraced by a pair of spaced angle members 85—85 suitably secured together by bolts 86 (see Figure 5). The oppositely extending base flanges of the angle members 85—85 are respectively secured, as by bolts 87 to a flat plate 88, which in turn is suitably secured to the engine body also by the bolts 87, the plate 88 being supported in suitably spaced relation to the engine body by spacers 89 embracing the shanks of the bolts 87 below the plate 88. Preferably, the tank mounting is such that the tank 23 is spaced from and generally parallels the top side of the engine 21.

Suitably secured to and extending rearwardly from the tank 23 in rigid assembly therewith is a hand grip 90 by means of which the saw may be held and guided by the operator, which grip is preferably provided with a hand-actuated trigger 90ª pivoted within the grip, as at 90ᵇ, for controlling the delivery of fuel to the engine carburetor 22.

The handle 31, by means of which the saw is principally supported by the operator during use of the saw, is formed of a single length of tubing which extends from a point just above the casting 25 on the drive shaft side of the saw upwardly and thence transversely across the engine, thence downwardly on the opposite side of the saw and thence transversely across the bottom of the saw to a point adjacent the lower end of the casting 25. Thus, this handle is practically in the form of a closed loop extending transversely about the engine part of the chain saw, the terminal ends of the handle tubing being vertically spaced apart on the drive shaft side of the saw for interconnection by the casting 25. In this connection it will be noted that the inner face of the casting 25 is provided adjacent the lower end thereof

with a laterally projecting stud 68 over which is adapted to be slipped the tubular end of the transversely extending bottom portion 31a of the handle 31, while the upper end of the casting 25 is provided with an integrally formed cradle 69 having an elongated, transversely curved seat for receiving the upper terminal end portion 31b of the handle. The transversely extending bottom portion 31a of the handle is fixedly secured to the stud 68 by bolts 70 extending diametrically through the telescopically fitted parts, the upper terminal portion 31b being similarly secured within its supporting cradle 69 by bolts 71.

It will be noted also that the cradle 69 is rearwardly inclined, as best shown in Figures 1 and 4, so that the upupper terminal end portion 31b of the tubular supporting handle 31 is correspondingly inclined to present the transversely extending top portion 31c of the handle substantially above the center of gravity of the saw so that upon lifting the saw by the handle part 31c it will be properly balanced fore and aft for facile handling thereof. The transversely extending bottom part 31a of the tubular handle 31 is disposed in vertically spaced, parallel relation with respect to the top part 31c and serves as a frontal, transversely extending bottom rest for the engine part of the saw.

Extending rearwardly of the saw from beneath the body of the engine 21 is the rear supporting leg 32 in the form of a rigid member of any suitable cross-sectional shape which is bent, as best shown in Figures 4 and 5, to provide a forward portion 91 secured, as by bolts 92, to the under side of the engine crank case, and a rearwardly and downwardly extending portion 93 terminating beneath the rear end of the carburetor 22. Resting upon and secured to the top of the rearwardly extending portion 92 of the supporting leg 32 is a transversely curved cradle 94 which immediately underlies and supports the carburetor and the parts of the engine unit immediately associated therewith. Thus, the rear supporting leg 32 is disposed in the longitudinally extending vertical median plane of the saw and conjointly with the transversely extending bottom part 32a of the tubular supporting handle provides an effective three point ground or floor-engaging support for the saw, the center of gravity of which is so located within the three point support that when the saw is at rest the cutting chain and its guide plate are maintained in its freely extending, elevated position shown in Figure 1.

The side casting 25 constitutes one of the principal features of the saw of the present invention and contributes materially not only to the economical manufacture of the saw and assembly of its component parts but also to reducing the weight of the saw without sacrificing its strength and sturdiness. Thus, the side casting 25 serves (1) as a protective guard and enclosure for the centrifugal clutch, the direct driven chain sprocket and that portion of the cutter chain which immediately adjoins the sprocket, (2) as a support for the chain guide plate, (3) as a means for supplying lubricating oil to the cutter chain and its guideway by gravity flow of the oil from the reservoir mounted on the top side of the engine, (4) as a means for extending the exhaust port of the engine forwardly and upwardly of the saw so as to direct the engine exhaust away from the operator of the saw, (5) as a means for providing a simple and effective rest for the saw when it is not in use, and (6) as a means for interconnecting the opposite extremities of the supporting handle for the saw, which handle is so designed that its main lifting part is disposed vertically above the center of gravity of the saw to balance it fore and aft for most efficient handling and operation thereof.

