

HOW STONE IS CRUSHED AND SCREENED.

The stone-crushing establishment shown in the illustration is situated near the West Shore R. R. depot at Weehawken, N. J., and is fitted up with three Blake hydraulic crushers and the necessary screens and elevators. The crushers are made of cast iron, about 6 inches in thickness, and the feed opening at the top is 15 inches in length and 7 inches in width. Each crusher has a stationary vertical jaw and a movable jaw swinging on a pivot to approach the other. Both jaws are fluted, the ridges of one jaw being opposite the grooves of the other. The movable jaw, which approaches to within $\frac{3}{8}$ of an inch of the bottom of the other, is made in two sections, so that the fluted part when the ridges are worn out can be replaced by a new one, which is fastened in place by means of key bolts. On the back and lower half of the movable jaw is a groove about 4 inches in height and 3 inches in depth, in which rests the larger end of a V-shaped toggle plate, 4 inches thick, 14 inches wide, and about 17 inches in length. The small end is round and rests loosely in the end of a small 9 inch cylinder, the end where the toggle plate rests being shaped inside like a druggist's mortar about 5 inches in depth. This small cylinder slides into a large 20 inch cylinder, and when the wheels of the hydraulic engine revolve, the piston or plunger which runs through the top of the large cylinder descends and presses the 1 gallon of water which the cylinder is supplied with against the small cylinder. A 3 ton pressure is thus given which drives the small cylinder forward, with the toggle plate and movable jaw, the latter being moved up to within $\frac{3}{8}$ of an inch of the bottom of the fixed jaw, and breaking all the stone between the jaws.

Connected to the movable jaw, and running underneath the cylinder, is an India rubber spring which draws the jaw back as the plunger ascends. As the stone is broken it falls into a chute on the under side of the crusher and passes into a circular iron screen which is perforated with different sizes of holes. This screen is 3 feet in diameter, 8 feet in length, and made of $\frac{1}{2}$ inch iron. It is made in ten sections securely bolted together. The holes in the screens are 1, $1\frac{1}{2}$, and $2\frac{1}{2}$ inches in diameter. The screen is hung at an angle so that the larger pieces of stone as they fall into it will roll down to the lower end and pass through the large holes to the elevator below.

The elevator is about 50 feet in length and runs out to the center of a large stone bin. The sides are made of heavy timber, about 2 feet apart, and running between them on 3 inch wooden rollers is an 18 inch wooden belt made of strips of wood 2 inches in width and 1 inch in thickness. These are fastened closely together by means of a 12 inch rubber belt running across the center and screwed fast to the under side of the strips. The stone as it falls from the screen drops on to this wooden belt and is carried out to the end of the elevator, where it falls down into the stone bin. The bin is elevated about 7 feet from the ground and rests on 12 by 12 timbers, which are placed far enough apart for a cart to back in underneath the bin for a load of stone. Projecting down from the bottom of the bin about 6 inches is a 7 inch iron pipe covered at the bottom with an iron plate. The cart is backed directly under this pipe, when the driver pushes the plate one side and down comes the stone, which fills up the cart in about two minutes. The plate is then pushed back again over the mouth of the pipe until the next cart comes. The stone is sold by the cubic yard. One stone breaker will crush from 50 to 60 yards of stone every 10 hours. The establishment is run by steam power, a 24 h. p. engine being used. The plant is owned by John Murphy, of West Hoboken, N. J., and cost about \$10,000.

Name Plate Metal.

A good material for engine name plates and the like may be made as follows: To 100 parts by weight of copper thoroughly melted add successively, each being carefully pulverized, 6 parts of magnesia, 57 of sal ammoniac, 18 of quicklime and 9 of cream of tartar. Stir constantly while adding the above, then add 15 parts of either zinc or tin in small portions, the stirring being continued until the whole is thoroughly melted and mixed. After resting in a molten condition for half an hour, the surface is skimmed and the metal made use of. The resulting metal has a fine grain, is easily polished, is malleable and is slow in tarnishing.

The Influence of Diet on the Growth of Hair.

