THE EVOLUTION OF THE INTERNATIONAL RACING YACHT.—I.

It was during the fall of the year 1887, and at a time when the ever memorable Volunteer-Thistle contests were in full swing, that the writer had occasion to visit a railroad construction camp that was located high up in the Cascade Mountains of Oregon. It was a remote, a weird and romantic spot, and set amid those surroundings of giant forest, frowning precipice, and snow-clad peak that go to make up the grandeur of Western mountain scenery. It was the last place on earth in which one would look to hear of yachts and international cup racing. Yet here, three thousand miles from Sandy Hook, sat a group of typical Westerners discussing the merits of keel and centerboard boats with an intelligent earnestness that would have done credit to a crowd of Down East fishermen or Sandy Hook pilots. The episode was characteristic of that widespread interest in these contests which is to be found in every corner of the land. Many a sleepy hamlet, whose periods of excitement are strictly limited to the Fourth of July and the annual advent of the itinerant circus, scans its morning paper with a feverish interest on the day of a cup contest, to see whether the mantle of George Steers, the designer of the famous America, has fallen upon worthy shoulders.

The present paper will trace, in a brief way and with the aid of diagrams, the development of the racing yacht in the last ten years, and will show the evolution from American sloop and English cutter of the present accepted type.

In the history of cup contests, these ten years may be called the period of the "single-stickers;" of the sloop versus the cutter; or, as it is more commonly named, the centerboard versus the keel.

Previous to the coming of the Genesta, the two types of yacht, American and English, were radically different. The American sloop, Fig. 6, was a boat of wide beam, shallow draught, and small displacement, with an insignificant amount of ballast, which was often moulded in between the ribs on each side amidships, and known as "wing ballast." She carried a large sail spread, and last, but not least, to prevent her shallow hull from sliding bodily to leeward when on a wind, she had a centerboard.

The peculiarities of her rig, Fig. 4, consisted in great length of mainmast, giving a lofty hoist to the mainsail, the gaff being peaked rather low; a relatively short topmast; a single head sail, which was laced to a boom, the mainsail being also laced to the main boom. Her bowsprit was fixed and had a sharp upward rake from the bow.

The English cutter, Fig. 7, was marked by characteristics directly opposite to those of the sloop. She had narrow beam, deep draught, and large displacement, and carried a perfect "lead mine" of ballast, bolted to the bottom of her keel. Relatively to the American sloop, she had a small sail spread, and her deep keel answered the purposes of a centerboard. Her rig, Fig. 5, was marked by a comparatively short mainmast, the requisite height for light canvas being gained by a lofty topmast. The mainsail had a small hoist, but the long gaff was peaked high, giving a better set to the canvas in windward work. The mainsail was not laced, but was hauled out taut to the end of the boom, the foot of the sail falling with a long, easy curve below the boom. She had double headsails (foresail and jib), and her bowsprit was loose and could be reefed inboard in heavy weather.

Now, here we have two types of yacht that are widely divergent on every point of comparison. To what powerful modifying influence are we to attribute this divergence? The answer is simple. Each type had been developed by the climatic and topographical necessities of the courses on which they were built to sail.

The shoal waters and tortuous channels of American harbors demanded a shallow boat; the light breezes of the American Indian summer encouraged a big sail spread; and a big sail spread on a shallow boat demands a centerboard—and there you have it.

On the other hand, the deep waters of the English harbors encouraged deep draught; the vicious snapping squalls of the English waters prohibited a big sail spread; and the short lumpy seas of the channel called for a hull of moderate beam, with fair and easy lines, as best fitted to split its way through them—hence the cutter.

