

holding Farmer Gamble's hand. Presently he woke, and "babbled of green fields." With every second that passed, Dorothy felt something approaching which she had never seen or realised before. Her hand involuntarily tightened round Farmer Gamble's withered fingers. The dying man seemed to understand.

"Don't be frightened, Missie," he whispered, faintly. "He be a long time a-coming. "Maybe, when He sees you here, He'll do it quickly. I always were a stubborn chap to give in, and I always were a——"

He broke off.

That awful Something was coming nearer—nearer yet.

"He's a-coming, my pretty," gasped the poor old man. "He's a-coming! Won't you say a—prayer?"

And Dorothy's trembling voice rose up to meet that grim presence on the threshold.

"I hear his footstep on the stair," whispered the old man. "He be a-coming! Coming!—hold my—hand. No—no! He may take you too. Look up. He's nearer—nearer——"

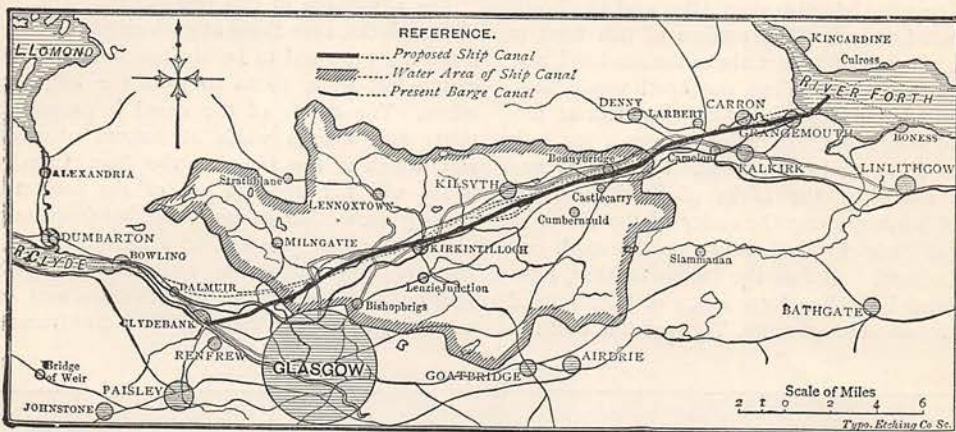
Suddenly he looked up, and half-raised himself from the bed.

"I thought it were Death a coming—up the stair. Death, Death, Death! And it's—it's my wife—her face a-shining, and flowers in—her hands! Cicely—Cicely!"

He stretched out his hands, a smile upon his lips, and in another moment Dorothy was alone.

END OF CHAPTER THE EIGHTEENTH.

THE PROPOSED SCOTCH WATER-WAY (FORTH AND CLYDE SHIP-CANAL).



THE idea of making a separate island of Scotland seems a curious one, yet it is involved in the project, which is now being discussed, of constructing a deep water-way available for vessels of the largest size from the Forth to the Clyde, so as to unite the waters of the North Sea and the Atlantic. Of course everybody knows that there are already two canals across Scotland—one from the Forth to the Clyde, and the other from Inverness to Fort William. But these are useful for small vessels only, and are not of great assistance to commerce. The present Forth and Clyde Canal, which was designed by Smeaton, was constructed just one hundred years ago—or, rather, it was completed just about a hundred years ago, after some twenty years' labour. It is some thirty-nine miles long, but its depth is only ten feet, and its width only fifty-six feet, so that it is of no use for sea-going vessels, except those of the smallest class.

The project which is being discussed among engi-

neers, by the Chambers of Commerce, and by the shipping world, and which has been put before ministers and Parliament in a tentative manner, is one for the construction of a water-way from sea to sea which will be capable of giving passage at all times to merchant-vessels of the largest size, and war-ships of the greatest known calibre. Such a canal to be of the greatest possible use must have the smallest possible number of locks, or other appliances involving delay, and must also be on the most direct line which will permit the fewest impediments. Several routes have been from time to time discussed, but at the present moment attention is concentrated on two, which may be briefly described, as it is probable that one or other of these will be selected if the necessary support of capitalists and Parliament can be secured.