In the *British Medical Journal* for July 25, Dr. E. D. Mapother says: "Several cases of shedding of hair after influenza have confirmed my opinion that diet has much to do with the production and with the cure of symptomatic alopecia. Hair contains five per cent of sulphur, and its ash twenty per cent of silicon and ten per cent of iron and manganese. Solutions of beef,

The Hospice of the Great St. Bernard.

This asylum for the Alpine wayfarer (7,609 feet above the sea level) is said to have been founded A.D. 962 by St. Bernard of Menthon, while, according to some authorities, it rose a century earlier, under Charlemagne. Neither saint nor emperor is likely to make good his claim, as the archives of the hospice have been completely destroyed in two successive conflagrations. But like other Christian institutions, it had undoubtedly a pagan predecessor. The Romans on the self same spot built a temple to the Pennine Jove, and that, in turn, occupied the site of a still earlier shrine of prehistoric antiquity. The truth is, the Alpine passes were in common use from the remotest ages—the Christian world treading the same route which had been trodden by the Romans, who also availed themselves of the track made by the aborigines. At its highest point the tutelary deity had his place of worship, and this was served by the local priesthood, who rendered assistance to the distressed or ailing traveler and received votive tributes in return for its good offices. The existence of a temple of Jupiter on

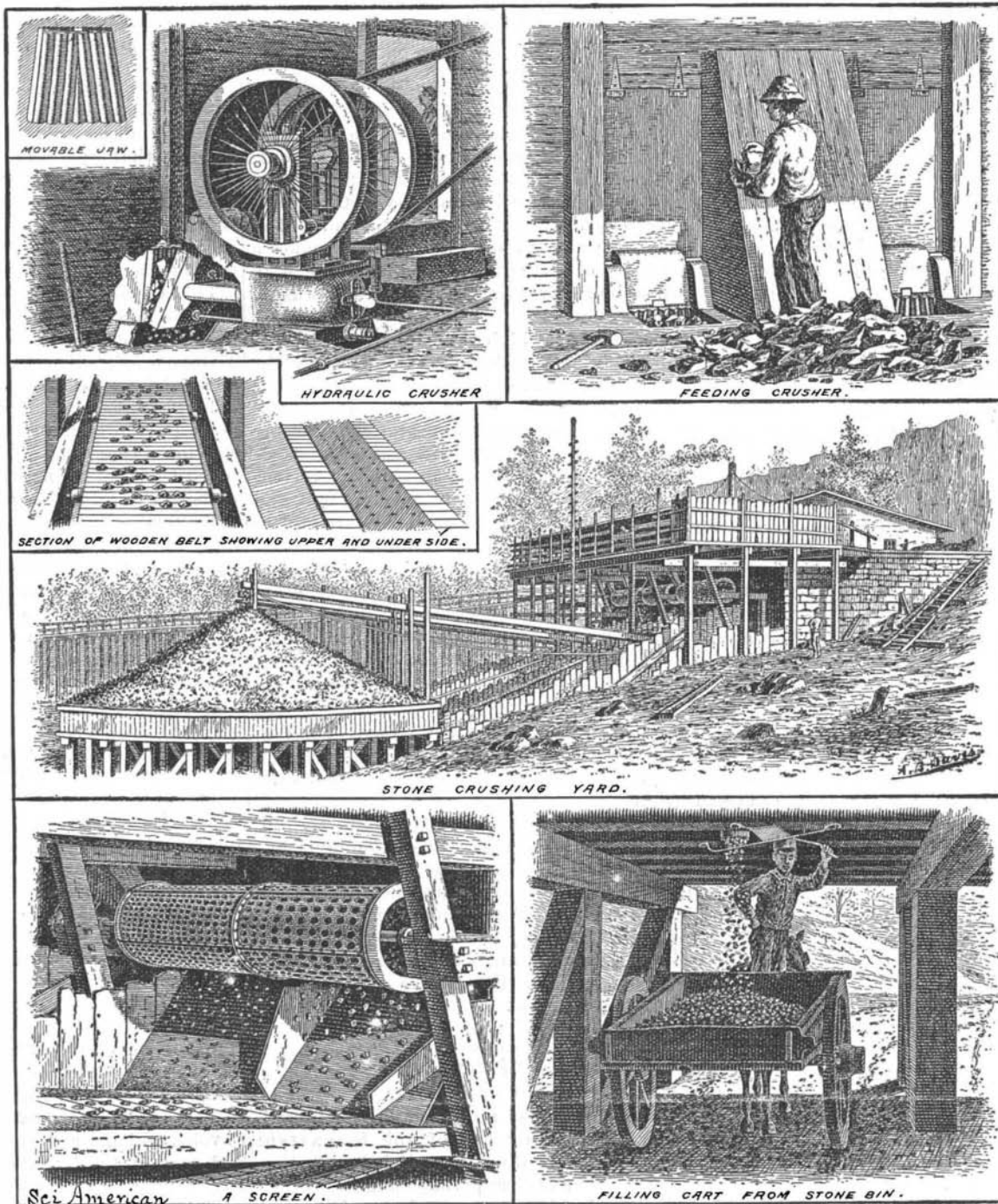
the spot, with its staff of priests, is well known; and the relics that have turned up near it attest its uses to have been similar to those of the present hospice. A discovery of importance has just been made in its vicinity—a bronze statue in excellent preservation of Jupiter himself. Its artistic value is very great; its height, forty centimeters. At the same time other treasure-trove was brought to the surface, including a number of medals and a statuette of a lion measuring sixteen centimeters, also of fine workmanship. These are now the property of the monks, and will attract to the hospice a public more able to keep them in funds than the proper recipients of their kindness. Sad to relate, the revenues of the monastery, heavily drawn upon by the travelers (from 16,000 to 20,000 annually) who throw themselves on its bounty, are diminishing, the contributions left by these comfortably accommodated guests being miserably below what, in the majority of cases, they can afford.

