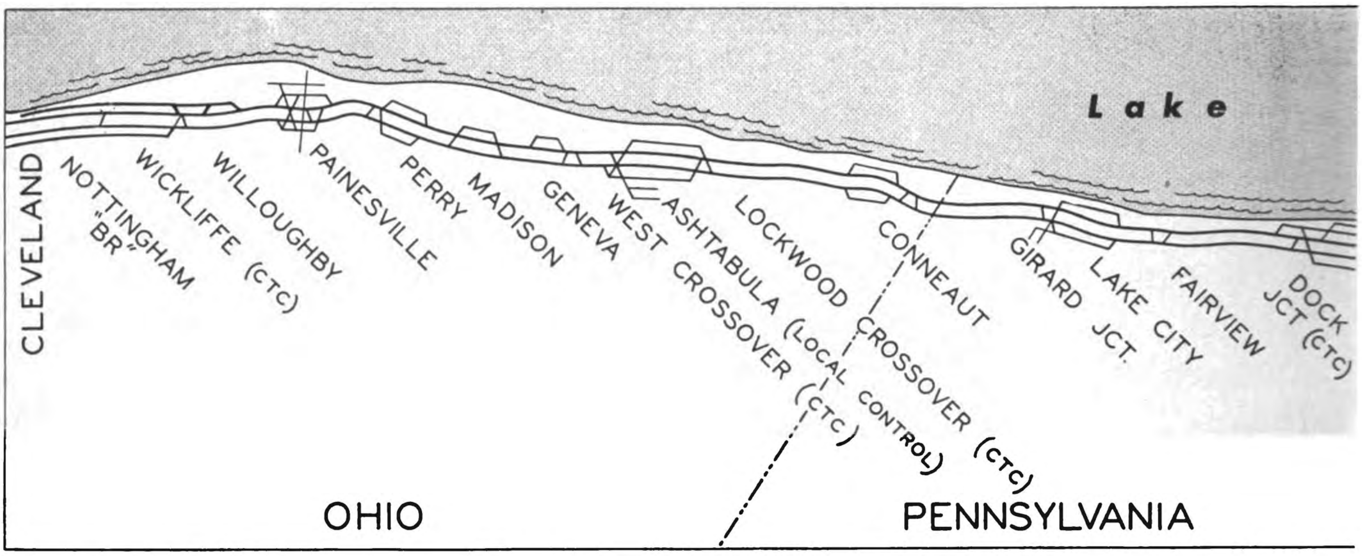


POWER CROSSOVERS AND SIDINGS as shown will be included in the new centralized traffic control system . . .

New York Central's CTC—

It's Four Tracks to Two

On 163 road miles between Cleveland, O. and Buffalo, N. Y., two main tracks are being taken up, and CTC installed on the two remaining tracks, authorizing train movements in either direction on each track. CTC machines have fleeting controls

Progress Report

Because of the great interest in the New York Central's announcement that they are to remove two main tracks and install centralized traffic control on the two remaining tracks, we made a special trip to Cleveland, Erie and other points on the line to obtain an "on-the-scene progress report" concerning this project. When talking with the men who are working on the design and construction, they told us of many interesting developments which will be of interest to you. We are presenting this information now, while work is underway, rather than waiting for the completion of the job. This is article No. 2 in a series on "Modern Systems of Signaling Controls and Circuits." The first article, about a new interlocking control machine on the Reading, was published in the October issue. Watch for other articles in this series next year.