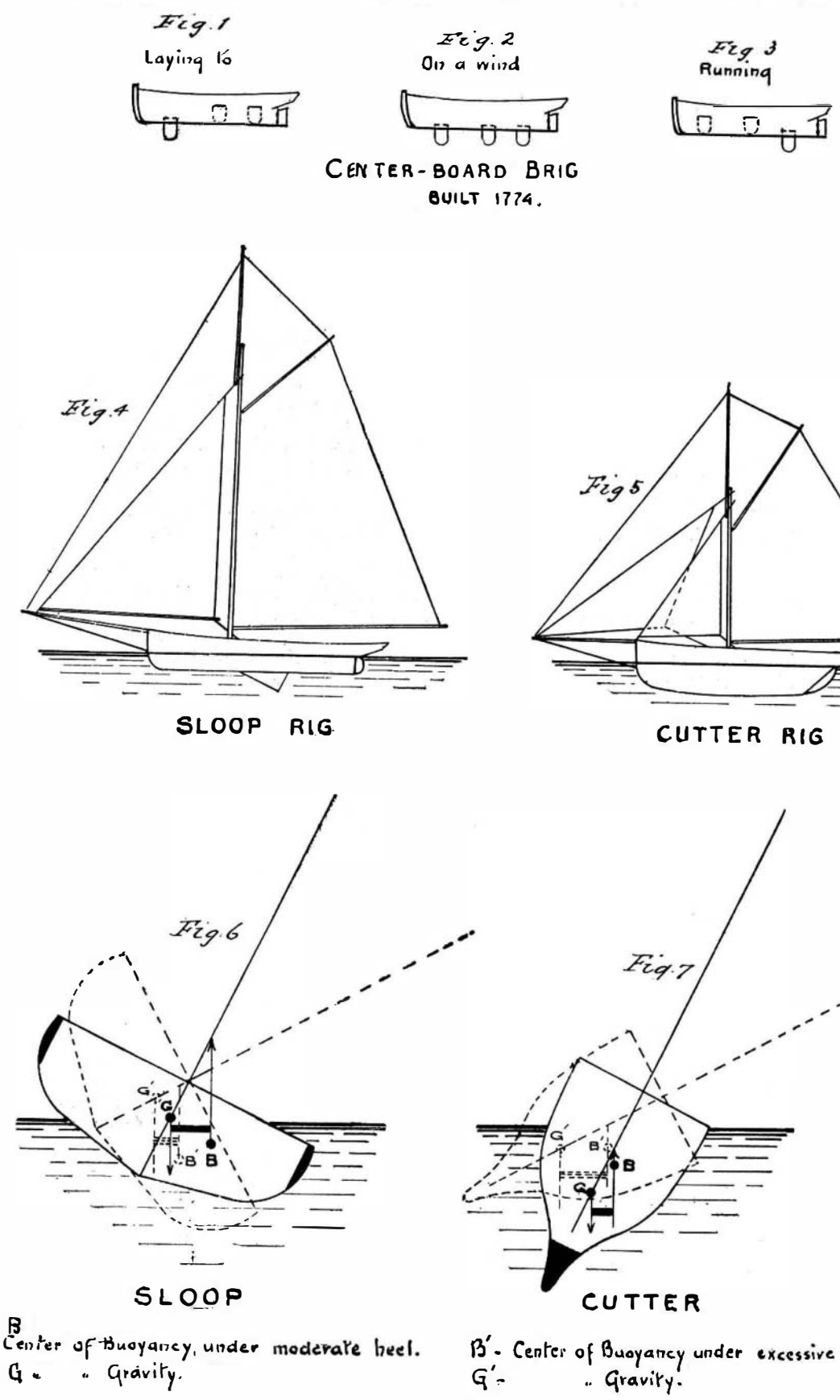
That the centerboard is specially adapted to American rather than British waters is indicated by the fact that more than a century ago it was tried on some English boats and found wanting. In 1774 the English navy built the brig Lady Nelson, of which we present three views, Figs. 1, 2, 3. She was fitted with three sliding keels; and she was tested in a voyage to Australia and back. About the same time a centerboard yacht was built for the commodore of the Cumberland Sailing Society, a Thames yacht club; but the device met with little favor, and we hear no more of it on that side of the water. In this country, on the contrary, it proved to be just the thing. It became so thoroughly identified with the American sloop as to be regarded as its very best feature; and when upon the advent of the Watson keel cutter Madge in 1881, and her victorious career against American centerboards, a school of prophets arose foretelling the speedy decline of the board and adoption of the keel in its place, the controversy waxed warm, and the centerboard advocates contended for the superior excellence of their adopted type with that fervent zeal which only a yachting enthusiast can show.

