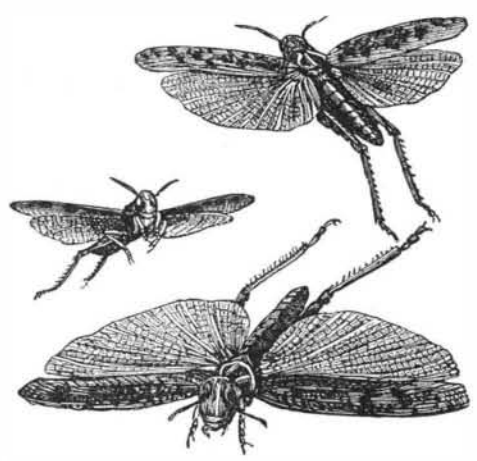
THE PLAGUE OF CRICKETS IN ALGERIA.

The lamentable visitation of destructive insects by which the whole province of Constantine, in the French dominion of Algeria, has this year suffered enormous damage to its crops of every kind of grain, was at first attributed to locusts, supposed to resemble those of ill fame, ancient and modern, in the countries of Western Asia and the Levant. It has since been ascertained that the present enemy is neither the locust nor the migratory grasshopper, but a native species of cricket, known to scientific entomologists as the *Stauronotus Maroccanus*, which is bred on the dry and bare highlands above the Tell of Algeria, and elsewhere on the



ADULT WINGED CRICKET (STAURONOTUS MAROCCANUS), MALE AND FEMALE.

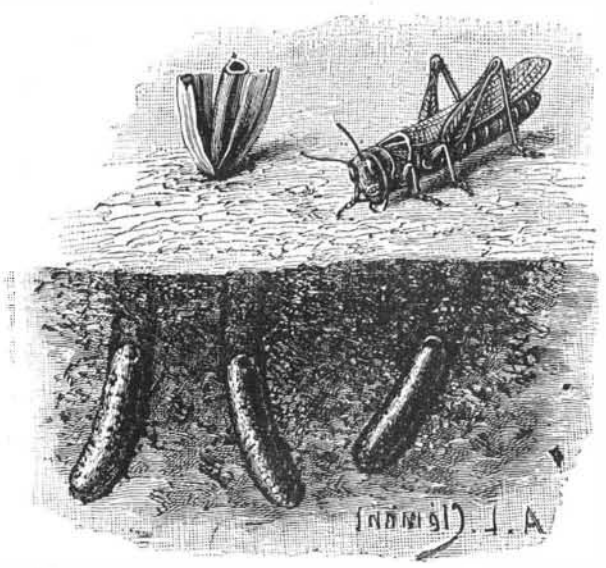
slopes of the Atlas mountain range, and which has been observed during the past three years, descending into the cultivated region of Algeria, toward the shores of the Mediterranean. Its ravages have been experienced in Morocco, it is said, on several former occasions.

The locust, the cricket, and the grasshopper belong to different families of the Saltatoria, or leapers, a section of the order of orthopterous insects.

The famous or infamous migratory locust of Asia and Africa is a big insect, two inches or two inches and a half long, with strong hind legs of nearly the same length, making prodigious jumps, and is therefore a rapid traveler. Wo to the country over which it travels! "They consume as a fire, and the land is utterly burned up." The prophet Joel gives a terrible, but exact, description of the locusts in Judea. When in the wingless condition in May and June, their arrival is more to be dreaded than after they begin to fly, because in the latter state vast clouds of them may be driven aside by the wind. Through such a cloud in the sky overhead, the sunlight is yellow, as through a smoky fog. Where they have descended, every blade of grass, every leaf of a tree—the very bark, if tender, of many trees—with all fruit and grain, will presently disappear. They are not stopped by the water of a shallow pool or stream, for the bodies of those who first enter it soon form a bridge, over which the mighty host can pass. Cold, rainy weather may kill them, but human efforts do comparatively little, though in Cyprus, seven years ago, by order of the British government, and by the digging of ditches, with the sides lined so that they could not climb out, 250 tons of dead locusts were obtained, and their weight is above ninety million insects to the ton. Where huge heaps and banks of their rotting bodies have remained on the ground, the pestilential stench has been smelled a hundred miles away. They supply, however an inexhaustible store of food to many kinds of birds, to some beasts, and to all sorts of worms and reptiles.