In addition, the well 35 formed in the casting 25 for accommodating therein the centrifugal clutch unit results in the construction of a saw which is of an overall width not materially greater than that of the engine itself, it being noted that the cutter chain is disposed for operation in a plane which very closely adjoins the drive shaft side of the engine. Because of this exceedingly close coupling of the saw engine and the chain driven thereby, the engine drive shaft need not be greatly extended, as in the case of chain saws wherein the chain is driven through the intervention of a gear reduction drive, and thus the drive shaft of the saw of the present invention is not subject to any such whipping action as may cause excessive wear of the drive shaft bearings.

The clutch-sprocket assembly hereinbefore described and as shown most clearly in Figures 12 and 14 also contributes to the overall operating efficiency of the saw in that it provides a positive and effective direct drive connection between the driven element of the clutch, i. e., the drum 40, and the chain drive sprocket 27, the assembly of the sprocket to the drum being so compact that the cutter chain is disposed with its inner face almost in contact with the web 44 of the clutch drum 40.

The direct drive saw of the present invention, of course, provides for operation of the cutter chain at the same linear speed of movement as that of the engine drive shaft, and consequently, by suitable spacing of the cutter teeth on the chain to balance the engine torque as transmitted to the chain by the direct engine drive, full advantage may be taken of the high speed operation of the saw. To this end, it may be desirable to space apart the cutter teeth, as shown in Figure 2A, to an extent greater than the normal spacing of the teeth on slower moving chains of the conventional saws having a gear reduction drive between the engine shaft and the chain sprocket. Preferably, the cutter teeth 81 are spaced at least three chain links apart, it being noted that in Fig. 2A successive cutter tooth links 81 are interconnected by five intervening links or linkages. By so increasing the cutter tooth link spacing, with the chain operating at full engine speed, the several teeth will be enabled to cut and clear away the successively cut chips without any tendency for the cutter chain to become clogged in the kerf, with resulting slowing up of the cutter chain and increase of the working load on the saw engine.

It will be understood, of course, that the saw of the present invention as hereinbefore described and as shown in the accompanying drawings is susceptible of various changes and modifications which may be made from time to time without departing from the general principles or real spirit of the invention, and accordingly, it is intended to claim the same broadly, as well as specifically, as indicated by the appended claims.

What is claimed as new and useful is:

1. In a portable chain saw, a power unit having a main drive shaft for the saw chain, a centrifugal clutch having engageable concentric elements respectively keyed to and revoluble about said shaft, said revoluble element being in the form of a drum having a web extending radially of the drive shaft, and a chain sprocket also revolubly mounted on said shaft, said sprocket having circumferentially spaced chain-engaging teeth which are respectively interfitted in notches provided in said web of the clutch drum whereby said drum is directly coupled to said sprocket to drive the latter when the clutch elements are operatively engaged.

2. In a portable chain saw, a main drive unit having a power take-off shaft, a centrifugal clutch having concentric elements which are automatically engageable upon rotation of said shaft at a predetermined rotative speed thereof and which are respectively keyed to and revoluble about said shaft, the clutch element revoluble about the shaft having a centrally apertured web disposed in a plane normal to the shaft axis, which said web is provided with a plurality of correspondingly shaped notches spaced circumferentially about the peripheral edge of its central aperture, and a chain sprocket journalled on said shaft in concentric relation to the web of said revoluble clutch element, said sprocket having a plurality of circumferentially spaced chain-engaging teeth

equal in number to the number ot notches in said centrally apertured web, said sprocket teeth being respectively fitted in said notches to provide a direct drive coupling between the power take-off shaft and the sprocket when said clutch elements are operatively engaged to rotate in unison.