The heroism of the monks should be remembered by the well-to-do holiday visitor. They begin their career at the age of eighteen or nineteen. After fifteen years' service the severe climate has made old men of them. For eight or nine months out of the twelve they see none but the poorest wayfarers, when the cold is intense, the snow lying deep, the danger from storms incessant and fearful. Their sole companions are the dogs, whose keen scent has

guided them to the snow wreath under which the buried traveler has so often been rescued and brought to life—dogs like that noble fellow "Barry," who saved forty men in his time, and who now, carefully stuffed, adorns the museum at Bern.—*Lancet*.

Interesting Discovery in Egypt.

The correspondent of the *London Times* at Alexandria telegraphed on October 11 that three colossal statues, ten feet high, of rose granite, had just been found at Aboukir, a few feet below the surface. The discovery was made from indications furnished to the government by a local investigator, Daninos Pasha. The first two represent in one group Rameses II. and Queen Hentwara seated on the same throne. This is unique among Egyptian statues. The third statue represents Rameses standing upright in military attire, a scepter in his hand and a crown upon his head. Both bear hieroglyphic inscriptions, and both have been thrown from their pedestals face downward. Their site is on the ancient Cape Zephyrium, near the remains of the temple of Venus at Arsinoe. Relics of the early Christians have been found in the same locality.



IMPROVED STONE CRUSHING MACHINERY.

or rather of part of it, starchy mixtures, and even milk, which constitute the diet of patients with influenza and other fevers, cannot supply these elements, and atrophy at the root and falling of hair result. The color and strength of hair in young mammals is not attained so long as milk is their sole food. As to drugs, iron has prompt influence. The foods which most abundantly contain the above-named elements are the various albuminoids and the oat, the ash of that grain yielding twenty-two per cent of silicon. With care these foods are admissible in the course of febrile diseases, when albumen is the constituent suffering most by the increased metabolism. I have often found a dietary largely composed of oatmeal and brown bread greatly promote the growth of hair, especially when the baldness was preceded by constipation and sluggish capillary circulation. Those races of men who consume most meat are the most hirsute. Again, it is well known in the zoological gardens that carnivorous mammals, birds, and serpents keep their hair, feathers, or cuticle in bad condition unless fed with whole animals, and the egesta contain the cuticular appendages of their prey in a digested or partly digested state."

Microbes and Carpets.

