

May 2, 1876.

GEORGE ROBERT STEPHENSON, President,
in the Chair.

THE following Candidates were balloted for and duly elected :—
GEORGE HEATON DAGLISH, EWING MATHESON, and SYDNEY WILLIAM
YOCKNEY, as Members; Captain CLAYTON SCUDAMORE BEAUCHAMP,
R.E., ROBERT BELL BOOTH, EDWARD KYNASTON BURSTAL, Stud. Inst.
C.E., HENRY COOK, JOHN JOSEPH DAVIES, ELIM HENRY D'AVIGDOR,
PHILIP RICKMAN EMMOTT, RICHARD WILLIAM HENRY PAGET HIGGS,
ALEXANDER IZAT, Lieut.-Col. ALFRED STOWELL JONES, *U.C.*, GEORGE
BRAITHWAITE LLOYD, JOHN McLAREN, HORACE JOHN MANNERING,
WILLIAM MAYLOR, PATRICK WALTER MEIK, Stud. Inst. C.E., JAMES
RICHMOND, ARTHUR LEWIS STRIDE, HENRY THOMAS SIMPSON WARD,
and THOMAS WALTER WOODHOUSE, as Associates.

It was announced that the Council, acting under the provisions
of Sect. III., Cl. 8, of the Bye-Laws, had transferred ADAM
FETTIPLACE BLANDY, WELLS HOOD, JOHN KYLE, and JOHN STEELL,
from the class of Associates to that of Members.

Also that the following Candidates, having been duly recom-
mended, had been admitted by the Council, under the provisions
of Sect. IV. of the Bye-Laws, as Students of the Institution :—
JOHN CHARLES GILL, JOHN HENRY ANDERSON IVENS, GEORGE MARSTON,
WALTER SMITH, and FRANCIS ASPINALL WYTHES.

No. 1,458.—“Fascine Work at the Outfalls of the Fen Rivers, and
Reclamation of the Foreshore.” By WILLIAM HENRY WHEELER,
M. Inst. C.E.

THE estuary of the Wash, on the east coast of England, receives
the waters of the four rivers which drain the fens of Cambridge-
shire and Lincolnshire. Of these the Ouse takes the rainfall
from 2,960 square miles of high land and fens, the Nene from 1,132,
the Witham from 1,050, and the Welland from 703 square miles.
The waters of these four rivers, flowing from an area of 5,845
square miles of country, find their way to the sea through shifting
sands which encumber the head of the estuary. The course of the
various channels is continually changing, and their position shift-
ing, owing to alterations in the wind or tidal and fresh-water
currents. The strength of the ebb tide and land water is thus

exhausted in making fresh channels, instead of in keeping a deep and rapid course.

The Dutch engineers, who were first called in to advise as to the reclamation of the Fen lands, entirely ignored the outfalls of the rivers, and depended on schemes of internal drainage. By throwing up embankments on the sides of the rivers, cutting new drains, and erecting windmills to pump the water out of the drains, they succeeded in bringing into cultivation several thousand acres of land which had previously been swamps, tenanted only by wild fowl. As one swamp after another was reclaimed, the whole Fen country became split up into districts, with separate bodies of Commissioners acting independently of one another; each only solicitous for the welfare of their own territory, and jealous of spending money that might benefit their neighbours, or more especially the navigation of the rivers. The system commenced by the Dutch engineers has been continued to the present day. The various bodies of Commissioners, instead of taking a comprehensive view of the matter, and commencing the improvements at the outfall of the rivers, so as to facilitate the discharge of the waters to the sea, thus obtaining a better fall and general lowering of the waters throughout the main arteries of the drainage, have spent hundreds of thousands of pounds in works of interior drainage and the erection of steam pumps, one tithe of which, if applied in training the outfalls to deep water, would have obviated the necessity for mechanical means, and rendered the fens permanently safe.

Kinderley struggled hard in his own district to obtain an improvement in the outfall, and partially succeeded. Rennie used all the influence he possessed to the same end, but had to succumb to the selfish and narrow views of his employers, and only partially succeeded. The works he accomplished in the upper part of the outfall of the three great rivers were sufficient to show the immense advantages to be obtained from a straight channel properly confined, as compared with a wide and tortuous stream.

