Nov. 13, 1951 R. G. LE TOURNEAU 2,574,646

HEAVY-DUTY MOBILE CRANE

Filed March 8, 1948 3 Sheets-Sheet 1

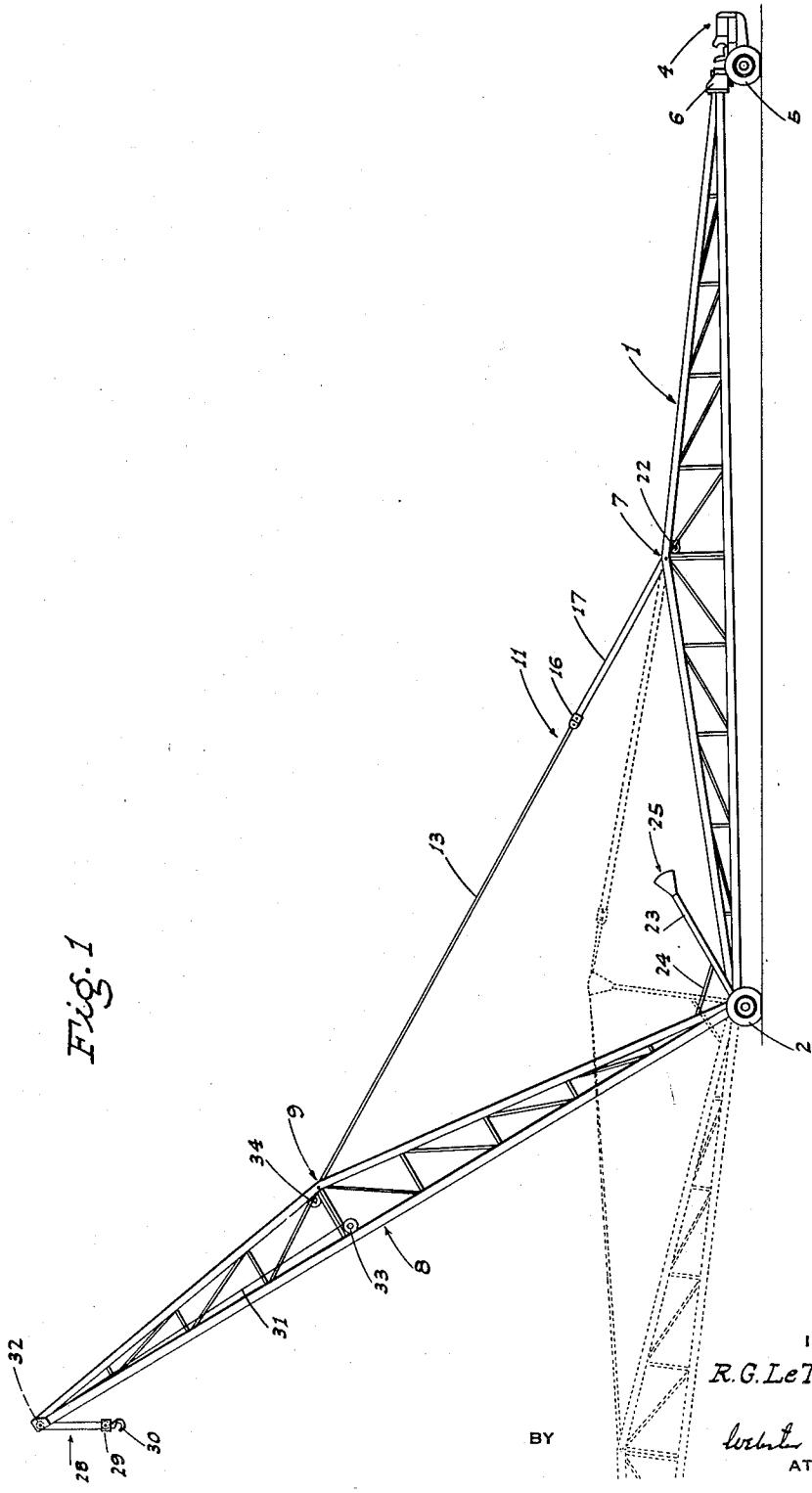



Fig. 1

INVENTOR
R. G. LeTourneau

BY

ATTORNEYS

Nov. 13, 1951 R. G. LE TOURNEAU 2,574,646

HEAVY-DUTY MOBILE CRANE

Filed March 8, 1948 3 Sheets-Sheet 2

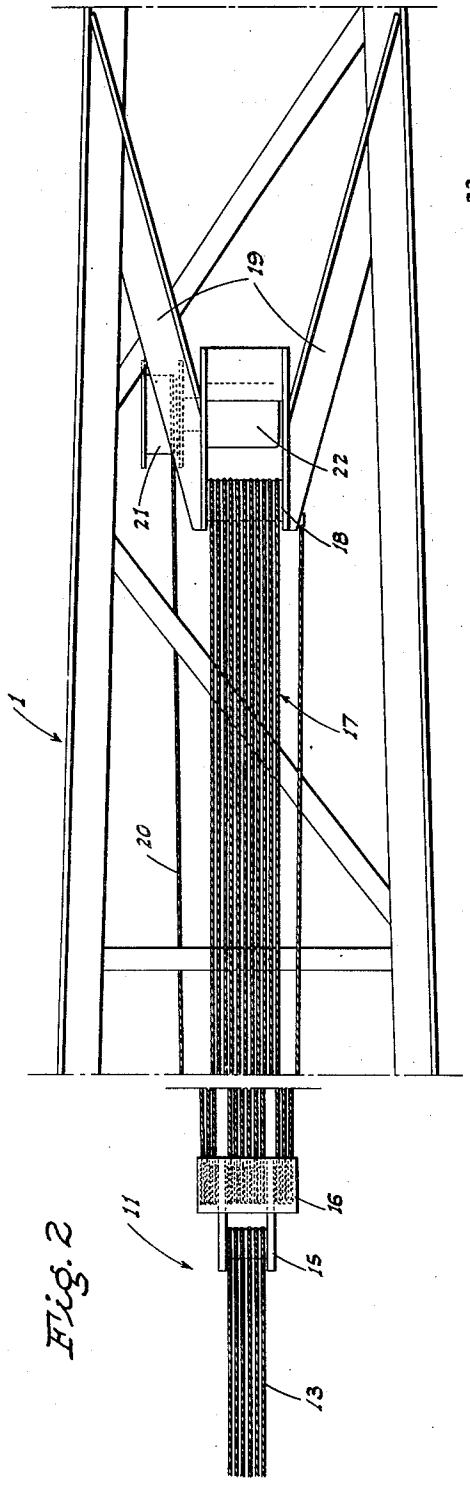



Fig. 2

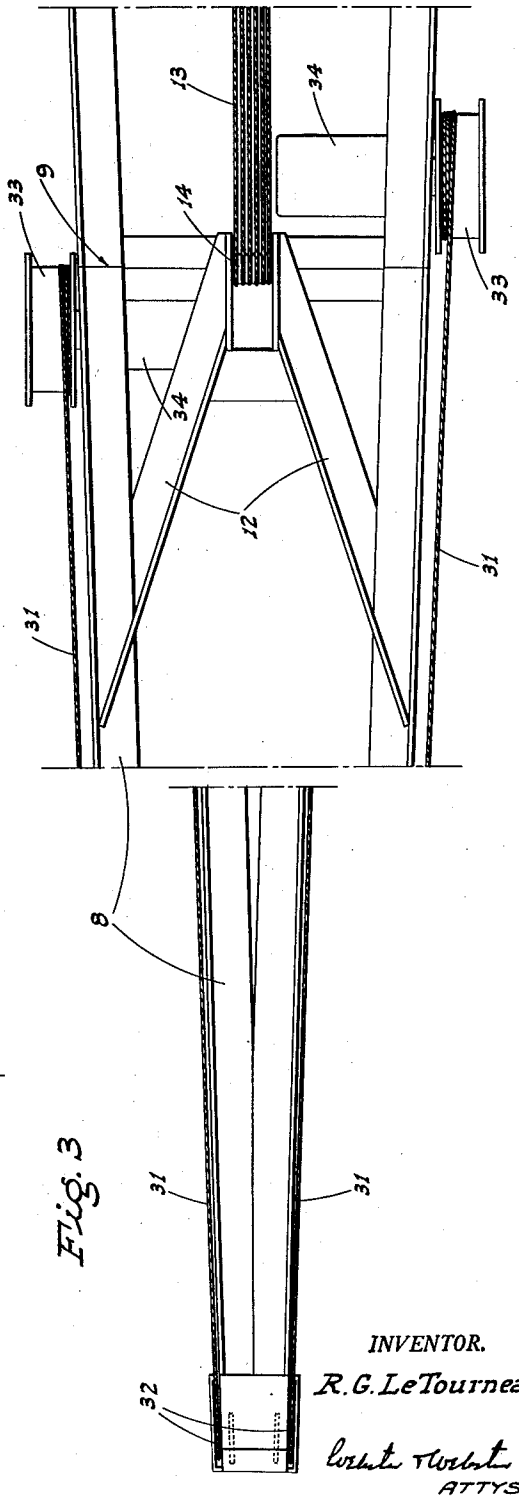



Fig. 3

INVENTOR.
R. G. LeTourneau
Wright Brown & Quinby
ATTYS

Nov. 13, 1951 R. G. LE TOURNEAU 2,574,646

HEAVY-DUTY MOBILE CRANE

Filed March 8, 1948 3 Sheets-Sheet 3

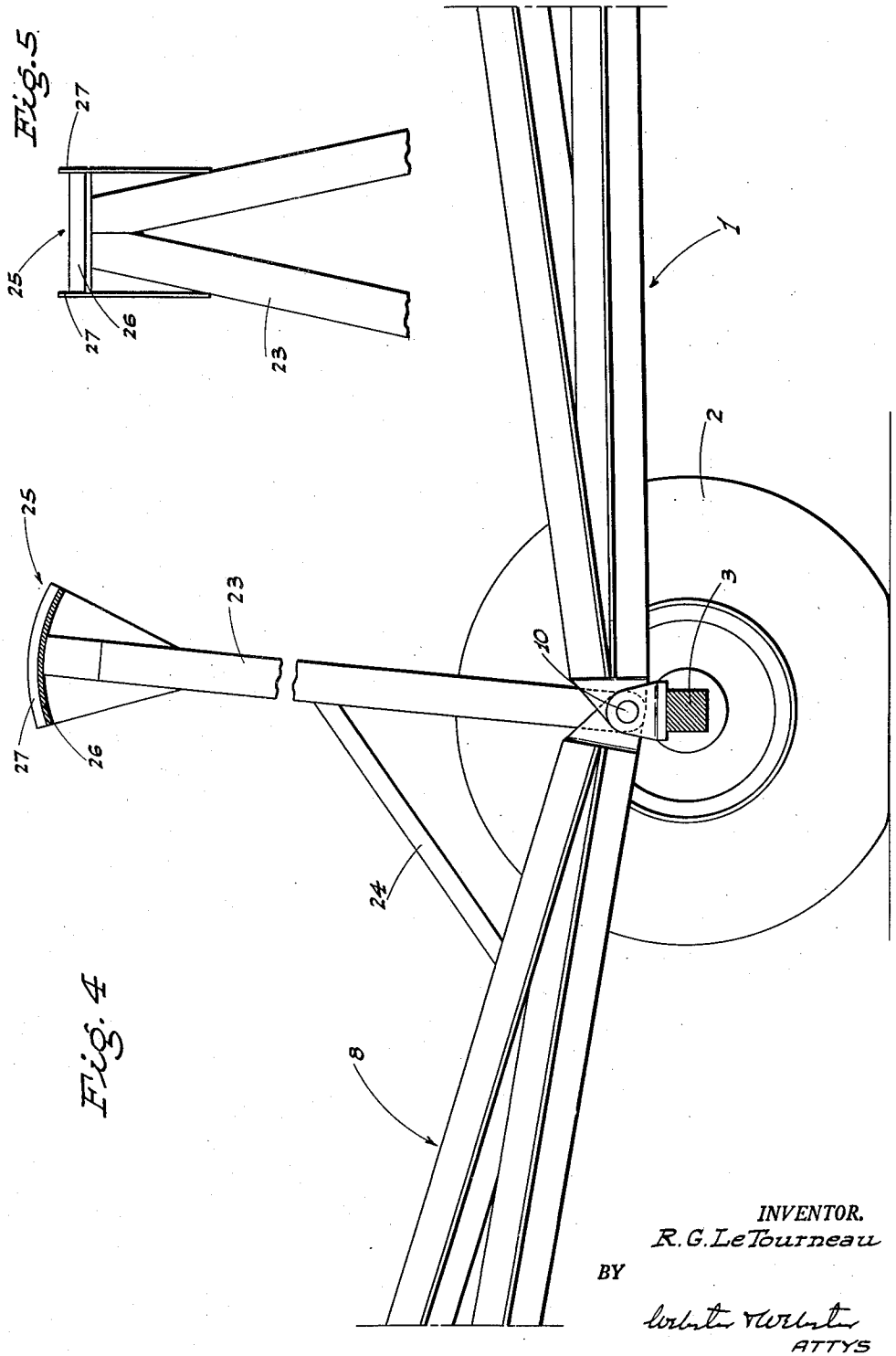



Fig. 4

Fig. 5

INVENTOR.
R. G. LeTourneau
BY
ATTYS

Patented Nov. 13, 1951 2,574,646

# UNITED STATES PATENT OFFICE

2,574,646

## HEAVY-DUTY MOBILE CRANE

Robert G. Le Tourneau, Longview, Tex., assignor to R. G. Le Tourneau, Inc., Stockton, Calif., a corporation of California

