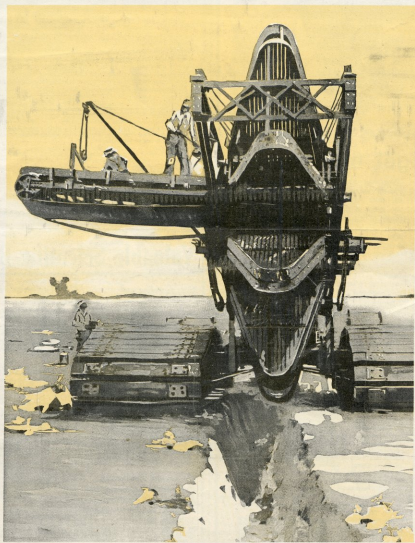


SCIENTIFIC AMERICAN



RECLAIMING WASTE LANDS WITH A GIGANTIC DITCHER.—[See page 258]

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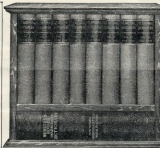
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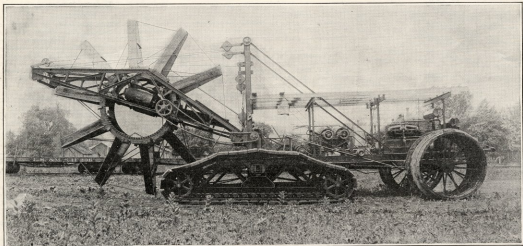
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One of the huge ditching machines used in cutting the canals for the reclamation of the Everglades of Florida. A cabin for the crew has been placed on the beam work over the power plant, after this photograph was taken

Reclaiming the Everglades of Florida

How Huge Ditchers Are Cutting Miles of Drainage Canals Through the Waste Lands

By Day Allen Willey

THERE are some 4,000,000 acres of waste land in Florida, according to the survey of the State engineer, that can be converted into productive farms and attractive gardens through reclamation by drainage—1,500,000 acres more than the territory reclaimed by the United States Irrigation Service. The great variety of crops and the average yield per acre from the land already reclaimed caused a thorough study to be made not only by the State engineer but also by Engineer J. G. Wright of the Department of Agriculture, the engineers of the Florida East Coast Railway, and a ditching company of Baltimore, which was first employed by the State to undertake the cutting of the drainage canals from Lake Okechobee, the flood source, to the tidal river.

After a comprehensive and accurate survey of the topography of the Everglades, it was proved that this part of Florida could be reclaimed by gravity. The first project taken up by the ditching concern was gone over by their engineers to verify the Wright report before the actual work started. The contract included the excavation of four canals of a total length of 200 miles and of an average depth of 5 feet with a six-foot width. When the first canal was completed it flowed from the lake into the New River by the natural incline of the waterway, the rim of the lake being 20½ feet above sea level.

Six ditchers were employed by the dredging concern in carrying out the initial contract. Aside from the ditchers for removing the rock formation, the tooth bucket ditchers and section ditchers, there was also included in the equipment of the workers a floating dynamite plant for shattering the hardest rock. The

excavating ditchers included a slipper and section pipe operated from the same arm.

The largest dredge in service was equipped with a 150-horsepower plant and a section pipe with what is termed a revolving cutter head. The latter was forced through the water, the plant growth, and the mud, carrying the material scooped up in a liquid state through the hull and depositing it on the bank of the excavation. The suction excavator was operated by a 12-inch pump with a capacity for removing 5,000 cubic yards in 40 hours.

For hard formation, the Everglades contractors made use of a special dredge. This machine had a bucket capacity of 2½ cubic yards and was one of the most powerful type of dredges constructed up to that time.

In the accompanying views are shown a few of the ditching machines employed in the Everglades reclamation work. One of these ditchers, operated by gasoline power, not only digs trenches, but also pulverizes the surface of the muck lands so that they are ready for farming after the drainage has been completed. The same machine, it is claimed, has a capacity of over 500 linear feet of soil in 10 hours.

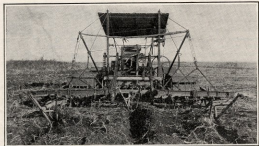
Another ditcher employed in the work is operated by a steam power plant. Its teeth, mounted on a large wheel, are capable of cutting a trench 400 feet long every working day, to a depth of 6 feet and a width of 3 feet. Still another type of ditcher, operated by a gasoline engine, is equipped with a cabin placed over the power plant. In this cabin there are berths for all members of the crew, who can sleep comfortably in their lofty quarters, no matter where the machine may

stop work for the night. On top of the cabin is a searchlight, which serves to good stead in nocturnal operations and for the pleasure of the crew.