The *Stauronotus Maroccanus* is a very noxious creature. The female, which is the larger, measures three-quarters of an inch to an inch and a quarter in length, and the male commonly about three-quarters of an inch. Its color is russet or reddish brown; the corselet on the back is marked with an oblique cross, and there are vertical bands of alternate light and dark hues along the lower part of the body. The pair of adult insects, male and female, furnished with powerful wings, of which we give an illustration, are parents of this pernicious race. The female seeks to lay her eggs about the end of June or at the beginning of July. She chooses dry and sterile ground, in a situation not likely to be disturbed; and uses a natural apparatus, a valvular sucking tube, at the extremity of her abdomen, to lift and remove the grains of sand, boring a hole in the earth, about an inch deep. In this hole she deposits the ovary, a cylindrical case or shell of hardened mucilage, three-quarters of an inch long, containing all her eggs, some forty in number, very neatly packed together; then she covers them by filling up the hole. They are slowly hatched by the heat of the sun in the earth, where they remain nine months, until the new-born insect emerges, in the spring of the next year, a little white caterpillar, which speedily becomes a cricket, and is then quite ready to attack and devour the graminaceous plants for which it has a predilection. They swarm in millions all over the land, and by a mysterious instinct are guided to distant corn fields, advancing in vast and dense columns with a wide front, keeping the closest possible array, to conquer and despoil the agricultural industry of mankind. While on the road through the wilderness, or in a pastoral region, they will eat grass or any green herb; but as soon as they enter a field of wheat or barley, it is a wonderful sight to observe their passionate alacrity. They rush at every corn stalk, five or six of them climbing up it at once, and presently gain the top, which bends under their weight. Then, with the sharp-edged shears of their upper jaw mandibles, two strong horny hooks moving horizontally, crossing each other like the blades of a pair of scissors, they quickly cut the ear of grain to pieces, feeding on its farinaceous part, while they disdain the husks and the stalk. In attacking an ear of barley, they of course begin operations by stripping off the spikelets of its beard, which they do not eat; the husk of every grain is also torn off and thrown away. The business-like precision and skill with which these insects go to work, in their foraging among the corn, may be appreciated by the aid of our illustrations, showing the different stages in their treatment of the unfortunate plant. Any crumbs of farina that the busy plunderers aloft may let fall to the ground will be eagerly seized by the vast multitude below, which cannot find an unoccupied stalk to ascend; but, unless they happen to be famished by a very long march over bare ground, they despise the husks and straw. The insect army, gorged with a plenteous repast, and perhaps exulting in its victorious prosperity, marches on to fresh fields and pastures new. The agriculturists of the neighboring village are ruined. It is all over in a few hours. The *Stauronotus Maroccanus*—a tremendous name for a terrible, tiny foe—has conquered and devastated the country in a very brief campaign more effectually than would have been done by a barbarous human invader.