The straightening of the Ouse by the Eau Brink Cut, reduced the course of the water from a winding bed of upwards of $5\frac{1}{2}$ miles to a straight channel of 3 miles, and effected a fall in the low-water mark of from 8 feet to 9 feet. The works of the Norfolk Estuary Company, by making a straight cut of 2 miles through the marshes below the town of Lynn, and continuing the works through the sands by guide walls of fascine work, still further reduced the level of low water 3 feet, a gain of inestimable importance in a district where the fall in the main drains is often

not more than 4 inches in 1 mile. Kinderley's cut in the Nene and the new cut and training works of Rennie reduced the low-water level 10 feet in that river, and equally beneficial results followed similar, though more limited works, in the Witham and the Welland. These works, however, are only the commencement of what ought to be continued. As soon as the water leaves the trained channels it spreads out through several miles of shifting sands.

When, between the guide banks, there is upwards of 10 feet depth of water at low tide, below them there is only from 2 feet to 3 feet. By a continuation of the training work through the sands this bar would disappear, a fall of several feet would be gained, a natural drainage acquired in place of a mechanical lifting of the waters, and deep water would be provided for vessels at all states of the tide. A gradual accretion of land at the back of the guide walls would also take place, which ultimately could be inclosed and brought into cultivation.

A general outline of the position of the Fen rivers having now been given, it is proposed to describe in detail the plans adopted for training the channels of the rivers through the sand where already carried out, and the result which has ensued in the accretion and warping of land; the history of the large cuts being so well known, and having so often been described.

FASCINE WORK.

From the peculiar geological character of the Fen district, neither refuse slag from ironworks nor stone from quarries could be obtained within reasonable distance to form the guide banks, and the engineer had to rely on the natural resources of the country through which the rivers passed. At the suggestion of Mr. Beasley, an attempt was made to train the channel of the Welland with barrier banks made of fascines and clay. This plan having been found to answer, it has been continued for all the training works in the Fen rivers.

The work is carried out in the following manner:—The line of the channel having been settled, operations are commenced on the convex side of the stream, so that the water may scour round the end of the jetty as it advances, and wash away the silt and sand through which the new channel is to be driven. Three barges are used, one containing faggots or fascines (locally called kids), the others clay. The barges are brought to the jetty at high water, two being moored in advance of the finished work and parallel with

the jetty, the other at the end of the two at right angles to them. At low water the men throw the faggots out of the boats on the water in the space left between the three barges, the faggots being placed transversely to the direction of the jetty, overlapping each other, and covering a space equal to the intended width of the base. Each layer of fascines is weighted with clay and gradually sinks, layer after layer being added until the fascine work rises above low water. The jetty is subsequently raised to a height equal to half-tide level. The batter generally given is at the rate of 6 inches to 1 foot. The greatest depth of water at low water in which jetties have been thus constructed is about 20 feet, the average depth being about 10 feet, and as the jetty rises 6 feet above low water, the total height of the fascine work is 16 feet, or, in extreme cases, 26 feet. The substratum of the estuary is clay, and on this the fascines find a firm resting place. When a good current is running, the silt or sand through which the channel is being driven, and which is from 3 to 4 feet above low water, is washed away for a space of 40 or 50 feet from the end of the jetty, and the fascines settle down at once on the bed. When the silt is not all removed it is gradually washed out from underneath the fascines, which settle down in a mass.

The fascines are made of thorns cut from the hedges, tied in bundles with tarred rope, the extreme length of each fascine being 6 feet, and the girth 3 feet. The branches, being small and tough, become interlaced. The silt brought up by the tides is rapidly deposited in and at the back of the work, and thus a solid embankment is formed of sufficient tenacity and strength to withstand the strongest tidal current, and so compact that, when necessary to remove any of the work, it can only be done by cutting the thorns out branch by branch.

The trained channel of the Witham is 200 feet wide; the flood tide runs up at the rate of about 5 miles an hour; the ebb, when heavy land freshes are running, moves at the rate of from 3 miles to 4 miles, with a depth of 10 feet or 11 feet, and, after the break-up of a frost, carries with it large blocks of ice. This stream has been diverted from its original course by jetties made simply with fascines and clay as described, a single course of stone bedded in clay being placed on the top to weight the fascine work and to prevent the upper layer being lifted by the tides or carried away by ice.

The channel of the Ouse is 500 feet wide, and 10 feet deep at low water; it is exposed to the effect of northerly gales. Guide walls, about 1 mile in length, of faggots, clay, and chalk, for car-

rying the water through the Vinegar Middle Sands, constructed about twenty years ago, have effectually answered their purpose, and withstood the efforts of the river to assume its old course, thus showing the practicability of training wide and deep rivers by this means.