The first excavation work included canals extending from cuts through the rock rim of the lake to tidal rivers. The complete canals range from 50 to 60 feet in length, and have a depth of 6 to 7 feet. The cutting of 2,000 miles of lateral canals by gasoline ditchers served to reclaim 1,500,000 acres of swamp land through which the water flowed into the canals. And the success of this work proved that the remainder of the Everglades—2,500,000 acres—could be reclaimed by the natural incline of the surface, from the flood source to the rivers entering the sea. There has since been a second contract taken up by a subsidiary of the Baltimore dredging concern for the reclamation of another large portion of the Florida waste lands, which will make all the waste lands, or a total of 4,000,000 acres, ready for cultivation when the work is completed.

The new contract includes the excavation of nine canals, aggregating 425 miles. All of these waterways are now under way, with widths ranging from 50 to 60 feet for the larger ones, and an average of 25 feet on the three smaller ones. The depth of the main canals ranges from 5 to 7 feet, while the others average 4 feet. The work of excavation being performed by dredge mucks use of such types as the slipper, clamshell, and suction machines, also two floating dynamite plants for rock excavation, which are equipped with steam-driven shovel buckets for removing the rock blown out from the bed of the cut.

So much of the last reclamation has been ac-



A ditcher that not only digs trenches four to six feet deep but also prepares the soil for subsequent farming



The same ditcher as that shown in the illustration above, after the cabin had been mounted in place

established that within a year the entire area will be ready for the farmer and the settler. The 4,000,000 acres represent only a small proportion of the total swamp lands of the United States on which millions of people might find homes and occupations, if they were properly drained. And drainage is not only possible but also inexpensive, considering the value of the land reclaimed for settlement.

The Everglades, where drained, are being occupied by settlers from many other parts of the country.

Every kind of fruit and vegetable raised in the temperate zone can be cultivated at a profit in Florida. Oranges, bananas, pineapples, and other varieties of tropical tree and bush products may be added to the list of fruits. The farms under cultivation since the reclamation work prove this to be true.

The new land is being sold in large tracts by the State authorities to be divided into tracts and other farms by large corporations that have been organized in various cities, but the possibilities for producing sugar are perhaps the most important.

It is interesting to note in passing that while the Government went to an estimated expense of \$50,000,000 for the cost of reservoirs and the necessary work, including irrigation canals, the State of Florida will reclaim a great submerged area one third larger than the total irrigation acreage by a bond issue of \$4,500,000, or less than one tenth the cost of the Federal irrigation project.

A Machine That Prints One Hundred Miles of Printed Matter in Ten Hours

By Oswald T. Curtis

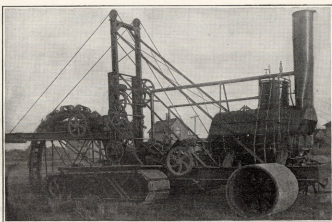
ONE hundred miles of printed sheets in 10 hours—just newspapers, but high-quality 9 x 12 printed matter—is the productive capacity of a remarkable printing press now in operation in New York City. The machine can be used for almost any class of printing; as an example, it prints tickets in two different colors on each side, bearing an individual number, perforated to tear at the proper place, and having a triangular piece cut out of each side, the finished tickets being rolled into a solid wheel one foot in diameter ready for the ticket booth of a subway or motion picture house; as the case may be. Ten hours' production of these tickets, if placed end to end in a straight line, would stretch over a distance of some 400 miles. And this is by far one of the easier accomplishments of the newly-introduced printing press.

Printing labels in several colors is a forte of the new printing machine. It will turn out labels in four colors for canned goods, beautifully printed, at the rate of 4,000 impressions per hour and delivered cut to the exact size to fit the can. Again, it will print match-boxes in two colors on both sides, and perforate, score and cut them out with a die without affecting the rate of production.

Once more, the machine may be used to produce gum labels in two colors and punched with holes similar to a millage ticket, or it may be mill-heads perforated for tearing off various portions and punched in two or more places for convenience in filing in loose-leaf binders.