The keel and the centerboard, however, as we have shown above, are only two among many features that distinguish the two types and that make each peculiarly adapted to its own waters.

The sloop was the product of smooth seas, shallow harbors and light winds, the keel the product of broken water and blustering winds. Each type is ill at ease and an easy victim on the other's sailing courses. Witness the easy defeat of Genesta, Thistle, and Valkyrie in America, and the collapse of Navahoe and Vigilant abroad. Abroad they were "out of harmony with the environment," whereas each type was an easy winner in its own waters.

Now let us leave the centerboard as we found it—an excellent device in its own proper sphere—and by the aid of the figures, Nos. 6 and 7, let us look at the questions of beam and draught in their relation to wind and sea. The center of gravity, G, is a fixed point in the yacht's bulk, and remains the same under all angles of heel. The center of buoyancy, B, represents the center of gravity of the bulk of water displaced by the immersed body of the yacht. Unlike the C. G. of the yacht, it changes as the yacht heels, and keeps moving out to leeward as the fuller body of the boat is pressed down into the water. The action of the dead weight of the boat may be represented by a vertical line passing through the C. G. and pulling down with a force equal to this dead weight; the action of the buoyancy of the water may be represented by a vertical line passing through the C. B. and thrusting upward with a pressure also equal to the dead weight of the boat, or what is the same thing, the dead weight of the displaced water. Now this force, multiplied by the horizontal distance in feet between these two vertical lines (shown by a full black line), will represent in foot tons the righting power of the boat at that particular angle of heel. In the case of the sloop, during the early stages of heeling, and owing to the rapid shifting to leeward of B, this righting power (commonly called stiffness) increases rapidly. As the heeling becomes excessive, the C. G. swings up over the C. B. and the righting lever begins to decrease, as shown in the dotted lines. The sloop will ultimately reach an angle at which G will be vertically over B, when the boat will have lost all righting power, and capsize will follow. So that it is easily seen that the sloop will show great stiffness in moderate winds and dangerously little as a strong breeze lays her down.

In the narrow, deep-bodied cutter, the center of buoyancy, represented by B, moves out to leeward very slowly in the initial heeling, and she will show very slight initial stability. But as the breeze freshens, unlike the sloop, her C.B. keeps shifting indefinitely to leeward and her stability proportionately increasing. Her maximum stability will be seen when she is on her beam ends. This is shown by the thick dotted horizontal line in Fig. 7. The above facts



THE EVOLUTION OF THE INTERNATIONAL RACING YACHT.

indicate clearly that the beamy sloop can stand up on an even keel under a press of canvas that would overpower her slim and narrow sister. She will have, in this respect, a great advantage in moderate winds. It is true that her great beam will give her bluffer waterlines, and a harder form to drive through the water, as compared with the cutter. But experience has proved that at moderate speeds the difference is slight; and it is only when the beamy boat is driven by strong winds at high speed that wave making sets in. At this point we should expect the fine sharp lines of the cutter to tell in her favor; and experience has shown theory to be correct in this case. In the review of the past ten years' racing, which will be made in the succeeding paper, it will be shown that the lighter the wind the larger was the margin by which the cutter was beaten, and that the only occasions on which she made anything like an even fight were those rare chance when old Neptune was good enough to send the visiting boat a rattling breeze that had something of the English Channel vim and weight to it.

Genesta had one such opportunity in her second race, and Valkyrie in her third race off Sandy Hook. In both cases the advantages of moderate beam, low center of gravity and snug sail spread aloft were clearly proved. J. B. W.