In the Nene, the channel has been trained for $1\frac{1}{4}$ mile at its lower end with guide banks of fascines, clay, and chalk; the work having stood now for forty years.

The Welland has been trained through the sands for $1\frac{1}{4}$ mile, the total length of the training walls being 2 miles 60 chains, and the cost, according to Mr. Walker's Report in 1838, £7,026.

In the Witham, a length of 3 miles of fascine work has been completed at intervals during the last thirty years, and the Author is now engaged in continuing the training at the lower end of the river. In all these cases the method of carrying on the work has been similar to that described, except that in the Ouse and the Nene a larger quantity of stone has been used, making the work more costly, and in the Welland marsh sods have sometimes been substituted for clay.

COST OF FASCINE WORK.

The cost of the work lately done in the Witham has been about 19s. per lineal foot, or 1s. 8d. per cubic yard. The average height of the pier is 16 feet. The base is 22 feet wide, and the top 13 feet. Each lineal foot takes about seventy faggots, which cost 14s. 6d. per hundred of six score delivered at any accessible place on the riverside. For getting and delivering the clay the men are paid 30s. a barge-load, containing about 30 tons, the clay being obtained from the foreshores at the lower part of the river. Conveying the faggots by boat from the place of delivery to the work, including loading and unloading, costs 4s. per hundred, the distance being about 5 miles, and the boats only able to navigate the river on the tide. One hundred faggots require 10 tons of clay. The cost of labour in building the jetty is 3s. per hundred. The whole cost may be summarised as follows:—

	£.	s.	d.
Fascines, per one hundred and twenty	0	14	6
Conveying by boat " "	0	4	0
Labour, laying, &c.	0	3	0
10 tons of clay at 1s.	0	10	0
Stone for top, $\frac{1}{4}$ ton at 6s.	0	1	6
Total per hundred kids.	1	13	0

Or allowing seventy fascines to each lineal foot to the dimensions given above, makes the cost of the pier 19s. 3d. per lineal foot, or 1s. 8d. per cubic yard.

After the formation of the jetty, deposit rapidly takes place at the back, until the silt becomes as high as the top of the fascines. By fixing the channel in one place, and thus preventing the water continually turning over the sands, these jetties have been the means of warping up very large areas of land, which in course of time have been embanked and come under cultivation.

ACCRETION OF LAND.

The accretion of land in the Wash is slowly but continually taking place. Partly from the alluvial soil from the coasts of Lincolnshire and Yorkshire brought with the tides into the Wash, partly from the alluvion brought down the Fen rivers, and partly from the disturbance of the sands in the centre of the bay, there is always a large quantity of soil held in suspension in the water, which soil is deposited on the foreshores. As might be expected, the greatest increment is at the head of the bay, nearest to the mouth of the four rivers. Owing probably to the set of the tides and the prevalent winds, the increase is much greater on the western, or Lincolnshire coast, than on that of Norfolk. Mr. Gordon, in his report to the Admiralty on the evidence taken respecting the Lincolnshire Estuary scheme, gives the following estimate of the rate and the periods of inclosure. The quantity inclosed by the Romans in the first and second centuries is unknown. During the seventeenth century, banks were erected excluding the tide from an area of 35,000 acres. During the eighteenth century 19,000 acres were inclosed, and during the nineteenth, 6,000 acres. About 3,000 acres have been inclosed since that estimate was made. He states, further, that the advance on the Lincolnshire shore has been an average of $\frac{1}{2}$ mile since the erection of the Roman banks. Of the total quantity inclosed since the time of the Romans, 8,000 acres belong to Marsh land in Norfolk along a frontage of 10 miles; 37,000 acres to South Holland, in Lincolnshire, off the coast of the parishes of Sutton, Gedney, Holbeach, and Moulton, with a frontage of 19 miles; and the rest to North Holland.

If not assisted by artificial means, the process of accretion is stationary after a certain distance from the shore. The oldest salt-marshes are about $\frac{1}{2}$ mile in depth, beyond which there is nothing but bare sands. Directly the marsh is inclosed by a bank, and the water shut off, the accretion at once becomes rapid, and in the

course of a few months the sand is covered with warp; then a growth of samphire follows, succeeded by grass, and in a few years a marsh is formed outside the recent inclosure, which rapidly rises by the accession of warp, through which the grass grows, until for a foot or more in depth the soil is a mass of the finest warp, mixed with roots of grass and decayed vegetation. This process, repeated during several years, makes some of the most valuable and fertile soil in the country.