Application March 8, 1948, Serial No. 13,663

2 Claims. (Cl. 212—8)

1

The present invention relates in general to a mobile crane.

One object of the present invention is to provide a heavy-duty, mobile crane which has an extremely long reach, and is capable of lifting relatively great loads to an extreme height.

Another object of the invention is to provide a mobile crane which includes an elongated, wheel-supported, tractor-drawn body which is fitted at the rear end with a vertically swingable, elongated boom; both the body and boom being of great length as compared to conventional cranes, and there being a novel, boom-control cable system, connected between the body and boom.

An additional object of the invention is to incorporate in the structure a novel saddle frame, having a stiffleg or tower position, adapted to engage and support the boom control cable system, when the boom is at a low angle for maximum reach, so as to maintain the effective working leverage of said cable system.

A further object of the invention is to provide a mobile crane wherein the boom control cable system, and the hoist cable system, are both actuated by electric winch units; the latter system including dual winch units in novel combination with the hoist cable.

It is also an object to provide a crane which is effectively counterbalanced, and operatively stable, permitting the handling of heavy loads accessible only on very long reach, and which load may subsequently be lifted to a high point.

A further object of the invention is to provide a reliable mobile crane, and one which will be exceedingly effective for the purpose for which it is designed.

These objects are accomplished by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings:

Fig. 1 is a side elevation of the heavy-duty mobile crane; the boom being shown at a high angle in full lines and at a low angle in dotted lines.

Fig. 2 is an enlarged fragmentary plan view, foreshortened, showing mainly the boom control cable system and its winch unit.

Fig. 3 is an enlarged fragmentary plan view, foreshortened, showing mainly the hoist cable system and its winch units.

Fig. 4 is an enlarged fragmentary sectional elevation at the juncture of the body and boom, and including a disclosure of the saddle frame in upstanding position.

2

Fig. 5 is an enlarged fragmentary elevation, taken transversely of the implement, of the upper portion of the saddle frame.

Referring now more particularly to the characters of reference on the drawings, the heavy-duty portable crane comprises an extremely elongated tongue or body 1 supported, at its rear end, by a plurality of transversely spaced, pneumatic tire wheels 2 of high flotation type; such wheels being connected by an axle bar 3.