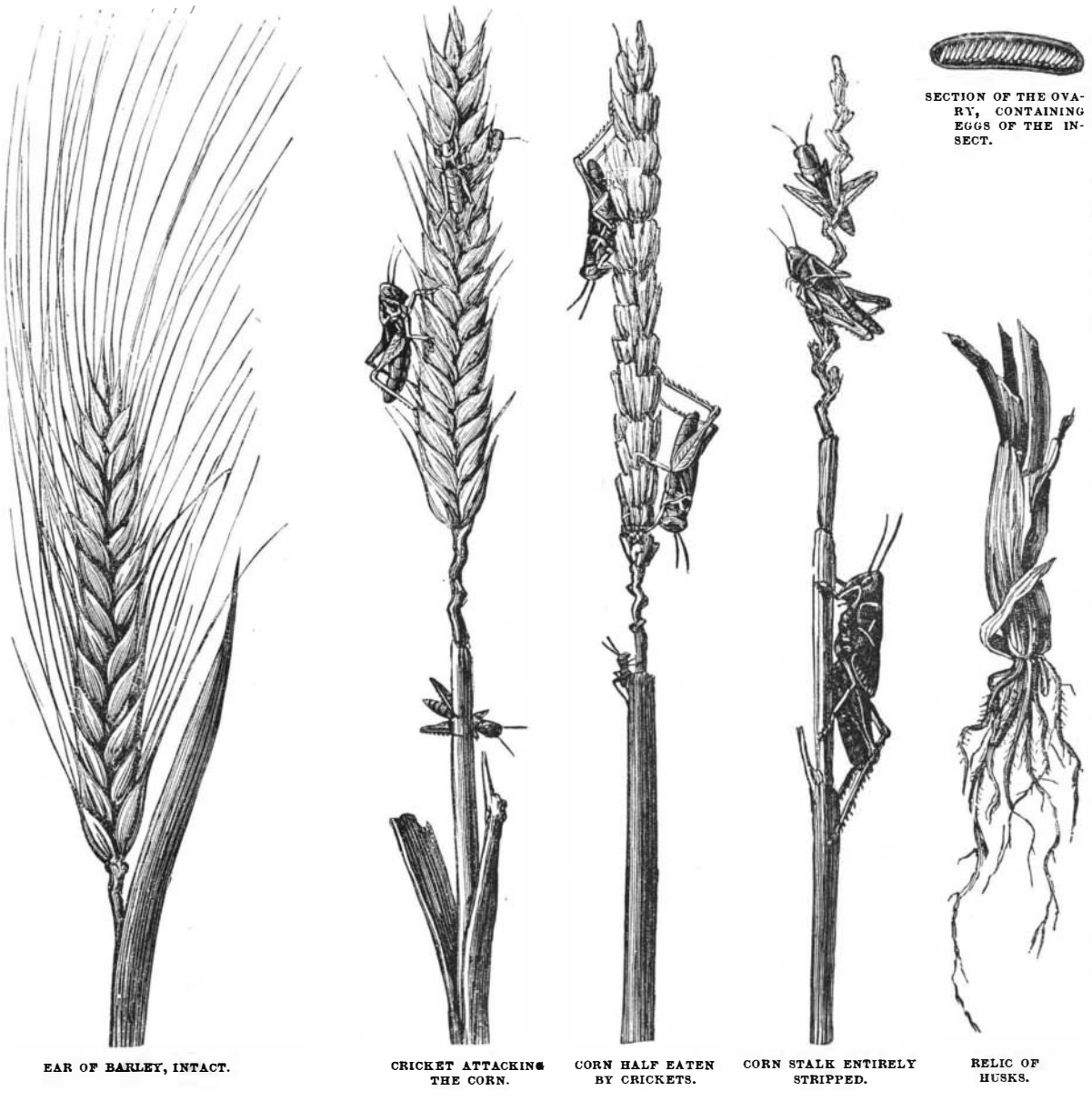
These ravages, in the part of Algeria where they have most prevailed, already extend over a territory three or four hundred miles in length, and the estimate of



CRICKET WITH ITS OVARIES BURIED IN THE EARTH.

the damage at six or seven million francs, which was made some weeks ago, has probably been much exceeded. The aspect of the country this summer is dismal and distressing, the cultivators are in despair, and the attempts to kill or drive away the insects have been quite unsuccessful. It seems impossible to stop them on the march, or to do anything with them afterward, when they have taken wings to themselves. The only plan to be recommended is that of searching, in the autumn and winter, for the places where they have laid their eggs, and either destroying the vitality of these by some chemical application, or watching for the appearance of the caterpillars, in March or April, and killing them before they can do any mischief.

Locusts, in most parts of the north of Africa, have always been dreaded as the most formidable natural enemy. The Arabs, however, eat locusts, as John the Baptist did; and one would not object to them boiled, with wild honey, or stewed in butter. Among the numerous accounts of them, in different countries, is that of Mr. Barrow, who visited a territory where, he says, they covered an area of 2,000 square miles. They had reached a broad river, and, in endeavoring to get at the reeds growing along its banks, such enormous quantities of the insects had been drowned that the whole river was filled with their dead, so that its water remained scarcely visible when he was there. On the seashore, when the winged insects came there, a strong wind drove them into the sea, which afterward cast their bodies up on the beach, forming a bank three feet or four feet high, for a length of fifty miles along the coast. It is a mercy to southern Europe that they cannot travel across the Mediterranean. —*Illus. London News.*



SECTION OF THE OVARY, CONTAINING EGGS OF THE INSECT.

EAR OF BARLEY, INTACT.

CRICKET ATTACKING THE CORN.

CORN HALF EATEN BY CRICKETS.

CORN STALK ENTIRELY STRIPPED.

RELIC OF HUSKS.

First Voyage of the Steamer City of New York.

This new Inman line steamer took 8 d. 11 h. and 29 m. corrected time in making her first passage this way across the Atlantic, arriving at New York in the early morning of August 10. The vessel was actually steaming only 6 d. 21 h., the circulating pumps getting out of order. Those who have expected she would be a very fast vessel, and perhaps beat all previous records, are, however, as confident as ever that she will quite equal their anticipations after her machinery has had a little wear. An illustrated description of the vessel appeared in our issue of April 14.

