ARTICLES

A LOW COST, LIGHT WEIGHT EXCAVATOR FOR DIGGING OR CLEANING MOSQUITO CONTROL DITCHES

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During 1947, the design of a new ditching machine was begun for the Morris County Mosquito Extermination Commission.

It was essential that the machine be simple and inexpensive to build for the funds available for this project were very limited. A design was therefore worked out that would permit the fabrication of the principal machine parts in metal working shops nearby, and the final assembly by the mechanics regularly employed by the mosquito commission.

The design also provided for the use of standard parts wherever possible, and that the completed machine be as light in weight as consistent with the service which was expected of it.

Since the machine was to be used only in fresh water swamps or in cleaning fresh water streams, and would have to dig only muck, sand, and relatively soft sod and alluvial soils, it was not necessary to provide for the excavation of rocky soils, stumps, roots, etc.

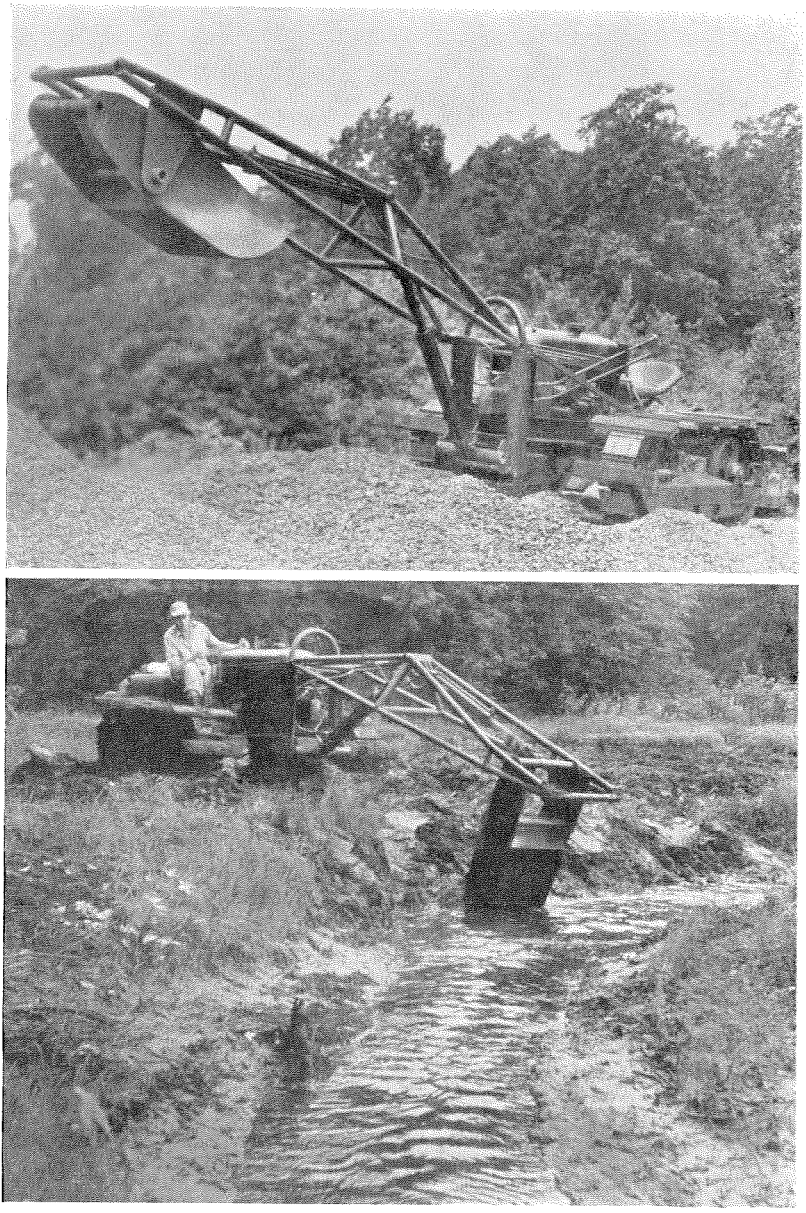
At an earlier date,[1] the Middlesex County Mosquito Extermination Commission had done considerable marsh ditch-cleaning using a slip scraper, chained hoe-fashion to the end of a boom mounted on the front end of a tractor. Consideration was first given to the construction of a duplicate of this machine, but it was finally decided that by the expenditure of a small additional sum, and substituting a trench shovel design, there could be constructed for one-man operation a much more efficient machine, providing complete hydraulic control of the position of the boom and the bucket, at the fingertips of the operator.