John H. Dunn, Editor

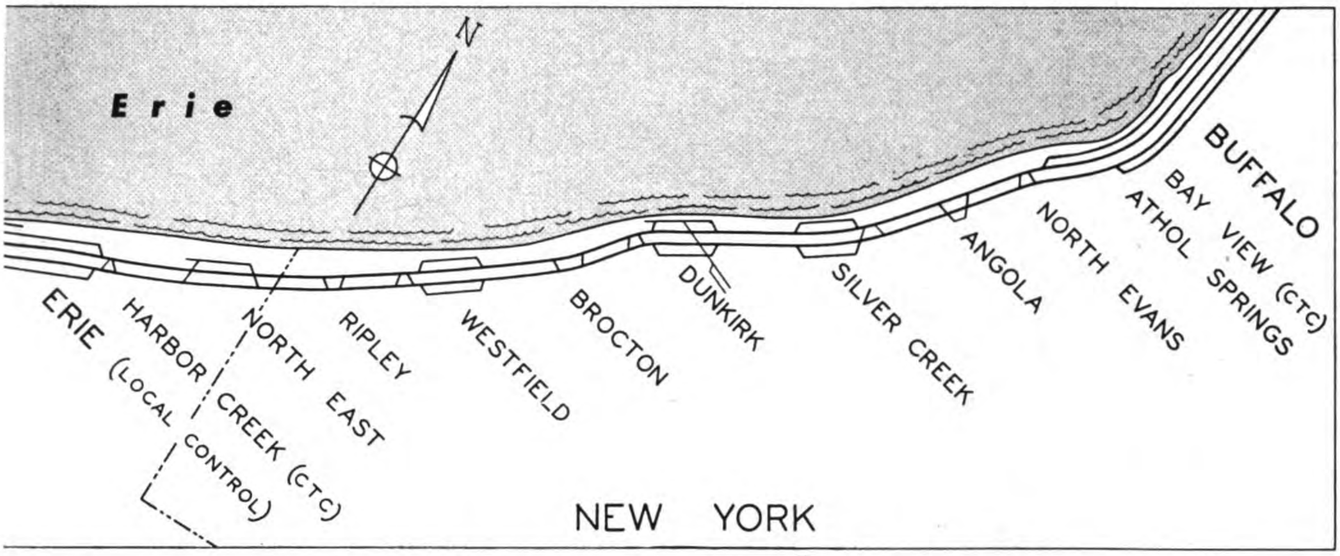
IN MAY, the New York Central announced a proposed project including the removal of two main tracks on 163 road miles of four-track main line, and the installation of centralized traffic control for train movements in both directions on the two remaining tracks. Now the planning and early stages of construction have proceeded to an extent that we can give you a progress report including many details not previously available. This CTC project, which is to cost $6 million, will pay for itself through reductions in maintenance and operating expense. In addition, a large quantity of the 127-lb. rail and ties, removed from two tracks taken up, will be available for use elsewhere.

Two outside tracks will be taken up. On track 4, to be removed, the speed is now 50 mph, and on track 3, to be removed, the limit is 30 mph. On tracks 1 and 2, which are to be left in place, the speed limit has been, and will continue to be, 80 mph for passenger trains and 60 mph for freights. The traffic consists of 85 or more trains daily, half of which are passenger trains. Each of the four tracks was signalled for one direction only, tracks 1 and 3 westward, and tracks 2 and 4 eastward. Up to now, the passenger trains and many of the faster through freights were operated on tracks 1 and 2, other trains being operated on tracks 3 and 4.

Main-Track Crossovers

The track capacity to operate the 85 or more trains daily, on the proposed two tracks only, is to be secured by more intensive use of these two tracks. Each track is being signaled for train movements both ways, just like two single-track lines side by side. Power operated crossovers, spaced an average of 7.3 mi. apart, will be used to divert trains from one track to the other, so that idle sections of the "other" main can be used to run fast trains around slower ones.

To determine where the crossovers between the two



. . . with the exception of locally controlled interlockings at Ashtabula, Ohio and Erie, Pa.

main tracks should be located, the train movements for typical days were "redispatched" on "time-distance" charts, according to what could be done with CTC on two main tracks. Then the proposed locations of crossovers were shifted according to local considerations. For example, a main track crossover and an end of a siding were spotted together to form one remote control CTC interlocking.

In the CTC territories, there are to be a total of 42 crossovers between main tracks 1 and 2. These layouts are spaced an average of 7.3 mi., the maximum being 11 mi. and the minimum 4 mi. Model 5C, 110-volt d.c. switch machines are to be used, these high-voltage machines providing fast operation, considered essential because of the high density of traffic. All power switches are to be equipped with dispatcher-controlled snow melters.

Sidings for Switching

Two-mile sections of tracks 3 and 4 (the two outer tracks) are to remain in service as "work sidings" being located at towns where considerable local switching is required. House tracks, industrial spurs, etc. are connected to these sidings through hand-throw switches equipped with circuit controllers. The sidings have power switches and No. 20 turnouts, and may be used for passing trains. Their capacity is such that a 150-car train can pull into the siding at 30 mph, and still have enough track length to stop short of the leave-siding dwarf signal. The CTC territory is to include 22 of these "work sidings", 12 of which are to be sections of track 3 left in place, and 10 of which are sections of track 4.