At its forward end the body 1 is supported by a two-wheel tractor 4 which includes transversely spaced pneumatic tire wheels 5 also of high flotation type. The front end of the body 1 is coupled to the two-wheel tractor 4 by means of an electrically actuated power steering unit, indicated generally at 6.

In practice, the two-wheel tractor 4 is a large implement of substantial weight, and the great length of the body 1 is evident from a comparison of the tractor therewith, as in Fig. 1, wherein the tractor and body are in correct proportion.

The body 1 is of trussed skeleton construction, and includes an apex 7 substantially centrally of the ends of said body.

The numeral 8 indicates an extremely elongated boom, whose length, while approaching that of the body 1, is somewhat shorter; said boom likewise being of trussed skeleton structure, including an apex 9 intermediate its ends.

The boom 8 is connected, at its lower end, with the rear end of the body 1, by means of a transverse pivotal mount 10, for vertical swinging of said boom between high-angle and low-angle positions.

The boom 8 is adjustable in position by means of a boom control cable system, indicated generally at 11, which extends between the apex 7 of the body 1 and the apex 9 of the boom 8; such boom control cable system comprising:

The boom 8 adjacent the apex 9 thereof is fitted with a forwardly extending tension frame 12, to which a multi-strand fixed cable unit 13 is coupled, as at 14. Such multi-strand fixed cable unit 13 extends from the tension frame 12 and apex 9 forwardly to connection, as at 15, with a sheave block 16 of a multi-strand block and tackle unit 17. At its forward end, i. e. the end opposite the sheave block 16, the multi-strand block and tackle unit 17 includes another sheave block 18 attached to a rearwardly projecting tension frame 19 in the body 1 adjacent its apex 7.

The multi-strand block and tackle unit 17 includes an actuating lead 20 which runs forwardly from the sheave block 16 to connection with the cable drum 21 of a reversible electric motor driven winch unit 22; the latter including a normally set but automatically releasable brake.

With this arrangement the actual control of the boom is accomplished by the relatively short, multi-strand block and tackle unit 17; the multi-strand fixed cable unit 13 serving only as a connecting instrumentality.

By operation of the winch unit 22 the boom 8 can be adjusted between a low-angle position closely approaching horizontal, and with maximum outward reach, and a high-angle position approaching vertical, with a maximum upward reach.

As the boom 8 is extremely elongated, in comparison to conventional cranes, its reach in horizontal and vertical planes is relatively great, as is its ability to lift substantial loads in any position of adjustment. Further, the crane is well balanced and stable under great load; this for the reason that the body 1 is extremely elongated, of somewhat greater length than the boom 8, and is counter-balanced at its forward end by the heavy tractor 4 connected to said end, as at 6.

When the boom 8 is adjusted to a low angle position the boom control cable system 11 would lose its effective working leverage with respect to said boom in the absence of a compensating device, which comprises the following:

At its lower end the boom 8 is fitted with an A-frame or stiffleg 23 whose legs are spaced transversely of the implement, and which frame extends substantially radial of the pivotal mount 10. Bracing 24 serves to fix the A-frame 23 rigid relative to the boom 8; the included angle between said boom and A-frame approaching 90°. By reason of this included angle, the A-frame 23 projects upwardly substantially perpendicularly as a stiffleg or tower, when the boom 8 is in a low angle position. At its upper end the A-frame 23 is fitted with a saddle 25 opening lengthwise of the implement, which saddle includes an upwardly convex bed 26. Cable retention flanges 27 upstand from the saddle 25 at opposite ends.

When the boom 8 is adjusted to a low-angle position, the A-frame 23 swings upwardly, to its stiffleg or tower position, and the saddle 25 engages the boom control cable system 11 in supporting relation thereto intermediate its ends; this assuring that said system maintains its effective working leverage with respect to the boom even when the latter is in a low-angle position. The height of the A-frame 23 is such that the cable system 11 cannot approach the boom 8 in practice closer than approximately 30°. In high-angle positions of the boom 8, the cable system 11 is free of the saddle 25, and in such high-angle positions the frame 23 has swung forwardly and downwardly toward the body 1, as in full lines in Fig. 1. The arrangement is such that the frame 23 will abut the body 1, to provide a stop to prevent the boom 8 passing vertical dead-center in a forward direction.