The cause of the accretion not extending beyond a certain point is easily explained. The tidal water, carrying matter in suspension, spreads over the foreshore up to the banks, and for the short time when there is a period of quiet, the matter in suspension is deposited. The silicious particles of silt and sand, having the heaviest specific gravity, are deposited first, the warp or loamy particles being carried back with the ebbing current. Gradually, as the marsh rises, the silt is deposited before the water reaches the banks, the warp alone being carried to the upper part and there deposited. As samphire and grass respectively grow, this process is hastened, the vegetation holding the warp and filtering it from the water as it recedes. To the deposit of this light flocculent matter, constituting the argillaceous portion of the suspended matter, a state of rest in the water is necessary, agitation keeping it in a state of suspension. After a certain breadth of marsh has been formed, generally on this coast about $\frac{1}{3}$ mile, the body of water flowing off the marsh on the recession of the tide becomes so great, as to form a current sufficiently strong to carry with it both the silicious and argillaceous particles held in suspension. After a time, from the action of the forward and retrograde motion of the wavelets of the ebbing tide, a marked and broken line or steep, from 1 foot to 2 feet in height, appears at the edge of the newly-formed marsh, up to which the neap tides reach, and beyond which the marsh ceases to grow. The existing marsh is then covered by spring tides, but continues to rise slowly until only covered by the few spring tides which rise above the average height.

Warp begins to take place at 12 feet above low water. Mean low water in the estuary is 7.32 feet below the Ordnance datum. Samphire commences to grow when the surface is just covered at neap tides, or from 14 to 15 feet above low water, and disappears when the level of the soil is about 16 feet above low water, or 2 feet above an ordinary neap tide; the samphire being gradually replaced by grass.

Newer and more recently-formed salt-marshes are about 18 feet above low water, and the old marshes 20 $\frac{1}{2}$ feet. Much of the old

inclosed salt-marsh is higher than the land inside the Roman banks.

The following are the approximate levels at which the process of accretion takes place, compared with the Ordnance datum :—

	Feet.
Mean low water	7·32 below.
Warp first deposited	5·50 above.
Samphire	6·68 „
Grass first appears	8·68 „
New marsh	10·68 „
Old high marsh	13·15 „
Ordinary neap tides	6·69 „
Ordinary spring tides	13·34 „
Mean high water	10·21 „

The period of time, during which the process is maturing, varies according to the situation of the marsh, and to the artificial means taken to assist the warping process. Silt foreshores, outside a newly-erected inclosure, become grass marsh in about ten years; but after this a period of twenty to twenty-five years ought to elapse before any inclosure takes place, during which time the marine vegetation and grass filter the finer particles of warp from the water, and the roots and decayed vegetation fill the soil with organic matter.

In 1837, when the training works of the Welland were commenced, a large area of the foreshore on the Moulton and Frampton shores was bare sand; in 1851 it was all grassed over, the Moulton marsh extending over 800 acres, and the Frampton over 300 acres. The latter was inclosed in 1864 and the former in 1875.

Under favourable circumstances the accretions have been very rapid. Thus, in the case of the river Ouse, when the Eau Brink Cut was made, the tides were allowed to flow into the bed of the old river, and at the end of fourteen years the upper portion was inclosed. Twenty years afterwards a second portion was taken in, and the remainder, making 900 acres altogether, within thirty years from the making of the cut. The lower area was inclosed too soon, and would have been much better land if warp for another ten years had been allowed to accumulate. The upper part, where the warp first settled, is now some of the richest and best pasture and arable land in the Fen district, and is let at a rental of £4 an acre. The circumstances here, however, were exceptional. The works of the Eau Brink Cut had such an effect in depressing the low-water level that the bottom of the old Bedford river, and all the side drains and ditches emptying into them, were run nearly dry, and when the winter rains came and