British Naval Maneuvers.

Some of the principal vessels of the British navy have been lately engaged in active maneuvers for the purpose of practice and instruction. Milford Haven was the locality chosen. Two fleets, A and B, were assembled, one for offense, the other for defense. We make the following abstracts from the *Broad Arrow*:

The vessels were collected together very expeditiously, and arrived at the starting point of their operations in a state of preparedness for service which reflects the highest credit upon the Admiralty and dockyard officials.

There never before existed anywhere a naval squadron possessing such powers of offense and defense as are to be found in these two fleets, simply because ships, guns, torpedoes, and all the other paraphernalia of naval warfare were never before so destructive, and never before were such elaborate measures taken to secure safety against the weapons of the enemy. In comparison with the duties to be performed, and with the naval forces of other powers at the time, the British navy of eighty years ago was undoubtedly much stronger than we can show to-day, but absolutely the British experimental squadrons of 1888 are by far the most formidable ever mustered.

"A" fleet consists of thirteen armored vessels, eleven cruisers, two torpedo gunboats, and twelve first class torpedo boats, while "B" fleet consists of nine armored vessels, eight cruisers, two torpedo gunboats, and twelve first class torpedo boats. Hence the British fleet "A" and the supposed hostile fleet "B" together contain no less than twenty-two armorclad vessels, nineteen cruisers, four torpedo gunboats, and twenty-four first class torpedo boats.

The greatest difficulty in handling this large collection of vessels is found to be that of keeping them supplied with coal. The commanders of the two fleets have speedily discovered this to be the case, and if such a difficulty arises so soon after commencing operations on our own shores, what would be the position of a fleet blockading an enemy's ports or attacking his commerce for any length of time? The delays in coaling the fleet at Milford have been put down to the credit of the colliers and the coal merchants, and perhaps with some justice, but in the event of the war operations being real, is it to be supposed that these blunders would be less likely to happen than when the ships are merely playing at war?

Not only was there delay through a misappropriation of the coals carried by the several collier steamers, but in addition both delay and disaster resulted from the attempt to coal heavy armorclads in an open roadstead. The damage suffered in this way by the Benbow seems to have delayed the whole fleet for nearly twenty-four hours. Now, if there was a difficulty in avoiding damage to booms and gun sponsons when receiving coals from a merchant steamer in the comparatively land-locked waters of Milford Haven, how much less likely is it that damage would be avoided when coaling at sea, outside a harbor, or on an ocean commercial track?

These considerations are deserving of notice, more especially from the fact that they appear to a large extent to be inevitable conditions of modern naval warfare, and are such as would tell as much at least in our favor as in that of our possible enemies. A great naval war between two maritime powers has not been fought since steam power entirely supplanted the use of sails in the largest war ships, and consequently we have little or no experience as yet of the true part which will be played by the coaling question in future naval operations on a large scale. These experiments seem to afford us some small idea of what would happen in the event of a war, say between Great Britain and France.

It is not only in the expense of chartering steamers to carry coal to our ships engaged in operations off the enemy's ports that the penalty of wholly abandoning sail power would be paid, but also in getting the colliers to their destinations in safety, and then in transferring the coals from the colliers to the fighting ships. A shrewd enemy would lie in wait for the defenseless colliers, and by sinking or capture prevent them from taking the essential supplies of coal to the fleet. Without that coal, an attacking or blockading fleet would be helpless and useless.

Almost all the torpedo boats have come to grief in one way or another. Of the six belonging to the Lough Swilly squadron, only one arrived intact. All the others developed some weakness or other, either in the form of leaky steam pipes, burnt boiler tubes, or some other defect in the machinery department.