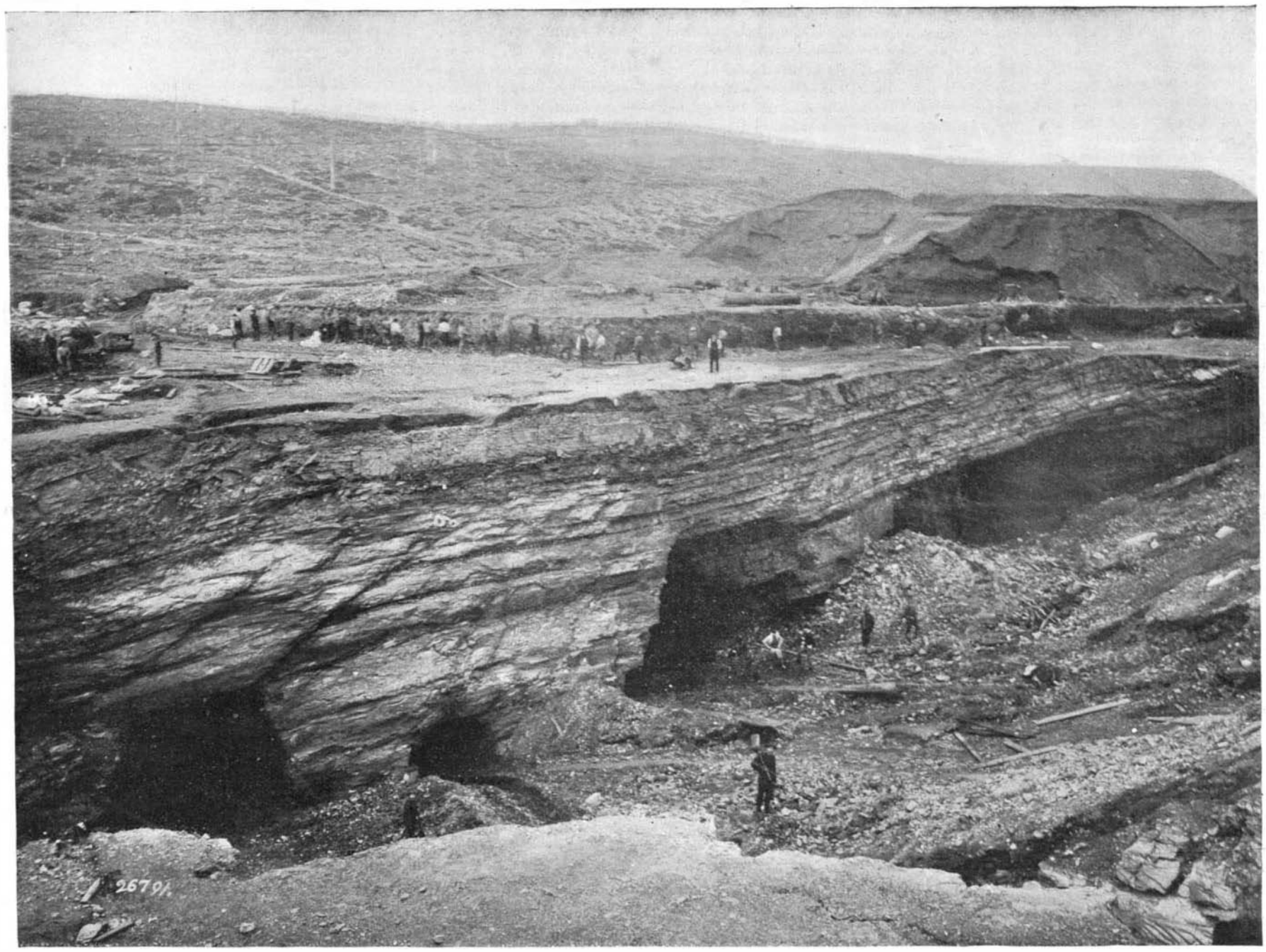
A GREAT COAL VEIN.

Among the largest and most advantageously located coal mining properties in the world are those of the Philadelphia and Reading Coal and Iron Company. In 1894 the company mined 7,415,000 tons, and it receives a large amount annually from royalties on leased collieries. In nearly all the locations where the mines are operated, the coal is obtained in such abundance and with such small expenditure of labor that the operators are extremely wasteful in the work of getting the coal from its place in the earth on to the cars for market, but it is safe to say that there are few places in the world where great quantities of coal are so readily obtainable as on the site shown in our illustration.