scoured them out, the alluvial deposit and vegetation in their bottom were carried down into the main stream, remaining there in suspension until brought back by the tides and deposited in the old channel during the quiet period at high water; thus not only was there an unusual quantity of matter in suspension, but the deposit was of the richest and most fertilising description. As a contrast to this, the first 1,300 acres of land, inclosed after the improvement of the river Nene, above the embankment of the Cross Keys Wash, being taken in too soon, was of the most indifferent kind, and not worth half the value of the land below the embankment, which was allowed a longer time to accrete. After the training works were completed in the Nene, about the year 1831, the land warped up rapidly, the process being assisted by the immense amount of soil removed from the new cut by scouring. Some of the land below the Cross Keys embankment warped up 7 feet, and became good grass marsh in twelve years. It was inclosed in 1842, and was sold five years afterwards for £80 an acre. Since the year 1831, upwards of 3,000 acres have been inclosed, which were let immediately after inclosure for from £2 to £3 an acre. Recent inclosures have been sold by the Commissioners at the rate of £60 an acre.

Encouraged by the large quantities of valuable land thus reclaimed, after the Eau Brink Cut and the training works in the Nene had been completed, Sir John Rennie devised gigantic schemes for inclosing all the foreshores lying along the Lincolnshire and Norfolk coasts, and bringing the four Fen rivers into one common outfall. These schemes were finally taken up by the Lincolnshire and the Norfolk Estuary Companies. Both obtained Parliamentary powers to carry out the works, but the Lincolnshire company was unable to raise the necessary capital. The Norfolk company, however, having secured a subsidy of £120,000 from the drainage and navigation interests in return for the improvements in the channel of the Ouse, obtained the necessary number of shareholders, but up to the present time, out of the 30,000 acres over which their power extended, only 647 acres of land of their own and 876 acres belonging to the frontagers have been inclosed, after an expenditure of more than £400,000. The remainder is still nearly all bare sands. There is only a small quantity of grass and samphire, the best of which will not be fit for inclosure for at least ten years, by which time, unless a fresh Act is obtained, the company's powers will have expired. Mr. Gordon, the Admiralty Inspector, pointed out that the quantity of warp brought up in suspension in the water could never be sufficient to accrete this vast

tract of land within any reasonable time, and that the experience of past times showed that the greater part of the suspended matter was all carried away from this part of the coast to Lincolnshire. A slow accretion is now going on between the new channel and the bed of the old river, but the great bulk of the 30,000 acres is no nearer being covered with soil than it was when the company first started operations.

METHODS OF ASSISTING ACCRETION.

On that part of the coast where the tides bring the alluvial deposit the process of warping has, in some places, been greatly assisted by rows of faggots placed parallel with the inclosure banks. These check the movement of the water and assist the deposit, and a striking difference in the height of the marshes may be seen on two adjoining estates, on one of which this process has been carried on, as compared with the other, where nothing has been done. The Norfolk Estuary Company has lately gone to great and unnecessary expense in attempts to make the fore-shores accrete more rapidly, by placing parallel lines of piles and planks at right angles to the channel. These jetties are composed of fir piles 6 inches square, placed in duplicate at intervals of 6 feet; between them are boards, the tops of which are about 2 feet above the sands. The cost of these jetties is £6 per chain, and already 300 chains have been partly completed at a cost exceeding £600. The use of the boards has since been abandoned, and only single piles placed at intervals of 6 feet. As far as can be seen at present, no appreciable quantity of warp has been effected, and a much better result would have been derived from the use of faggots at one-tenth of the cost.

The accretion and growth of grass has also in some places been greatly assisted by what is locally termed 'inoculation,' or cutting sods off the marsh already formed, and laying them about singly on the silt; these become fixed, and the grass gradually spreads until the separate sods are united and the whole surface is grassed over.

After the marsh is covered with grass the surface becomes broken up by numerous creeks and 'pot-holes,' which are both expensive and difficult to deal with after inclosure. This in some cases has been obviated by a small expenditure of labour as the marsh is growing up, by cutting grips to lead the tidal water off, and thus forming straight channels, which ultimately serve as division ditches on the inclosed lands.

CROWN RIGHTS.

By a judicious expenditure of labour in placing fascines or straw ropes and sods on the bare sands, and by cutting watercourses as the marshes accrete, large tracts of valuable marsh might be added to the frontages of the various proprietors, but the uncertainty of the Crown rights delays the carrying out of works which otherwise might be attempted.