War having, according to the Admiralty instructions, been duly declared at noon on the 24th of July, the same afternoon the Amphion cruiser, one of Sir George Tryon's blockaded squadron, came sufficiently near the blockading ships to be chased by the Inflexible, which opened fire, but was soon left behind out of range, closing Lough Swilly, and getting within the circle supposed to be swept by powerful forts mounting ordnance of 100 tons weight, with numerous smaller 22 ton guns of 9·2 inch bore. Admiral Rowley continued to advance with his battle ships and cruisers, returning the fire of the Rodney until within the prescribed range of the fortresses, when, according to the rules of the mimic war, she and her consorts returned to their blookading stations. At Berehaven, the Rupert being left with her mines and cables guarding the entrance, the Hercules leading, the blockading squadron was sighted soon after noon on the 25th, composed of the Benbow, Conquerer, Collingwood, Northumberland, Northampton, Hotspur, and Mersey. The blockaded force, which had sallied out, consisted of the Hercules, Warspite, Ajax, Hero, Iris, Cossack, and Volage. The Mersey seemed intent upon cutting off the latter vessel, and therefore the Iris and the Severn, twin sister to the Mersey, were dispatched, and, coming within range, fire was opened, and then the Mersey, at once putting on all steam power, ran out of range of their guns and within the protected fort circle. The blockading, squadron keeping at a distance, and not coming near the fire of the forts, Admiral Tryon exercised his vessels in steam tactics, of which they appear to have had little or no experience. The event of the greatest importance is the reported escape of the Iris, which will now be free to prey upon commerce in accordance with the rules issued by the Admiralty.

The escape of the Iris was observed by the Active and the Rover, but as the Iris steamed 17 knots and her pursuers scarcely 14 and 12 knots respectively, she was soon out of sight, nor does it appear that the Arethusa, sent to Milford and coaled, to be ready for any such eventuality as the escape of a blockaded cruiser, is likely to catch her, for she rolls and jumps about in a very uneasy manner, scooping up the sea at her gun sponsons, and sending a deluge of water over her deck, whereas the Iris seems both drier and steadier as well as faster. The maneuvers have already shown that the Sandfly and vessels of her class are unsuitable for war purposes, and the engines of some of the other classes seem to shake them far too severely. In the heavy breechloaders there has been an accident with one of the Rodney's guns, temporarily disabling it, and we are now finding out several weak points. The Northampton's steam steering gear broke down, and occasioned considerable loss of time in its repair, and several of the torpedo boats were troubled with leaky joints in their steam pipes or boiler tubes. The Calyso's boiler tubes also proved leaky on her being driven at a high speed, and there have been several minor accidents, partly occasioned by a want of familiarity with the work. On the whole, so far as the handling of our war ships and practicing them in useful maneuvers goes, there is every reason to be well satisfied that the mobilization of the fleet was urgently required, and will, we believe, hereafter lead to very great improvement, by instructing the officers far more thoroughly than is the case at present in steam tactics.

The Great American Crop.

Corn or maize is the great American tillage crop. There is no other of half its area. Wheat has nearly half and cotton a quarter of its breadth. It is sufficient to cover Ohio, Indiana, and Illinois, with a slice of Iowa in addition. Its area last year, though reduced by drought, was 51 per cent of that of all cereals together, and its product was 55 per cent. It was grown by the Indians before the white man appeared on the continent. It is now grown in every State and Territory in the Union, though sparingly in those of high elevations, in the Rocky Mountain region. The supply as population increases is enlarged rather than diminished. It was 25·5 bushels per head in 1850; 26·6 in 1860; 29·7 in 1870; and 35 in 1880.

The crop, large as it is, is exported in small proportion. Only 4 per cent of the production of seventeen years has gone abroad for a market. The home market is 96 per cent of all, and its relative abundance or scarcity makes the price. If scarce, the price is high, and foreigners decline to buy; if low enough to compete with foreign feeding stuffs, a larger quantity is exported. Neither Liverpool nor Chicago makes the price, but the farmers and country feeders, who use five-sixths of all. It is a crop of which railways carry but a small part. Less than one-fifth crosses State lines. Half is used for feeding for milk or flesh, one-tenth for human food, and four-tenths for the food of working animals. For spirits scarcely one per cent is used, and yet we hear demagogues, not to say statesmen, who insist that prices would go down if the farmer was deprived of the distillery demand. The uses of corn it would be difficult to limit, in food, in drink, in clothing, in bedding, in milk, meat and wool, starch and sugar. They are so many that the lack of foreign demand for the raw grain would prove a blessing, as there is a greater profit in enlargement of its extended products. It is a raw material for manufacture which we have even less reason to import than cotton, wool, hemp, or flax, and which, like all other raw materials, should only be exported as manufactures. The prospect for the present year is for the largest area ever grown of this distinctively American crop. Aside from the area intended for grain, there will be millions of acres drilled for forage, the silo, and the summer dairy. No other plant will produce so much nutritious feed on a given area. No other is worth so much for American tillage.—*Milling World.*

Frictional Gearing.