At Shenandoah Stupping a thin crust only of land has to be removed when a vein of coal 50 feet thick and of indefinite extent horizontally is reached. The coal is taken to the breakers at the colliery on the other side of the mountain through tunnels at the base of the vein. This stupping has only been worked a short time, but a half million tons have been taken therefrom.

Velvety Lawns.

In the note on "Brown Lawns," in the issue of the Gardeners' Magazine of August 3, it was conclusively shown that the retention of the verdure of a lawn during a period of dry weather depends to a considerable extent upon the supply of plant food in the soil, and that when it is possible to assist the grass with water, the supplies should not be withheld until it has been burnt up. In this note we purpose making a brief reference to the best methods of maintaining or restoring the fertility, as the case may be, of the soil to insure under adverse conditions velvety lawns. To dwell upon the fact that a vigorous growth of grasses cannot be obtained on soils that have become exhausted is not in these pages necessary, but it is essential to direct special attention to the fact that the application of manure to a lawn requires the greatest care to insure its having a beneficial effect. The importance of this will be fully appreciated when it is remembered that the herbage is of a complex character, and includes both gramineous and leguminous plants; and that as these differ materially in their food requirements, the peculiarities of each class must be duly considered. If this is not done, one or other will assuredly predominate. Without entering at length into the scientific aspect of the question, it may be well to point out that certain manures are more favorable to some plants forming the herbage than to others, and that when one kind of manure only is used, the plants for which it is specially adapted will grow with undue vigor and crowd out the others. For instance, dressings of wood ashes and kainit, in consequence of the potash they contain, and of gypsum, by reason of its power of rendering the potash in the soil available as plant food, have a favorable influence pon the growth of the clovers. On the other hand, nitrogenous manures, as nitrate of soda and sulphate of ammonia, promote the growth of grasses, and as a proper balance of grasses and clovers is essential to the formation of a velvety turf, it is important that the requirements of both classes be properly met. It therefore follows that, when artificial fertilizers are used, they should contain phosphates, potash, and nitrogen; superphosphates or bone meal, kainit, and nitrate of soda will give these constituents and in proper proportions if superphosphate and kainit are mixed in the proportion of two to one and applied at the rate of three pounds to the square rod, and subsequently a dressing of nitrate of soda be applied at the rate of one pound to the same area. The mixture may be applied late in the autumn or in February, but the dressing of nitrate should not be given until the end of March or beginning of April. Although these artificials supply the food required by the various plants, they do not supersede stable or farmyard manure, as the latter not only contains all the food constituents necessary, but act as a mulch, and by increasing the humus near the surface materially assist in conserving the moisture about the roots. As usually applied to lawns, natural manures have an objectionable appearance for a considerable period, and we would suggest that instead of spreading the manure over the lawn in a half rotted state, in accordance with the practice which obtains in dressing pastures, it should be dried sufficiently to permit its passage through a sieve and be then mixed with equal quantities of powdery leaf mould and old potting soil. This mixture spread over the turf in the autumn will quickly disappear, and prove of great value in promoting the growth of the grasses and clovers, and preventing the lawn being burnt up during dry weather.



THE MAMMOTH COAL VEIN, SHENANDOAH STUPPING, PA.

A Mine on Fire Over Forty Years.

The commissioners appointed by the local government to inquire into the "history, causes, and effect" of the coal mine fires of Pictou County have just finished taking evidence. The commission is composed of Inspector Gilpin, Deputy Inspector W. Madden, Henry Mitchell, and A. Dick. The work of the commission was directed mainly to an investigation of the condition of the Foord pit. This mine has been on fire in one place or another since the fifties, and it is burning yet. Explosion after explosion has occurred, and many lives have been lost. When fire broke out in one place the miners resorted to another, sinking a new shaft. To avoid the fire on an upper level, a shaft was sunk and coal taken out on the level immediately below the fire. Soon the fire came through, and again the miners were driven out. Nothing that the owners could do availed to drive out the fire, and the splendid mine has been practically abandoned, though a little coal is now being taken out on a level below a part that is on fire. The object of the commission is to learn whether something cannot be done to save so valuable a property as the Foord pit.—Halifax Herald.