Baggage tags can be printed, die cut and reinforced by a piece of cardboard around the hole with the machine scarcely making more noise than a dozen typewriters.

The new printing press



Steam-operated ditcher with a capacity of 400 feet of trench six feet deep and three feet wide per day

is made to take sheets ranging from 6 x 6 inches to 9 x 12 inches, and is fed from a roll of paper somewhat after the fashion of a newspaper press. The roll of paper is controlled by a device which prevents it from being fed into the machine too rapidly or too slowly. The machine is built in sections, varying in length according to the number of operations it is intended to perform; in fact, it may be looked upon as a series of printing presses, folders, die-cutters, slitters, scowers, gumming machines, and other printing equipment condensed into one unit. The machine illustrated is 4½ feet high and 21 feet long, of a weight of about 14,000 pounds. Its operation calls for a 7-horsepower motor.

The edge of the paper used in the press is gripped by rollers and proceeds into and under the first printing press, which is operated much in the same manner as a small trip hammer, the type being locked in the chase and brought down on the paper for the impression. The taking rollers lift the type or form with a sweeping motion, and if the job at hand is to be printed on both sides, the small press under the machine also operating in a like manner. Any press can be stopped and others kept operating; for instance, if the underside of the sheet is plain printed matter while the top side is color work, then the number of operating presses underneath the machine cover are less than those above, and vice versa. Another feature of the machine is that the punching and perforating mechanism can be regulated to punch or perforate at any speed or in any position in the sheet passing through the mechanism. As an example of the versatility of the machine in this connection, let us

take a combination original and duplicate bill-of-lading, which is to be printed on both sides and perforated through the center so that the duplicate can be torn off from the original. The original can have two or more holes punched in the top or side of the sheet, while the duplicate sheet can be passed through without holes. The numbering mechanism can be adjusted so that the original and duplicate forms will receive the same number, changing only for the next two sheets.

The illustration fails to show the underside printing press mechanism because of the side frames which hide it; but in general construction this mechanism is practically the same as the presses operating from above, the only difference being that the type is brought to the paper with an upward movement. The roller impression on the underside of the sheet, leaves its register obtained on the machine, considering the great speed, cannot fail to appeal to the printer; while to the mechanical engineer the synchronization of the multitudinous operations is a study in itself well worth investigating.

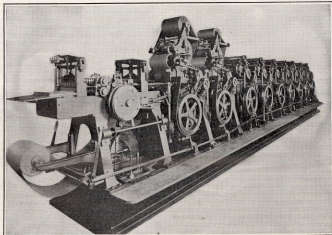
The slitters, as the name implies, are used in cutting the full sheet lengthwise into varying widths for narrow strips of paper or cardboard, such as tickets or tags. These are in the form of knife-edged disks which press down firmly on the paper that has already passed through the printing presses.

In sum, the machine consists of a number of printing presses handling any number of colors on both sides of the sheet; perforating mechanism to perforate the work in any manner desired; slitters to slit any sized sheet up to the capacity of the sheet; punching devices to punch any number of holes at any required distance and of any size; scowers to scower paper boxes, cartons or match boxes to permit of their subsequent folding; gumming facilities for gumming labels and shipping tags, and to reinforce leaflets; trimmers to cut any sheet to a given size and to cut tabs on index cards, and a numbering machine to number the work consecutively or individually. In truth, the machine does the work of eight distinct machines usually found in the better equipped printing shops.

Lobster-Rearing Plant on New England Coast

THE sturdy civil appropriation act, approved July 31, provides \$5,000 for the construction and equipment of a lobster-rearing plant on the New England coast. The United States Bureau of Fisheries is now making investigations to determine the best available location.

The Bureau hatched 128,700,000 lobsters in Maine and Massachusetts during the year ended June 30th, but owing to the character of the facilities available at the hatcheries it was necessary to plant them almost immediately after they had issued from the egg. At this stage they swim near the surface of the sea and are particularly subject to destruction by fishes. The new plant will make possible the rearing of a considerable number of them to a stage at which they acquire the habit of seeking safety among the rocks and in the crevices of the sea bottom. It is especially designed to prevent the practice of cannibalism, which produces a situation similar to that of the Killdeer eels when large numbers of the little lobsterlings are confined in a small space and which defecates attention to rear them in the existing plants of the Bureau.



Consisting of a number of machines grouped together to operate as a unit, this printing press is capable of a wide variety of work