At the recent meeting of the Institution of Mechanical Engineers, Dublin, Mr. John Purser Griffith, President of the Institution of Civil Engineers of Ireland, gave a description of the frictional gearing used on a double steam dredger in the port of Dublin.

The double steam dredger No. 4, in the Port of Dublin, was built by Messrs. Thomas Wingate & Co., of Glasgow, in 1871, and at that date was one of the largest dredgers afloat. Both sets of dredge buckets, the hoisting gear for the ladder, and the fore and aft winches, are all worked by a single-cylinder low-pressure condensing side lever engine of 150 i.h.p. It is necessary to be able at will to disconnect the gearing of either set of buckets from the main engine, or to raise the bucket ladders and warp the dredger about without driving the upper tumblers. To meet these requirements the builders adopted Robertson's grooved frictional gearing (Proceedings, 1856, page 262). Two grooved pinions of 54 in. diam., with nine grooves cut to an angle of 40° and 1¾ in. pitch, were fixed on the engine shaft, and geared into two grooved wheels of 127½ in. diam., running on intermediate shafts, but not keyed to them. Each of these wheels revolved on an eccentric gun metal bush, embracing the intermediate shaft and turning freely on it; and by means of long levers connected with the eccentric bushes the grooved wheels could be put in and out of gear with the pinions on the engine shaft. A cast iron driver keyed on the intermediate shaft was connected with the grooved wheel by a pin and sliding guide block, in such a manner as to allow of the eccentric motion; so that when the grooved wheel was thrown into gear it carried the cast iron driver around with it, and thereby turned the intermediate shaft, on which was keyed a toothed pinion gearing into the large spur wheel of the upper tumbler. Thus at will either or both of the upper tumblers could be put in and out of gear without stopping the engine. The speed of the grooved wheels at their circumference was about 500 ft. per minute. If half the engine power was transmitted by each set of gearing, and allowance be made for the friction of the engine itself, the tangential force at the rims would be about 3,690 lb., requiring, if the angle of the grooves were 40° and the coefficient of friction 0·18, a pressure of 7,615 lb. between wheel and pinion to prevent slipping. The dredger worked on the average forty-seven weeks per annum for eleven years till 1883, and raised nearly 4,500,000 tons. Some of the difficulties experienced in connection with this grooved gearing arose from variations in the hardness of the castings. As the large wheels wore down, the rim deflected between the arms, and this also caused unequal wear, which was attended by slipping of the gearing. In No. 4 dredger the pinion was wider in the face than the large wheel into which it geared, and was placed below it. The oil from the upper bearings trickled down the large wheel, and lubricated the outer grooves of the pinion. The wear and tear of these outer grooves was therefore less than that of the intermediate grooves. This led to their having a greater share of the pressure than the central grooves, and resulted in the outer faces bursting off. In addition to the mere angle, the form of the groove is an important feature in grooved gearing. When wheels of unequal diameters work into each other, it must be borne in mind that the small wheel will wear faster than the large; and the shape of the grooves in both wheels should be such that they will remain similar in shape till the tops of the ridges begin to touch the bottoms of the grooves. As soon as this point is reached, the wheels must of course be re-turned or renewed. In 1885 and 1886 the dredger was repaired, and spur gear with brake wheels substituted. In place of the grooved pinion and wheel a toothed pinion was keyed on the engine shaft, gearing into a spur wheel which ran loose on the intermediate shaft, and to the side of the spur wheel was bolted a cast iron brake wheel. As in the original arrangement, a cast iron driver was keyed on the intermediate shaft. At each end of the driver was hinged a T-shaped lever. To the short arms of the lever were attached with adjusting screws two steel brake bands, the other ends of which were fastened in a similar manner to the corresponding T-lever at the opposite end of the driver. The steel bands thus embraced the brake wheel like a brake strap. The long arms of the T-levers were connected by tension rods with bell cranks hinged at the center of the driver; and the bell cranks were also connected with a collar sliding on the intermediate shaft and revolving with the driver.

Mr. Bindon B. Stoney said the number of buckets they were able to get over per minute with the original frictional gear was twelve. With the modified brake gear they were able to get fourteen, with a much less consumption of coal.

Mr. D. Adamson said the frictional gear was not suitable for such a machine, where the motion was so slow. Where the frictional surface was only passing through 8·3 ft. per second, it was utterly inapplicable.