In our endeavor to be comfortable in this vale of tears, there is a tendency to overlook the elementary laws of hygiene, and in no respect, perhaps, more so than in the superabundance of curtains and carpets—those non-patented contrivances for hindering the free circulation of fresh air and stultifying nature's automatic arrangements for the deodorization and disinfection of our homes. Carpets are always objectionable when they are not designed to permit of easy removal for cleansing purposes without the necessity of turning a room topsy-turvy. In most houses the carpet only comes up once a year, by which time it is as full of microbes and accumulated filth as its interstices will allow. No wonder, then, if our rooms preserve a musty smell in spite of periodical opening of windows and vigorous sweepings, which only displace a portion of the dust to settle promptly elsewhere in some less accessible spot. Fixed carpets are even more objectionable and unwholesome in bedrooms, for there they absorb the fetid emanations of the night, and soak up various decomposable materials for future use. The ideal would be a polished wooden floor garnished with rugs in sufficient number to give an aspect and feeling of comfort, while admitting of easy exposure to the salutary influence of air and light. Rugs, carpets and curtains ought to be frequently shaken and hung up in the fresh air if they are to remain sweet, not once a month or year, but twice or thrice a week, if not oftener. At this price only can we hope to deprive confined spaces of their native unwholesomeness, and the sooner housewives lay this maxim to their hearts and act upon it, the better.—*Hospital Gazette.*

Union Label—Trade Mark.

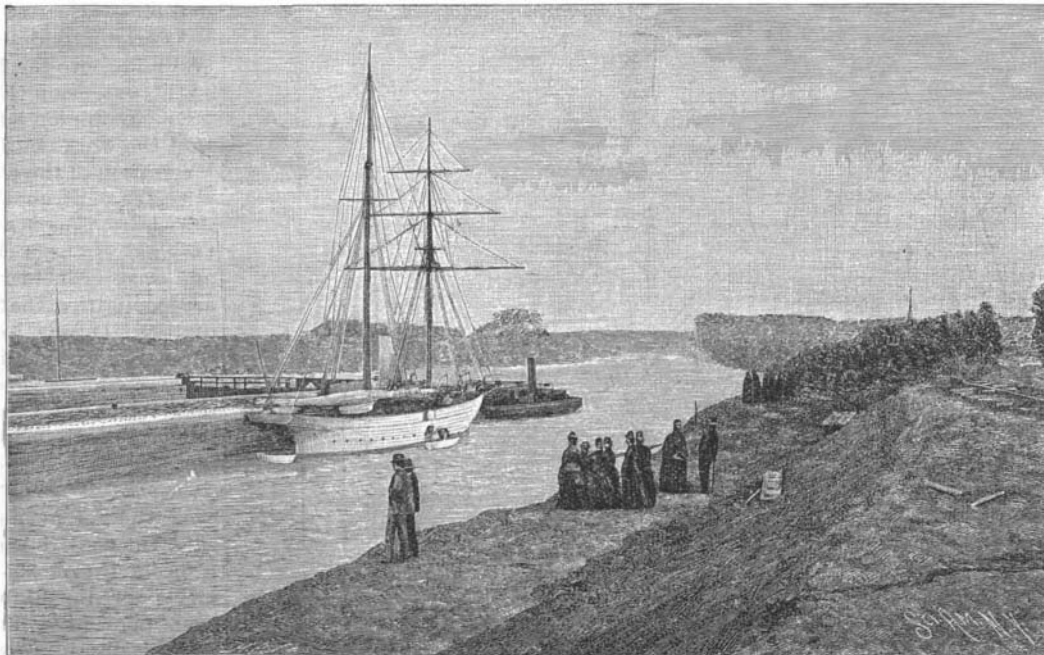
An interesting decision has just been rendered by the Supreme Court of Pennsylvania in a suit brought by Cigarmakers' International Union No. 126, of Ephrata, against one Brendle, to restrain him from using the Cigarmakers' International Union label on his goods. The defendant was a union manufacturer who had incurred the ill-will of local officials, and declined to use their labels, but issued similar labels or trade marks of his own. The union secured an injunction in the court below, but the Supreme Court reversed the decision of the court below on the ground that the Cigarmakers' Union, formed for the mental, moral, and physical welfare of its members, was a personal and social organization, not a commercial one, and, therefore, could not own a trade mark under the laws of Congress. It appears that the union label described the cigars it accompanied as being made by first class workmen, stigmatized all cigars not having the label as of inferior workmanship, and recommended the union cigars to all smokers throughout the world. In its decision the court said: "This is an attempt to use the public as a means of coercion in order to find a market for their goods or labor. A first-class workman is one who does first-class work, whether his name is on the rolls of any given society or not. Filthiness and criminality of character depend on conduct, not on membership of the union. Legitimate competition rests on superiority of workmanship and business methods, not on the use of vulgar epithets and personal denunciation. The International Union in this case has an avowed purpose to do harm to non-union men, to prevent the sale of their work, to cover them with opprobrium, and they ask a court of equity to say they have a right to do so. We decline to say so."—*Bradstreet's.*