Eleven Interlockings Now CTC Controlled

The entire centralized traffic control territory is to be controlled from two machines located in the dispatcher's office in Erie. One machine will control switches and signals between Bay View, N. Y. and Girard Jct., Pa. (94 mi.) with one break at Erie. The break is for 11 mi. between Harbor Creek and Dock Jct., these two points being CTC controlled. The west end CTC machine controls from Girard Jct. to "BR" tower at Nottingham, Ohio (63 mi.) with a five-mile break through Ashtabula, Ohio. Previously existing locally controlled interlockings were retained in these "break" areas because of the large number of industrial and local switching moves.

Eleven interlockings, which were either locally or remotely controlled, will be controlled from the CTC machines. Six of these interlockings were on the east end at Angola, Dunkirk and Westfield, N. Y., North East, Dock Jct., and Lake City, Pa. Five interlockings on the west end were at Girard Jct., Pa., West Crossover (Ashtabula), Madison, Painesville and Willoughy, Ohio.

New Ideas in CTC Machines

These CTC machines include several outstanding features, developed by the New York Central, which simplify and expedite manipulation. On the diagram, the lever for each switch is mounted in the ¼-in. white line which represents the track where the "turnout" joins the "straight track." For a crossover, the lever is at the center of the white line representing the crossover. An indication lamp in the face of each switch lever is white for "out-of-correspondence" and red for "locked." As further aid to the dispatcher to "see" the routes which he is lining up, the ¼-in. track lines include small triangular sections which are moved to repeat the operation of switches, so that the route being lined is indi-

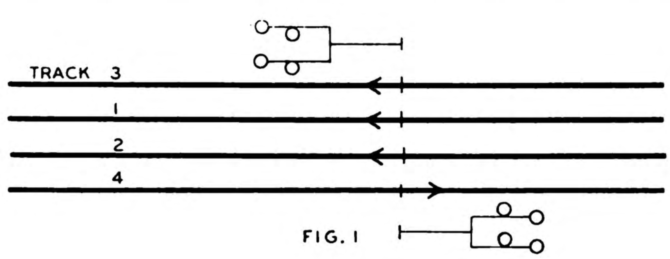


FIG. 1

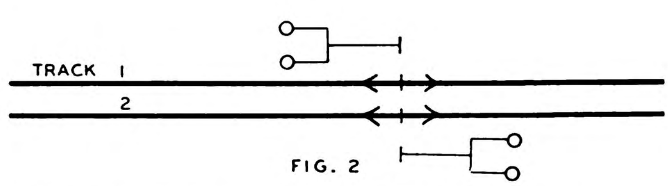
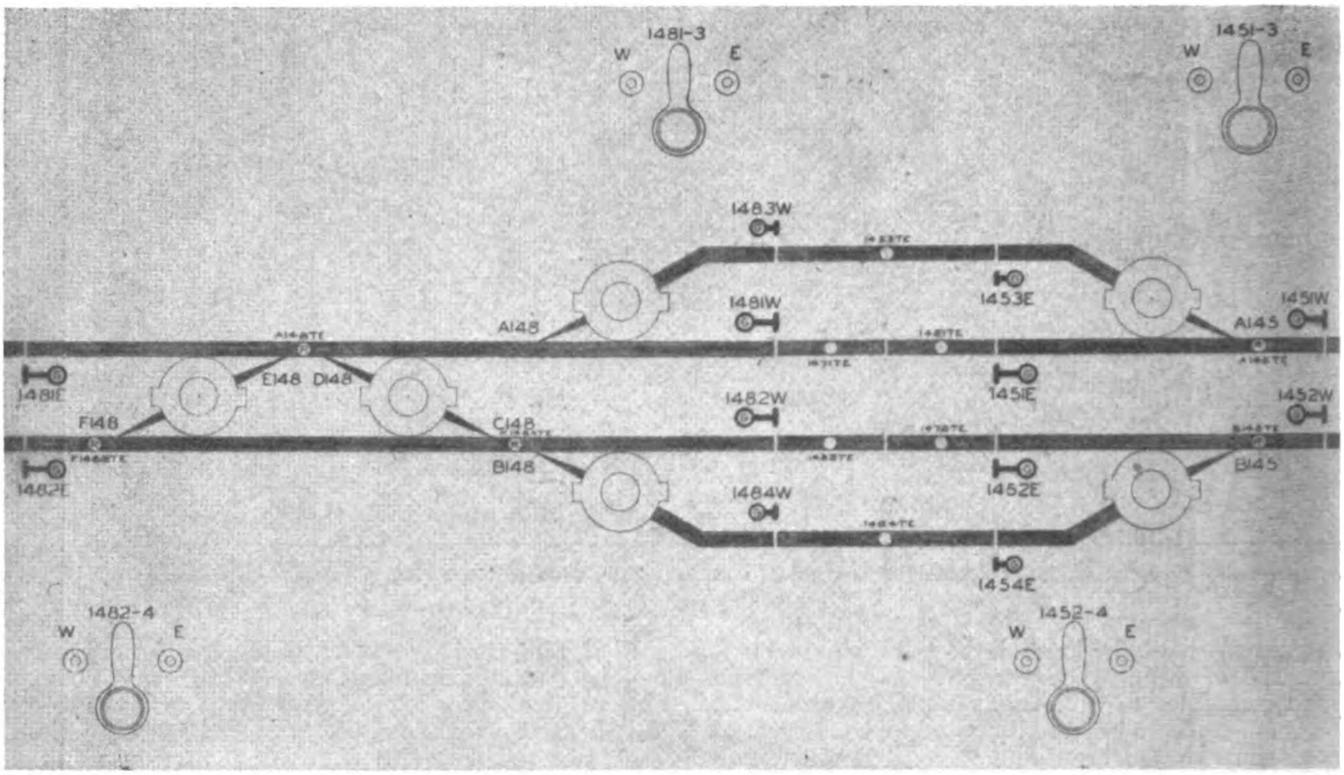