To the reader unacquainted with the navigation of the British coasts it may be necessary to point out, first, some of the assumed advantages to be gained which are thought to make this proposed water-way necessary. A vessel bound from a port on the east coast to one

on the west coast has, at present, a choice of routes. She must either go round the north, through the stormy Pentland Firth, where there are dangerous currents and prevalent fogs, or round by the south coast and through the crowded English Channel, with its ever-present risks of collision. The annual losses by wreck on these two routes are considerable, and it is contended that the ship-canal will effect an enormous saving on this head alone. Then a saving in distance means a saving in time, wear-and-tear of gear and machinery, wages, insurance, interest, and so forth. About distances we shall have something to say later on, and meanwhile return to the competitive plans.

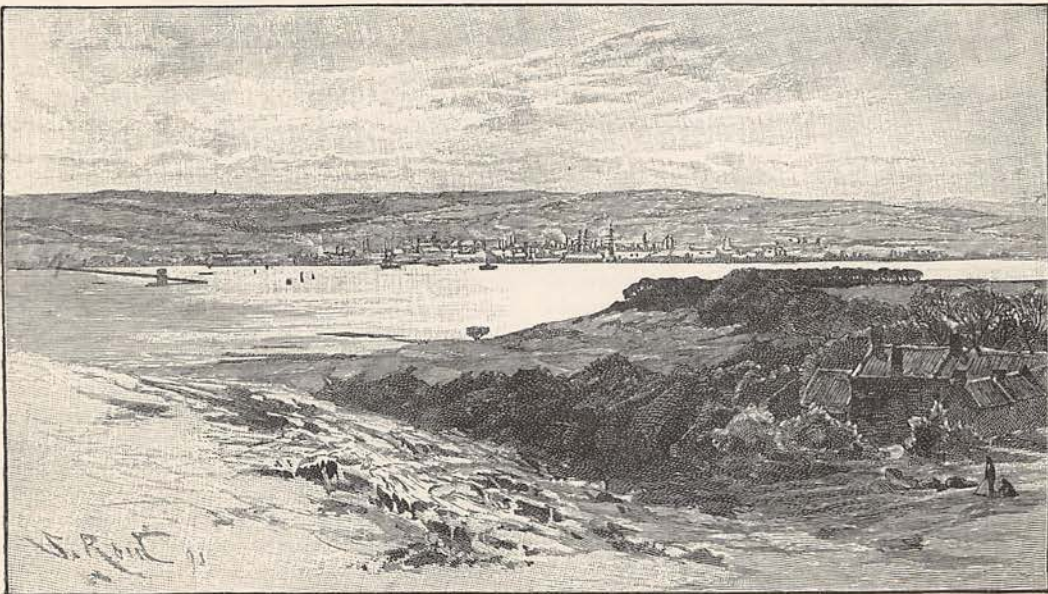
Of these, the lay reader will probably be most attracted by the one called the Loch Lomond route, because it proposes to make use of the Queen of Scottish Lakes, and to pass through the country of Rob Roy, as well as through the classic ground about Stirling. This scheme was laid before the International Congress on Inland Navigation last year by Mr. D. A. Stevenson, C.E., whose figures, etc., we adopt.

The principle of this scheme is the avoidance of locks by taking advantage of a practically level stretch of country lying between Alloa and the Forth to near Loch Lomond. The surface of this tract is only some thirty to fifty feet above the sea-level, and the stratum is alluvial. First, the Forth would have to be deepened to a depth of twenty-five feet at low tide from Grangemouth to Alloa, where a sea lock would give entrance to the canal. The run thence would be north by the Links of Forth, and by the town of Stirling, along the valley of the Forth to the Water of Endrick, which runs into the south end of Loch Lomond. Before the lake is reached, however, the level is broken by a range of high ground extending for about seven miles. Through this, cuttings

would have to be made, and it is proposed that about two miles of it should be a tunnel through the hill rather than an open cutting. Tunnels on canals are not unknown already, but we are not aware of any on a ship-canal, and of such a length. In this case the height of the tunnel is to be one hundred and fifty feet, but if an open cutting is found desirable it will not alter the plans, although it will add somewhat to the cost.