Mode of Operation.—On new narrow ditches (22" minimum width for standard bucket) the crawlers may be operated astride the proposed ditch. The bucket is lowered to desired depth, and positioned with its cutting lip forward of center, to present a plow-like edge to the earth. Crawlers are engaged, the machine backs away from the work until the plow action fills the bucket. The bucket cylinder is then energized, the bucket brought to the "closed" position where there can be no loss of the load, the boom is raised, the tractor turned off the center-line of the ditch which swings the boom and bucket clear of the ditch line, where the spoil is dumped on the meadow surface.

For digging harder material, the boom is lowered with the bucket in open position. With the full weight of boom and bucket resting on the ditch bottom, and the crawlers stationery, the bucket is moved to the "closed" position, the arc described by its cutting edge having in this mode of operation considerably increased penetration power.

For use on wider ditches, the machine is operated on one bank, the center line of the machine being at approximately right angles to the center line of the stream. Both types of operation previously described may be used, but the bucket must always be partly or fully closed when passing over the ditch bank, to prevent loss of part of the useful load.

[1] Proceedings of 34th Annual Meeting N. J. M. E. A.—p. 148.



New "Hydraulic Ditching Hoe," now being tested by Mr. James T. Hart, Supt., Morris County Mosquito Extermination Commission, N. J. Designed by Thomas D. Mulhern, N. J. Agr. Expt. Station. ¼ cubic yard capacity.

The machine is easily operated, and none of the 3 persons who have used it had any previous experience with machines of this type.

Mechanical Features: Tractor.—Cletrac H6–68 crawler type tractor was selected because of its light weight (1½ tons) and its width, which allowed bolting on wood treads 24" wide.

Boom Attachment Bracket.—Of welded steel construction, securely bolted through holes provided in tractor frame for fastening attachments. No additional holes had to be bored in the tractor.

Boom.—Of welded steel pipe, made in triangular sections for greatest strength with lightest weight, and is 10' 6" long.

Bucket.—3/16" steel plate, welded construction, digging edge and bottom shape designed for easy penetration, and to allow full bucket to be drawn over ground sled-fashion to dumping point. Bucket capacity ¼ cubic yard.

Hydraulic Pump.—Vickers Power Pak, mounted to tractor main frame, forward of radiator, driven by extension shaft coupled to front end of tractor crank shaft. One 1-way and one 2-way valves provided to operate hydraulic cylinders at 750 pounds per square inch pressure.

Boom Operating Cylinder.—International Harvester 3" x 28" cylinder one way, for power raising and gravity lowering. Spacing of boom and cylinder is such that extending the cylinder to its full length raised the boom only to its highest *safe* position. Overcontrolling is thus impossible.

Bucket Operating Cylinder.—International Harvester 3" x 28" cylinder, used as 2-way cylinder, for opening and closing bucket.

Counterweights.—Steel frame at rear of machine is provided for attaching counterweights. A 1,000 pound counterweight is necessary to balance load of full ¼-yard bucket. When not using boom and bucket, counterweight tray may be used to carry sprayer, duster, or other attachments on the tractor, as the boom and hydraulic equipment can be detached by taking out 7 bolts and two hose connections.

Costs.—Present machinery cost less than $550 (exclusive of tractor, which cost $1,675, delivered September, 1947).

Proposed future developments.—It is proposed, as additional funds become available, to make two improvements: (1) To lengthen the crawler tracks at their forward ends, to reduce or eliminate the need for counterweights. (2) To add a device to provide for swinging the boom sidewise. This will reduce the amount of crawler travel, and add to the efficiency and life of the machine. Costs of increasing the track length and adding the swinging device will probably be less than $1,000.

Blue Prints.—Can be supplied at cost by T. D. Mulhern, N. J. Agricultural Experiment Station, New Brunswick, N. J.

ANNOUNCEMENT

THE 1949 ANNUAL MEETING
of the
NEW JERSEY MOSQUITO EXTERMINATION ASSOCIATION
will be held at
HOTEL HADDON HALL, ATLANTIC CITY, N. J.
March 22, 23, 24 and 25, 1949

YOU ARE CORDIALLY INVITED TO ATTEND

To be sure of receiving a copy of the program when printed, please write to Thomas D. Mulhern, Sec., N. J. Mosquito Exterm. Assn., New Brunswick, N. J.