FIG. 2

BEFORE CTC: Fig. 1 shows signaling for single-direction operation on each of four main tracks. AFTER CTC: Fig. 2 shows signaling for either-direction movements on each of two main tracks. Service road will be outside these tracks



CTC MACHINE PANEL has crossover and switch levers which are in track diagram so that when they are operated a continuous line is shown for the route lined. Signal levers are above and below track plan

cated by a full width ¼-in. white line.

The signal levers, with their associated indication lamps, are located adjacent to the symbol for the track on which the signal governs, there being two horizontal rows of signal levers—one above the track diagram and the other below. Thus the levers are located on the diagram at the places corresponding to the signals in the field.

If two or more following trains are to use the same route through a CTC interlocking, the dispatcher can set up "fleet" control by throwing the signal lever and then raising a toggle switch immediately above that lever. This removes "stick control" so that after the passage of one train, the signal will again clear for the next one, without further attention by the dispatcher. No manipulation, other than ordinary operation of a lever, is required to control a call-on aspect.

In many previous CTC projects, train occupancy of the section of several miles between crossovers or siding layouts is indicated by only one or perhaps two track-occupancy lamps on the dispatcher's diagram. In order that the NYC dispatchers may know exactly of the location and progress of each train, the new machines have a track-occupancy lamp corresponding with each automatic block.

This is the first large installation employing Syncroscan for the transmission of controls and indications. Controls are sent in 1½ sec. Scanning of field stations gives the dispatcher a continuous check of indications with a maximum delay of 4 sec. after change. The system is duplex in operation, in that controls and indications may be transmitted simultaneously without interference.