Over all sands and marshes covered by an ordinary high tide (by which is meant the average height of high water of all tides taken over a period of not less than one year), the Board of Trade claim an ownership on behalf of the Crown. Marshes fit for inclosure are above this level; but these are intersected by creeks and low places, which are covered at high water, and the Crown rights over these must be obtained before any inclosure can take place. The amounts paid for this are various. Generally it may be regarded as a nominal consideration for retaining the rights. Thus on the inclosure of the Kirton marshes in 1870, covering an area of 1,000 acres, the sum of £100 was paid as compensation for the creeks and low places below the level of high water, which covered an area of about 7 acres. For an adjoining marsh of 50 acres the sum of £50 was paid. For a marsh in Fishtoft of 130 acres, the Crown claims were settled by a payment of £60. For the Moulton marsh, containing 400 acres, the area of the creeks and low places below ordinary high water being 46 acres, and the rest of the marsh being 1 foot 6 inches to 3 feet above high water, the claim made by the Board of Trade was £100.

In these cases the amount is not of serious consideration, but in larger undertakings the value put on the sands is a complete bar to any scheme of improvement. Thus for a scheme of improvement for the outfall of the Witham, the promoters were anxious to buy up the Crown rights over the foreshores, extending over 1,000 acres of purely bare sand of no value, when the sum of £4,000 was demanded. Considering that even if this land warped up as rapidly as that on the adjoining coast, thirty years must elapse before it would be fit for inclosure, the compound interest at 5 per cent. would raise the cost of the land to over £16,000, in addition to which large sums would have had to be spent by the promoters in fascine work to make the land accrete. In the case of the Freiston Shore railway and reclamation scheme, the sum fixed for payment for Crown claim was equal to about £2 per acre. In the Norfolk Estuary works the compensation was fixed at 1 per cent. on the outlay. In the Nene Outfall

works the Crown receives one-sixth of all lands inclosed, provided such land was bare sands at the time the act for carrying out the works was obtained. For these sums, unless a special Act of Parliament has been obtained, the title thus given is extremely doubtful. The question arises, whether land which gradually accretes and grows to the frontage would not become the property of the frontager, and all right pass from the Crown. The foreshore is only the property of the Crown when it is below high water. As soon as it rises above this point, by the process of natural accretion, it becomes a part of, and belongs to the owner of, the foreshore to which it grows. The purchaser of the Crown rights over a tract of land, which had been bought for the purpose of reclaiming by accretion, might find that as the land accreted and grew, it was claimed by the frontager, and that the Crown conveyance was really worthless. Unless therefore under a special Act of Parliament, no improvement in causing the accretion and warping of land can be carried out, except by a frontager.

VALUE OF THE SALT-MARSHES.

The foreshores, when they have grown into salt-marshes, are useful for the grazing of sheep, and let at from 5s. to 6s. an acre. The prospective advantages, however, make the value of the freehold greater than this rent would warrant. The sum of £20 an acre may be taken as a fair standard for the present value of a salt-marsh fit for inclosure. In the evidence given before the Norfolk Estuary Commissioners, the value of the marshes was put at £30, this being the price to be paid to the frontagers on a compulsory sale; but in the awards subsequently made for frontagers' marshes taken in by the company's embankment, the value of the marshes, before inclosure, was taken at from £18 to £20 an acre, and after inclosure at from £54 to £59 an acre.

COST OF EMBANKING.

The cost of embanking must of course depend on the depth of the marsh as compared with the length of the frontage, and special circumstances arising from situation make the banks either more or less costly. A fair average for an inclosure, with banks 10 feet in height, and slopes varying from 5 to 1 in the more exposed parts, to 3 to 1 where the bank is more sheltered, on the sea side, and $1\frac{1}{2}$ to 1 on the land side, may be taken at £15 to £20 an acre, including the sluice and other necessary works. In addition to this from £3 to £4 an acre will be required for levelling and

ditching. The land is let directly after inclosure at from 40s. to 50s. an acre, the freehold being valued at from £50 to £60 an acre. Some of the best marshes after inclosure have realised £80 an acre, the proprietor taking all risk as to the maintenance and safety of the banks.

There is all along the coast of Lincolnshire a large tract of marsh and sandy foreshores, which, with the judicious outlay of a small sum of money, would become ripe for inclosure and add considerably to the value of the property of the owners of the land inside the sea banks on which it abuts. Considering the value of this accreted land when inclosed, it is a matter of regret, from a national point of view, when so much produce has to be imported from abroad, that more energy is not displayed in works of reclamation.

The communication is accompanied by diagrams, from which Plate 8 has been compiled.