A hoist cable system, indicated generally at 28, is associated with the upper portion of the boom 8 and comprises the following:

A single length of cable runs, intermediate its ends, through a hoist sheave 29, which includes a load engaging hook 30, and thence said cable extends upwardly as a pair of separate leads 31 which pass over direction-changing sheaves 32 on the outer end of the boom 8. Thence, said separate leads 31 extend downwardly along the boom 8 to connection with separate cable drums 33. The cable drums 33 are each an included part of a separate reversible electric motor-driven winch unit 34; said winch units 34 being mounted in the boom 8 in adjacent but spaced relation, with the drums 33 laterally outward thereof. The winch units 34 each include a normally set, but automatically releasable, brake.



For relatively light loads only one winch unit 34 is actuated, and the lift is accomplished solely by one of the leads 31; the other winch unit then standing as an anchor. However, when a relatively great load is to be lifted, both winch units 34 are operated simultaneously to provide the larger power then necessary, and in which event both leads 31 are in operation.

The winch units 22 and 34 are connected in a selective electrical switching or control system (not here shown).

With the described heavy-duty mobile crane, loads requiring long reach and high lift can be handled with relative ease; manipulation of the crane being accomplished from the tractor 4 by its operator; the electric control system for the described winches including a switch panel on said tractor.

One advantageous adaptation of the described crane is in loading and unloading river barges, boats, and the like, from a short-line which does not have adequate pier facilities. The crane, standing on the shore, can reach over water a sufficient distance for loading or unloading, and if necessary the high flotation of the wheels 2 on a soft footing permits the implement to be moved outwardly beyond the shore-line in shallow water or at low tide to further increase its effective reach.

While the above adaptation is illustrative of a use to which the crane is admirably suited, it may be used for many other types of work wherein extreme reach, outward and upward, is essential.

From the foregoing description it will be readily seen that there has been produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described the invention the following is claimed as new and useful and upon which Letters Patent are desired:

1. A mobile crane comprising a wheel supported body, a boom pivoted at its lower end on the body at one end thereof and adapted for raising and lowering, said boom being of the suspension type, thick at the point of suspension near the center of said boom and tapering to a thin section at each end of the boom, a stiffleg from which to support said boom when said boom is at a lowered position, said stiffleg being fixed in relation to said boom adjacent its lower end and structurally independent of said boom and a boom-lift cable system extending from a winch on said body over said stiffleg to the point of suspension on said boom.

2. A mobile crane comprising a wheel supported body, a suspension type boom pivoted at its lower end on the body at one end thereof and adapted for raising and lowering, said boom

being in the form of a truss comprising: a relatively long base member; two members fixed at opposite ends of said base member, extending toward each other at an acute angle with respect to said base member, and joining at a point corresponding to the point of suspension near the center of said truss; a stiffleg from which to support said boom when said boom is at a lowered position, said stiffleg being fixed in relation to said boom adjacent its lower end, said boom being structurally independent of said stiffleg, and a boom-lift cable system extending from a winch on said body over said stiffleg to the point of suspension on said boom.

ROBERT G. LE TOURNEAU.



## REFERENCES CITED

The following references are of record in the file of this patent:


UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 1,414,795 | Suman et al. | May 2, 1922 |
| 1,649,574 | Conway | Nov. 15, 1927 |
| 1,817,859 | Cohen-Venezian | Aug. 4, 1931 |
| 1,917,955 | Dierks | July 11, 1933 |
| 2,078,393 | Le Tourneau | Apr. 27, 1937 |
| 2,149,381 | Young | Mar. 7, 1939 |
| 2,181,253 | Willis | Nov. 28, 1939 |
| 2,327,461 | Rowe | Aug. 24, 1943 |
| 2,382,767 | Zeilman | Aug. 14, 1945 |
| 2,444,835 | Le Tourneau | July 6, 1948 |
| 2,505,088 | Athy | Apr. 25, 1950 |