Longer Block, Fewer Aspects

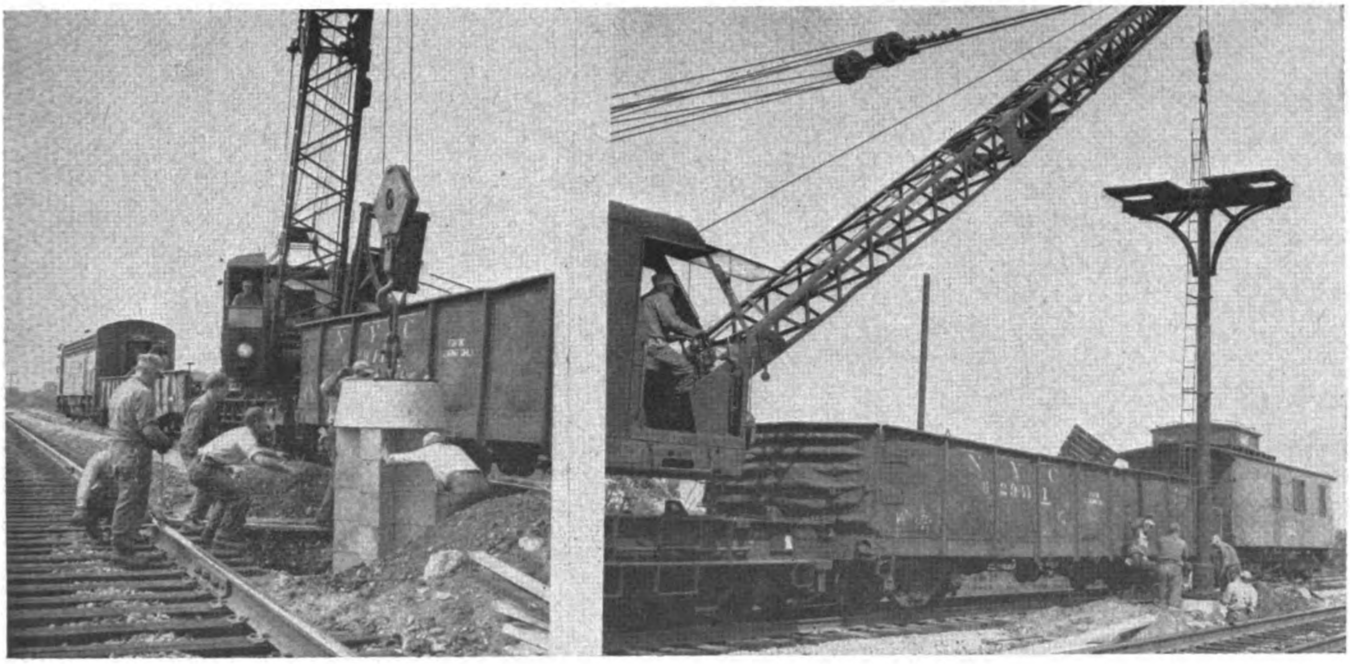
The previous single-direction automatic signaling on all four tracks included four-aspect signals with blocks about 5,200 ft. long. The new automatic signaling for both directions on each of the two tracks is to use three aspects with blocks about 10,000 to 12,000 ft. long. In approach to stations where passenger trains stop, such as Dunkirk, Erie and Ashtabula, signal block length is adjusted, and appropriate signal indications provided on both main tracks so that trains can close up without being required to make unnecessary stops. The intermittent inductive train stop system, including wayside inductors at all main track automatic and interlocking signals, is being revised according to the new locations and controls of wayside signals.

Flashing Aspects for Crossover Routes

In order to direct enginemen to bring their trains up to and through the crossovers at the speeds for which they are designed, special aspects are included in this new CTC project. If a route includes a diverging move on a No. 20 crossover reversed (good for 45 mph), the home signal aspect is red over flashing green over red, which indicates proceed, limited speed within interlocking limits. If only one block ahead is unoccupied, the home signal aspect is red over flashing yellow over red, indicating proceed at limited speed, prepared to stop at next signal. Limited speed is defined at 45 mph. The approach signal will display yellow over flashing green to indicate approach the next signal at limited speed.

If the turnout is a No. 16, then the home signal will display medium speed aspects for crossover moves; i.e., red-green-red indicating proceed; medium speed within interlocking limits; or red-yellow-red, to indicate proceed at medium speed preparing to stop at next signal. The approach signal will display yellow-green to indicate approach the home signal at medium speed. Medium speed is defined at 30 mph.

The sidings are track circuited, not only to control track-occupancy lamps on the dispatcher's diagram, but also to control signals. The turnouts to sidings are No.



PRECAST CONCRETE sectional foundations are set for bracket masts. One signal gang handles this work

20, signaled for entry at 30 mph. The aspect for a train to enter an unoccupied siding is red-yellow-red, proceed at medium speed, preparing to stop at next signal. The approach signal will display yellow-green to indicate approach next signal at medium speed. If the siding is occupied, the dispatcher can still line a route into it, in which case the home signal will display red-red-yellow to indicate proceed at restricted speed (15 mph). The approach signal will display yellow-red to indicate proceed prepared to stop at next signal, trains exceeding medium speed must reduce to that speed. The leave-siding dwarf may display four aspects: flashing green, proceed at limited speed within interlocking limits; flashing yellow, proceed at limited speed prepared to stop at next signal; yellow, proceed at restricted speed; and red for stop.