3. In a portable chain saw, a main drive unit having a laterally projecting power take-off shaft, a chain-driving sprocket having circumferentially spaced chain-engaging teeth, journalled upon said shaft, a centrifugal clutch having relatively rotatable interengageable elements respectively locked to said shaft and to said chain sprocket, said clutch being coaxially mounted with respect to said shaft and chain sprocket and being operative to provide a direct drive coupling between the shaft and chain sprocket when the clutch elements are operatively engaged to rotate in unison, that one of said clutch elements which is locked to the chain sprocket being in the form of a drum having a centrally apertured web disposed in a plane extending normal to the axis of the shaft and located between the opposite faces of the chain sprocket, which web is provided with notches spaced circumferentially about the peripheral edge of its central aperture to respectively accommodate the teeth of the chain sprocket whereby to non-rotatably couple together said clutch drum and sprocket, and means for securing said sprocket against axial displacement thereof from said clutch drum.

4. In a portable chain saw, a main drive unit having a laterally projecting power take-off shaft, a chain-driving sprocket having circumferentially spaced chain-engaging teeth journalled upon said shaft, a centrifugal clutch having relatively rotatable interengageable elements respectively locked to said shaft and to said chain sprocket, said clutch being coaxially mounted with respect to said shaft and chain sprocket and being operative to provide a direct drive coupling between the shaft and chain sprocket when the clutch elements are operatively engaged to rotate in unison, that one of said clutch elements which is locked to the chain sprocket being in the form of a drum having a centrally apertured web disposed in a plane extending normal to the axis of the shaft and located between the opposite faces of the chain sprocket, which web is provided with notches spaced circumferentially about the peripheral edge of its central aperture to respectively accommodate the teeth of the chain sprocket whereby to non-rotatably couple together said clutch drum and sprocket, and means for preventing relative axial movement between said sprocket and clutch drum, said last-mentioned means including external kerfs in the teeth of the sprocket which respectively receive circumferentially spaced parts of the apertured web of the clutch drum.

5. In a portable chain saw, a main drive unit having a laterally projecting power take-off shaft, a chain-driving sprocket having circumferentially spaced chain-engaging teeth journalled upon said shaft, a centrifugal clutch having relatively rotatable interengageable elements respectively locked to said shaft and to said chain sprocket, said clutch being coaxially mounted with respect to said shaft and chain sprocket and being operative to provide a direct drive coupling between the shaft and chain sprockets when the clutch elements are operatively engaged to rotate in unison, that one of said clutch elements which is locked to the chain sprocket being in the form of a drum having a centrally apertured web disposed in a plane extending normal to the axis of the shaft and located between the opposite faces of the chain sprocket, which web is provided with notches spaced circumferentially about the peripheral edge of its central aperture to respectively accommodate the teeth of the chain sprocket whereby to non-rotatably couple together said clutch drum and sprocket, and means for preventing relative axial movement between said sprocket and clutch drum, said last-mentioned means including external kerfs in the teeth of the sprocket which respectively receive circumferentially spaced parts of the apertured web of the clutch drum, and a locking plate non-rotatably interfitted with the teeth of the chain sprocket and secured flatwise against the web of the clutch drum to prevent relative angular displacement of the operatively associated clutch drum and sprocket.

6. In a portable chain saw, a main drive unit having a laterally projecting power take-off shaft, a chain-driving sprocket having circumferentially spaced chain-engaging teeth journalled upon said shaft, and a centrifugal clutch having relatively rotatable interengageable elements respectively locked to said shaft and to said chain sprocket, said clutch being coaxially mounted with respect to said shaft and chain sprocket and being operative to provide a direct drive coupling between the shaft and chain sprocket when the clutch elements are operatively engaged to rotate in unison, that one of said clutch elements which is locked to the chain sprocket being in the form of a drum having a centrally apertured web disposed in a plane extending normal to the axis of the shaft and located between the opposite faces of the chain sprocket, which web is provided with notches spaced circumferentially about the peripheral edge of its central aperture to respectively accommodate the teeth of the chain sprocket whereby to non-rotatably couple together said clutch drum and sprocket, the several teeth of the sprocket chain being respectively provided with external kerfs commonly disposed in the plane aforesaid and the several notches of the clutch drum web being respectively shaped to provide them with side edges which bear against corresponding sides of the sprocket teeth to provide a driving engagement between the clutch drum and the sprocket, the opposite side edges of said notches being partially cut away to provide web portions which respectively nest in said kerfs of the sprocket teeth to prevent axial movement of the sprocket relatively to the clutch drum.

7. In a portable saw as defined in claim 6 wherein said kerfs in the sprocket teeth are each of a depth extending approximately to the pitch line of said teeth.

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