The finest stationary engines made in the world, for economy, durability, and elegance in design, are made in the United States. English engines are often bulky and clumsy. French engines are frequently erratic in design and fragile in construction.

THE MANCHESTER SHIP CANAL.

This great engineering work is now rapidly approaching completion, and will soon be in full operation. The first completed section, from the entrance at Eastham on the river Mersey to Weston, was opened for traffic on the 29th of September. The length of this completed portion is eleven miles, being almost one-third of the entire length of the work.

The first consulting engineer was appointed (to look into the project and report) in the summer of 1882. It was only in August, 1885, after making three trials, that the sanction of Parliament was obtained for building the canal. Before a single sod was turned



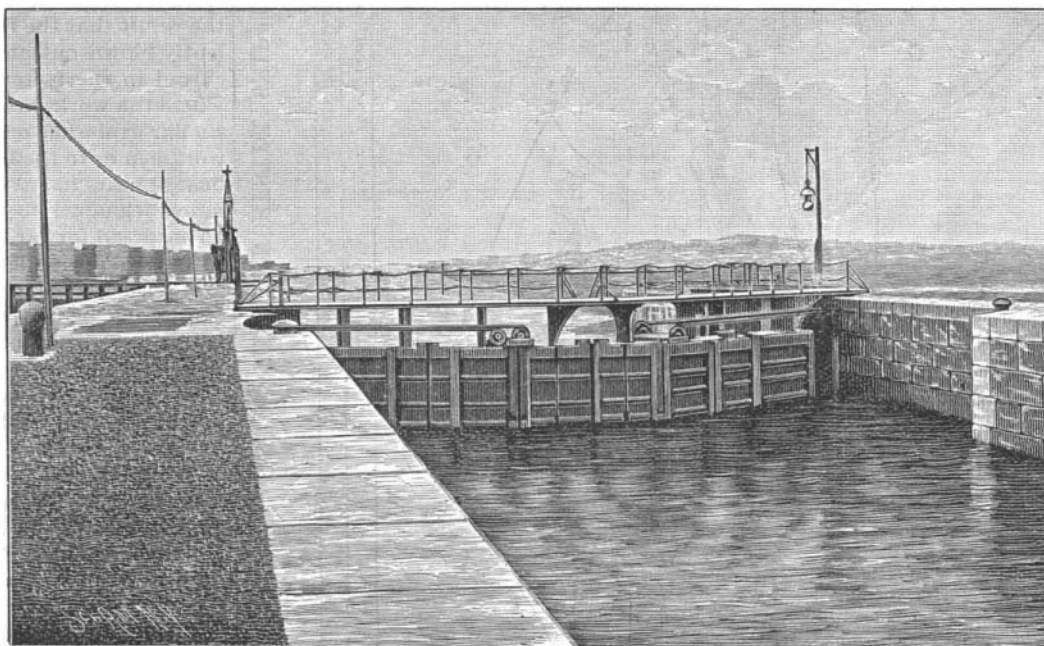
THE MANCHESTER SHIP CANAL—VIEW FROM LOCKS LOOKING ALONG THE CANAL.

in the great work, \$1,750,000 was spent in forwarding and contesting the canal project. In July, 1886, the contract for building the entire canal was let to Mr. Thomas Walker for \$28,750,000. The allowed time for finishing the work was four years, with a large bonus for whatever time was gained in finishing.

The canal extends from Eastham Locks on the south bank of the estuary of the Mersey River to Manchester, having a total length of a little over 35 miles. The minimum width on the bottom is to be 120 feet. The depth throughout is to be 26 feet. This is a very large cross section when compared with existing canals, which are as follows:

- Ghent canal, 55 feet 6 inches wide on the bottom, 21 feet 2 inches deep.
- Suez canal, 72 feet wide on bottom, 26 feet deep.
- Amsterdam, 88 feet 7 inches wide on bottom, 23 feet deep.