Construction Work

Several phases of the early construction work are being carried on simultaneously: as for example; the staking out on the ground of the remote interlocking (crossover locations); taking automatic block signals out of service; and rearranging the track circuits for the highway crossing protection for high-speed train movements in either direction on both main tracks.

One of the earlier portions of the construction work was the lengthening of blocks, by the simple process of taking every other automatic signal out of service, a total of 198 such signals being removed. Existing automatic signals were spaced about 5,200 ft., the westward signals for tracks 1 and 3 being on one bracket mast north of the tracks, and the eastward signals governing movements on tracks 2 and 4 being on the other bracket mast south of the tracks. In the new two-track arrangement, the same bracket mast, perhaps at different locations, will be used for new automatic block signals.

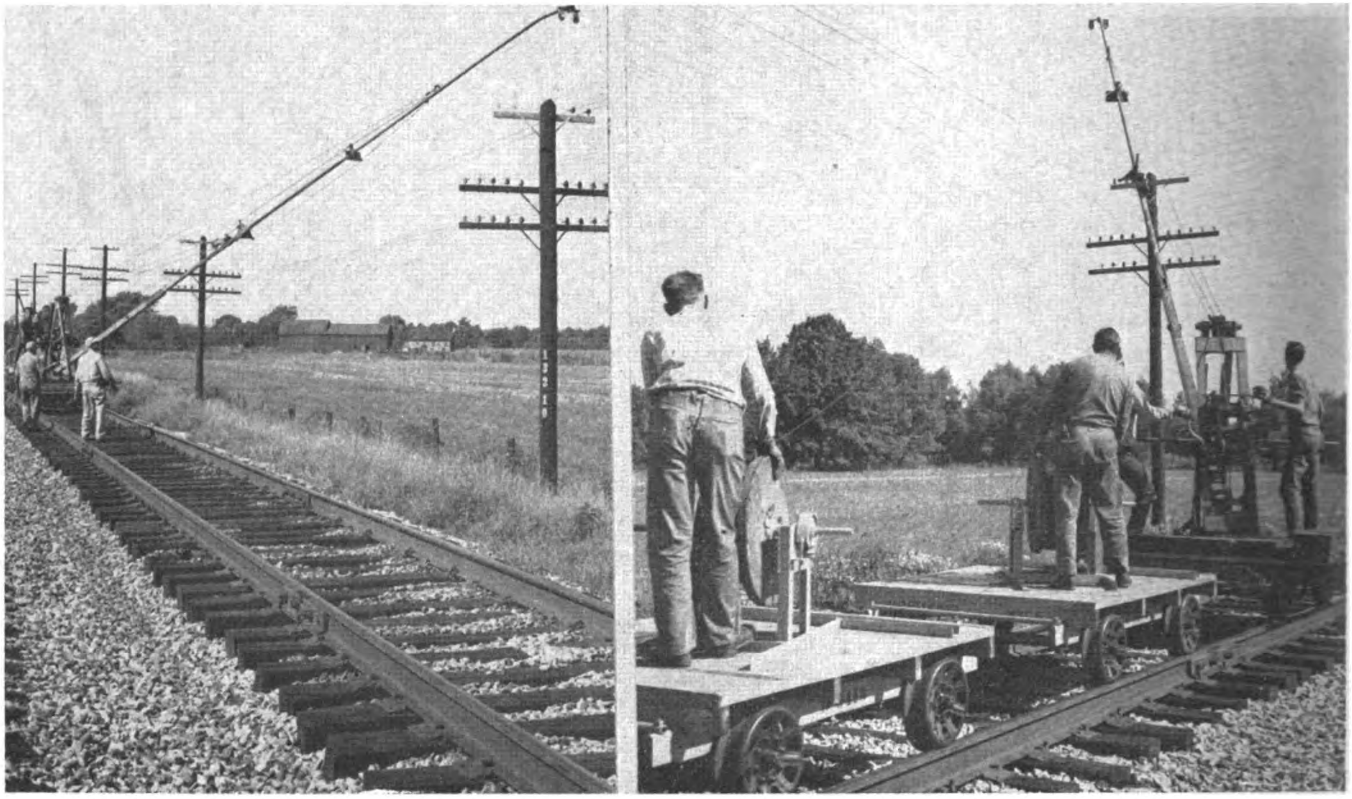
First, a signal removal gang, turned the light units toward the field side of the track, and cut the wires to the signals and to the wayside inductors. Then they tied the line control circuits through between existing signals, but eliminated the yellow-green aspect. One gang worked from each end of the division toward Erie. Later the gangs returned to remove the light units, relays, cases, bracket masts, etc., so that the material could be used elsewhere.