This, however, is the only difficult part of the route, for when Loch Lomond is reached—twenty-eight miles from the eastern entrance of the canal—there is plain sailing. A clear run of fourteen miles in the open waters of the lake will bring vessels to Tarbet—well known to Highland tourists. Between Tarbet and Loch Long is a narrow neck of land, less than two miles, which will be easily cut, and at Loch Long the sea is again entered by means of another lock. Loch Long, which is fifteen miles in length, is an arm of the Firth of Clyde, and through it vessels can, it is said, proceed at full speed out on to the broad Atlantic. From Grangemouth to the Firth of Clyde is sixty-nine and a quarter miles.

The advantage of this route is that it is level, and without locks, save those at each entrance. These sea locks are proposed to be six hundred feet long, and eighty feet wide, so as to pass the largest vessels afloat. The depth of the canal is proposed to be thirty feet, with a width at bottom of seventy-two feet, which is the same as the Suez Canal. This width will not allow of two of the largest vessels passing each other at any point, but frequent passing places are to be provided at suitable intervals. The cost of construction is estimated at £8,000,000 sterling, and the cost of maintenance and management at £60,000 per annum. The disadvantages are



GRANGEMOUTH, FROM N.E.



THE VALLEY OF THE FORTH, FROM CLACKMANNAN HILL.

—the length, the tunnel, the navigation of Loch Long, and the fact that it will debouch on the Clyde too low down to benefit the towns on the river.

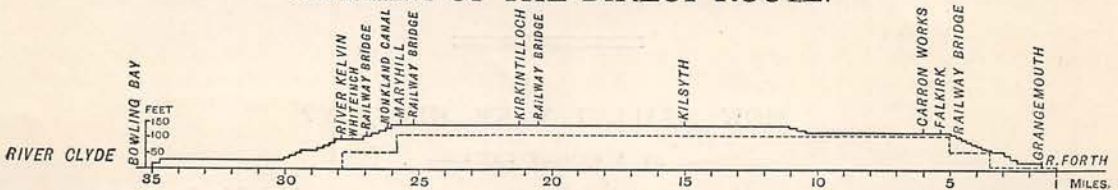
The other route is known as the Direct Route of Mr. J. Law Crawford, of Glasgow, on whose published descriptions we draw.

The western entrance of this canal would be at a place called Yoker, on the Clyde, some four miles below Glasgow, and practically within the area of the great city. It would run eastward to that valley of the Kelvin, and along the course of the valley to the summit of the water-sheds. Then it would follow the valley of the River Bonny to its junction with the River Carron, which would be canalised down to Grangemouth, where there would be a tidal lock. The total length of the water-way between the sea

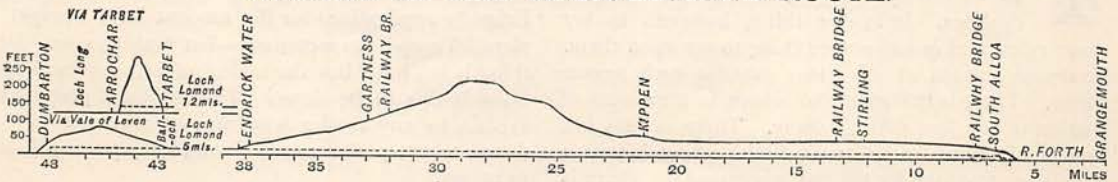
locks would be only twenty-nine miles and six furlongs. The depth proposed for this canal is twenty-six feet, but there would be a bottom width of one hundred feet, so that large vessels could pass each other at almost any point.

This canal, however, would require twelve locks, six on each side of the summit-level. These locks it is proposed to make double—*i.e.*, one part of six hundred feet by sixty-five feet for the largest vessels, and another part for general use four hundred feet by forty feet. This line would have to cross no fewer than six railways—two by means of swing bridges—and also the existing Forth and Clyde Canal, but in these intersections the engineers foresee no difficulties. The estimated cost of this plan, including land and interest, is £7,000,000 sterling.

OUTLINE OF THE DIRECT ROUTE.



OUTLINE OF THE LOCH-LOMOND ROUTE.