Quite satisfactory progress has been made on the en-



THE MANCHESTER SHIP CANAL—VIEW OF ONE OF THE LOCK GATES.

tire work, but the sudden death of Mr. Walker, the energetic contractor, proved rather embarrassing.

Mr. E. Leader Williams is the chief engineer of the work and has been one of its principal promoters from the beginning.

The canal is 48 feet wider than the bottom of the Suez canal, while the depth is equal; so that the largest cargo steamers can pass each other in the Manchester ship canal. At several points, near the locks and near the docks, this canal is wide enough for such ships to turn. For a length of three miles and a half, approaching Manchester, the width at the bottom is 170 feet, so that ships can lie outside the docks along the wharves on the Salford side. There will also be

open side basins, or widenings at ship building yards, or where cargoes are discharged or loaded, for manufacturing establishments or storehouses adjoining the canal.

Five sets of locks—at Eastham, on the Mersey sea estuary; at Latchford, on the Mersey, above Warrington; at Irlam, above the junction of the river Irwell with the Mersey; at Barton, on the Irwell; and at Manchester—raise the level of the canal, on the whole, 60 feet above the sea. Of its entire length, twenty-three miles, inland from Runcorn to Manchester, will have been formed by cutting a straight and deep channel for the rivers Mersey and Irwell. The lower

section, from Eastham to Runcorn, forms a curved line of twelve miles along the Cheshire shore of the broad inner expanse of the Mersey estuary; but at Weston Point, meeting the estuary of the navigable river Weaver, which is connected with an extensive system of canals, it will obtain valuable local traffic, especially the shipment of salt. A large trade with Cheshire and the Staffordshire potteries, by the Bridgewater canal, will also reach the ship canal at Runcorn, as well as that of the chemical manufacturers at Widnes. The Shropshire Union canals will feed the traffic at Ellesmere Port, near Eastham.

The Manchester docks, formed on both banks of the Irwell, chiefly in Salford, but also in Manchester on the site of the Pomona Gardens, Cornbrook, and extending to

Throstlenest and the Albert Bridge, near the Old Trafford Road, will afford ample accommodation to the trade of that city. They occupy a space of two hundred acres. The water area of the dock basins is sixty-two acres and a half, and the quay frontages are three miles and a half in aggregate length, to which may be added a mile of open wharves along the wide part of the canal just below; and there will be two miles and a half of the canal bank, lower down, available for discharging cargoes into barges and lighters, and putting them ashore. Fifty hydraulic cranes, some of great power, will be provided at the Manchester and Salford docks.

The docks at Warrington, twenty-two acres and a half in extent, will have a railroad connection with the London and North-western and the Great Western Railway, which will bring a large coal and general traffic.

At Runcorn, at the head of the Mersey estuary, the docks belonging to the Bridgewater Canal Navigation, having been purchased by the Manchester ship canal, will always be accessible, instead of being entered only at spring tides as hitherto; the local trade advantages here, as well as those of the docks at Weston Point, for the Weaver navigation, have already been noticed.

The ship canal will be entered from the sea, or rather from the Mersey estuary, about four miles above Birkenhead, by the tidal locks at Eastham, all the gates of which will be open at high tides. The sills of these entrances will be 11 feet lower than the deepest dock sills at Liverpool or Birkenhead; and the channel approaching them will be dredged 3 feet deeper than the lock sills.

One of the great causes of expense has been the erection or reconstruction of railway bridges crossing the canal, each at a high elevation, to give a clear headway of 75 ft. above the water, and with the approach lines of railway to rise by moderate gradients on each side. The Cheshire Lines Railway at Irlam, the Wigan Junction line, the Warrington and Stockport line, the Grand Junction line at Warrington, and the London and North-Western Railway at Runcorn, must be treated with such costly alterations. The Barton aqueduct of the Bridgewater canal across the Mersey is replaced by an opening swing bridge, which is an iron trough, closed at each end when the bridge is opened, to contain the water of the Bridgewater canal, held thus safely above the level of the ship canal.