The leading wires running from the holes to the machine should be strung toward the upstream end, and should be sufficiently long so that the operator is at a safe distance from flying ice.

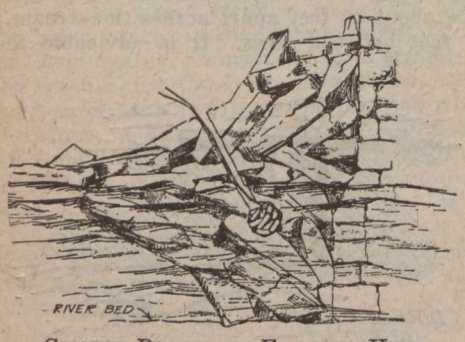
If it is inconvenient to use electric firing, the charges can be exploded by means of fuse and blasting caps; but care should be taken to protect each cap from water by smearing heavy grease or soap at the point where the cap is inserted in the dynamite. Also, a good grade of waterproof fuse should be used. Of course, in the latter method only one hole at a time can be fired, while with the electric method as many as desired can be set off simultaneously with much greater efficiency, assurance and safety. Good safety fuse burns at the rate of about 30 seconds per foot. Do not have a fuse too long, as this means that the fuse and cap are exposed to water a longer time. The bundles can be all made up and tied to the cross sticks and about 2 or 3 feet of fuse used in each. Fuses can be lighted before bundles are dropped in the holes. One minute is ample time for all to get away to a safe distance before the charge explodes.

The size of the charge per hole will depend entirely upon the thickness of the ice. If two or three feet thick, about six 1¼-in. x 8-in. cartridges, or three pounds, should be used in each hole. If thicker than this, from 8 to 10 cartridges or more should be used. Be sure to get the holes through the ice, as much greater efficiency is obtained by exploding the dynamite in the water than in the ice itself.

If the gorge or jam has actually formed it is well to honeycomb the ice below the gorge, as above described. Then at about mid channel, or what appears to be the weakest point of the gorge, a heavy charge of dynamite should be placed, under the ice, if possible; often it may be necessary to fire two or three heavy charges at different points if the gorge is a large one.

If it is impossible to get through the thick ice to the water by ice spuds, a hole can be dug partially through and a small charge of say 8 to 10 cartridges fired in it. This charge will enlarge the hole and probably break through and permit placing the heavier charge in the water under the ice. If the first light charge does not break through or make a large enough cavity, try a second or a third charge if necessary.

The size of the heavy charge will depend, of course, on the thickness and extent of the ice mass, and may vary from 50 to 100 pounds up to a ton or more. Size of charge must be regulated also according to the location and proximity of structures that might possibly be damaged by the explosion. It would be inadvisable to blast too heavily if too near a bridge pier, a cable line, dock or a factory building on shore. If, however, nothing like these interfere it is well to use larger sized charges. The tendency of most people in using dynamite for blasting ice is not to use enough. The reason is that the work is usually performed by those who have very little knowledge and a very exaggerated idea of the force of high explosives.



CHARGE PLACED TO ENLARGE HOLE

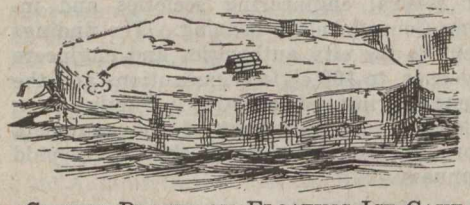
In breaking the great ice gorge at Niagara several years ago, 2,100 pounds of 60% dynamite were used at one time, distributed in three charges, before the ice gave away.

We know of a rather amusing case where just the opposite prevailed:

An ice gorge had actually formed in the river near a certain city, and the chief of the local fire department decided to try blasting. The chief of police had ordered all windows of houses and factories opened within several hundred feet of the river bank, and the factories vacated. No one was permitted to get anywhere near the work. They then proceeded with great fear and trembling to explode one cartridge—8 ounces—on a mass of ice that would actually require at least 100 pounds!

It is well, therefore, in blasting ice to err on the side of over-charging, as this sort of blasting can usually be carried on without fear of injury to adjoining or nearby property.

When heavy charges are necessary, dynamite can be placed in position in its original cases, containing 50 pounds each.


CHARGE PLACED ON FLOATING ICE CAKE

If the ice is floating, a gorge can often be prevented from forming at some lower point in the stream by shattering and breaking up the large floating cakes before they reach the narrow part or obstruction.

Breaking these large floating cakes is best accomplished by throwing charges of dynamite onto the cakes from the shore; or, if possible, from the downstream side of bridges considerably above the danger point. Each charge should be primed with a blasting cap and fuse, and a charge may vary from two cartridges to eight or ten cartridges of 40% tied securely into a bundle with a cord. The bundle can be wrapped in old newspaper or gunny sacking, which makes it less liable to roll or slide off the ice. In blasting ice in this way it is necessary to light the fuse while the dynamite is in the hands of the blaster, and particular attention should be given to having the fuse plenty long enough, and the charge must be thrown just as soon as the fuse is lighted.

It is most essential to make sure that the dynamite is thoroughly thawed before using, as chilled or frozen dynamite will not give satisfactory results. For that reason, low freezing dynamites like 40% to 60% dynamite is recommended for this class of work.

Do not leave dynamite exposed too long to cold water. Get all holes dug and bundles made up before loading, and place and fire the charges as quickly as possible.—From the Dupont Magazine.

NEW CONSULTING FIRM IN TORONTO

ANOTHER firm was added last month to the list of consulting engineers in Toronto, when E. J. Philip & Sons established an office in the Hamilton Trust Bldg., Queen St. West. Mr. Philip has just returned from Porto Rico where he spent two years with the Roberts Filter Mfg. Co., Inc., of Darby, Philadelphia, Pa., on American government business in connection with emergency water supplies. Previous to his connection with the Roberts Filter Co., Mr. Philip was manager at Brockville, Ont., of the gas, electric light and waterworks departments, and had previously held a similar position at Kitchener, Ont., where for seven and a half years he had been manager of the gas, electric light and street railway services. Prior to moving to Kitchener, he spent seven years as mechanical and electrical engineer with the T. Eaton Co., Ltd., Toronto. Engaged in private practice with Mr. Philip will be his two sons, one of whom has been in France for the past four years with the 11th Battery.

At the Irrigation Convention, held last week at Lethbridge, Alta., an irrigation plan involving the expenditure of $2,500,000, was discussed. This work would irrigate about 100,000 acres. The water would be obtained from the Old Man River, west of Macleod. Other irrigation projects discussed would require an expenditure of from $5,000,000 to $15,000,000.