TRENCHER can dig a trench 42 in. deep for underground cable

At new signal locations, pre-cast sectional concrete foundations are used for the bracket mast. Each foundation is 5 ft. square at the base and 7 ft. high and weighs about 3½ tons. These foundations, made by Permacrete Products Company, were assembled in the manufacturer's plant, and were shipped in gondolas. A work train was used to haul the foundations and bracket masts to new signal locations. Pneumatic tools such as diggers and jack hammers were used where necessary when digging the holes. A diesel crane was used to set the foundations and the bracket masts.

Code Line Strung by Machine

A new six-pin top arm replaces the former two-pin top arm on the signal pole line. The 440-volt a.c. power wires were transferred from the old top arm to the north



WIRE STRINGING MACHINE lays wire pair on top of crossarm. A line gang using it can string 3 mi of code line per hour

end of the new top arm. The CTC code line consisting of two No. 8 Copperweld, 40 per cent conductivity, wires with Hazaprene insulation are being strung on the south end of the arm. The code line is transposed, using a point-type transposition bracket every seventh pole.

These code line wires are being strung by a special machine which is basically a derrick with a 53-ft. boom mounted on a track car. The boom is telescopic so it can be lengthened to 61-ft., or it can be shortened to 15-ft. The code line wires are fed from reels mounted on a specially constructed mandrel with a brake adjustment which is used to reduce backlash of the wire. The wire feeds from the reels, and pays out through sheaves at the end of the boom, being laid up on the top crossarm. A track motor car pulls the derrick car, and the two track cars with the line wire reels (5,000 ft. of wire per reel). Splices using Nicopress sleeves are made on the track cars. By using this mechanized operation, the line gang can string three miles of code line per hour. A patent has been applied for this special machine which was designed by L. A. Jackson, field signal engineer, and O. H. Steffens, signal construction supervisor, and built in the Ashtabula shop of the NYC under the direction of H. A. Smolka, departmental foreman.

Fifteen Months to Install CTC

The construction is now well underway, and the project is scheduled for completion by September 2, 1956. Twenty-three cut-ins, each including 8 to 10 miles, will be made beginning at Buffalo and Cleveland, working toward Erie. After each cut-in is made, sections of tracks 3 and 4 between sidings will be removed. The roadbed of these former tracks will be graded as a service road for off-track equipment.

Construction headquarters is at Erie, with work being directed by L. A. Jackson, field signal engineer. O. H. Steffens, signal construction supervisor, has charge of installation work between Erie and Nottingham; and J. V. Hancock, signal construction supervisor, has charge of installation work east of Erie. Eight gangs handle the construction work, each gang consisting of 14 men and a foreman. Four gangs working on the east end are headquartered at Dunkirk, and the four gangs working the west end are headquartered at Painesville and Ashtabula (two gangs each.)

Four Types of Work Being Performed

Each gang does a particular type of work. On the east end, for example, the four gangs are assigned work as follows: (1) one pole line gang strings the CTC code line, puts on crossarms, sets new poles where required, etc.; (2) one removal gang takes signals out of service, relocates automatic signals including moving of relay cases and equipment; (3) one installation gang installs cable at remote interlockings and automatic block signal locations; and (4) one wire gang does case wiring in the field at the automatic block signal and highway crossing locations. The four gangs on the west end are similarly assigned. Each gang has a truck and a motor car for hauling men and materials to job sites. One pole line gang has a conventional line truck with an "A" frame and winch with power take-off, and the other line gang uses a 1½-ton closed body truck. The other gangs have 1½-2 ton stake trucks. Concurrently with signal construction work, the track department is relocating existing crossovers, installing new crossovers and turnouts for ends of sidings, etc.

The engineering, circuit design and installation work is being done by railroad forces under the jurisdiction of H. A. Scott, chief signal engineer. The major items of signaling equipment are being furnished by the General Railway Signal Company.