A modification has been suggested of a very interesting nature. Some years ago the experts of the Geological Survey of Scotland proved the existence of what is scientifically termed "a deep trough" between the Forth and the Clyde on the very line proposed for the canal. This "trough" is filled with beds of sand, gravel, and boulder clay, which are held to be the deposits of former tidal currents. In other words, at some remote period the sea swept right through between the two estuaries. This discovery has suggested a novelty in engineering — why not employ the forces which caused these deposits to sweep the "trough" clean again? At present, high water in the Firth of Clyde is nearly low water in the upper part of the Firth of Forth, and there is a difference between the two sea-levels of fourteen and a half feet. If, then, it is contended, there were now a free passage between the two estuaries, there would be a strong current through this old "trough" running each way four times in the twenty-four hours. A suggestion has therefore been made to carry a large pipe at low-water level along the old channel, so that at high-water in the Forth the sea would flow through the pipe with great force. Excavation would be going on all the time, and the detached sand, clay, etc., would be let down into the pipe by means of shafts, and swept away into deep water by the mere force of the current.

By this ingenious process it is calculated that the cost of excavating would be enormously reduced; and it is even supposed that it might render a tidal canal practicable, with gates only to regulate the force of the tide. On the other hand, another variation, but on the same line of route, is a proposal to raise the canal to a high level throughout, so as to pass over all railway bridges, etc., and to require no intermediate locks. Access would be given at each end by enormous locks on the principle of those which have been adopted for the Nicaragua Canal, which would lift vessels to the level of the elevated water-way at one operation, and lower them again at the other end at another single operation. These proposals, however, present problems in engineering which we are not prepared to discuss, and which must be left to experts. They are sufficiently interesting in themselves,

and it is not for the unskilled to pronounce judgment on their practicability.

It may be asked—why not deepen and widen the existing barge canal so as to make it available for ocean-going vessels? The answer is that this was carefully gone into, but it was found that excavations of so costly a nature would be required, and so much valuable land would be interfered with, that the total expense would be very much greater than that of an entirely new water-way on either of the routes proposed.

As to the distances to be saved by this water-way, we may take the figures by Mr. D. A. Stevenson, C.E. From the Clyde to ports on the east coast of Scotland, north-east of England and north-west of Europe, the distance saved would be from 530 to 240 miles. From the Forth to West Scotland, North-west England, Ireland, America, and the Mediterranean, the saving would be from 490 to 140 miles. From the Tyne to the St. Lawrence the saving would be 150 miles. From the west of England to Scotland and north-east of Ireland to the middle and western ports of the Continent, the saving would be from 380 to 100 miles. The canal would add another sea-channel to our national water-ways, and practically extend the coast-line throughout one of the principal industrial centres of the country. For naval purposes, it is contended that a broad and deep channel across Scotland would form one of the most powerful auxiliaries of the Navy that can be devised, and would be one of the most effective means for protecting both the coasts and our fleets of merchant-vessels in time of war.

It is also said that the canal would provide the shortest possible sea routes between the chief business centres of Russia, Germany, Norway, Sweden, Denmark, and the ports of Canada and the United States.

Taking all the probable and possible sources of traffic into account, it is considered a moderate estimate on a low scale of dues to assume an income of at least £600,000 per annum. This certainly does not seem an excessive revenue to expect from a national and an international water-way; but the financial aspects of the scheme are beyond the design of the present article.

HOW SHALL I MAKE HIM PAY?

BY A FAMILY LAWYER.

IT is good to owe no man anything; it is equally good to let no man owe us anything. Ready money is the best rule for our business dealings. It is one thing, however, to lay down rules, and quite another thing to act upon them. Everyone cannot at all times practise such severe virtue. There is the friend to whom in a moment of weakness you lent that £10 note. There is that bill for schooling due from Captain Smith, whose boys you have been teaching for the past six months. There is

that grocer's account which Mr. Jones owes you, and which he has for a year past been constantly promising to pay as soon as he gets his next month's salary. Friendly applications for the amount have brought a plentiful crop of expectations—but nothing else. Nothing is left for it but the taking of legal proceedings. How is this to be done? This is what I propose to explain to any reader who may be troubled with a debtor whose performances do not keep pace with his promises.