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GOVERNMENT LIGHT ON WESTERN RIVERS.

KING COAL'S HIGHWAY.

AT that most interesting point on the coast of the Gulf of Mexico where, through a low-walled channel, the Mississippi pours a fan-shaped torrent of umber-hued fresh-water into the azure saltness of the Gulf, two objects boldly claim attention. One of these, the Port Eads Light-house, towers above the surrounding buildings, a Cyclopean giant whose single eye glares about the four points of the compass, and winks once every thirty seconds. The other is a sloping solitary hillock of coal, immobile, dusky, sullen; its base set about with great black lumps, its apex irregular in form, crumbling, unsightly. A contrast, truly, to its brilliant *vis-à-vis*, yet holding within itself all the elements of a light as brilliant as that which pours through the Fresnel lenses opposite, and representing, moreover, in each homely lump a storehouse of heat, and a magazine of power to be evolved through glowing furnace and throbbing engine.

And as the voyager proceeds up the great river he will find no more light-houses, but at every plantation, at every city, and every town along the mighty stream he will find a companion to the coal pile at South Pass. He will see coal ashore and afloat, in transit by water or on land.

Whence comes it? How comes it? These are the questions it is the province of this paper to answer through pen, pencil, and graver.

Twenty-one hundred miles distant from the carbon heap at Port Eads its bulk is represented by a void as black as is the coal itself, deep beneath the goodly hills of Western Pennsylvania that are within sight of Pittsburgh's perpetual cloud of smoke. Under these hills a grimy army of men labor to dislodge what nature

stored there countless ages ago: solid carbon for the warming of a million firesides along the banks of the Father of Waters, for the driving of wheels in thousands of workshops in the valleys of the Ohio and Mississippi, for the lighting of busy streets in cities two thousand miles away, and for the impelling power of river and ocean steamers.

Between the subterranean pit of the producer and the furnace of the consumer there stretches, not the parallel metals of the railway, nor the terraced levels of a canal, but the devious channels of two great rivers, the Ohio and Mississippi. Thousands of miles of tortuous watercourse, a varied gauntlet that must be run by the coal-transporting fleets that issue from the portals of Pittsburgh, aptly termed the "Gate City of the West."

A gauntlet of shifting "bars," of treacherous shoals, and whirling and vexing cross currents, where meanderings and reversions of course so rapidly follow one another that the greater river seems to write its superabundant S's up and down the land, and the lesser Ohio seeks to describe its O's in watery loops throughout the thousand miles of its entire length from Pittsburgh to Cairo. These are but the spring and summer difficulties to be surmounted by the inland navigator. Winter multiplies them to a fourfold degree. Out of the Alleghany, whose sources lie within sight of Lake Erie, there pour at intervals during the winter months swift-moving glaciers of ponderous ice-cakes, drifting southward to their dissolution at the rate of six miles an hour. Or it may be that this stream and the Monongahela—as well as the Upper Ohio—are silent under solid fields of ice. Then let sudden thaw or genial rain release the imprisoned streams, and acres of ice break up and carry destruction to coal fleets moored at or near Pittsburgh awaiting a favorable stage of water. Then a hundred beats of a healthy pulse would mete out sufficient time for the destruction of enough coal to light and heat a city for a month.

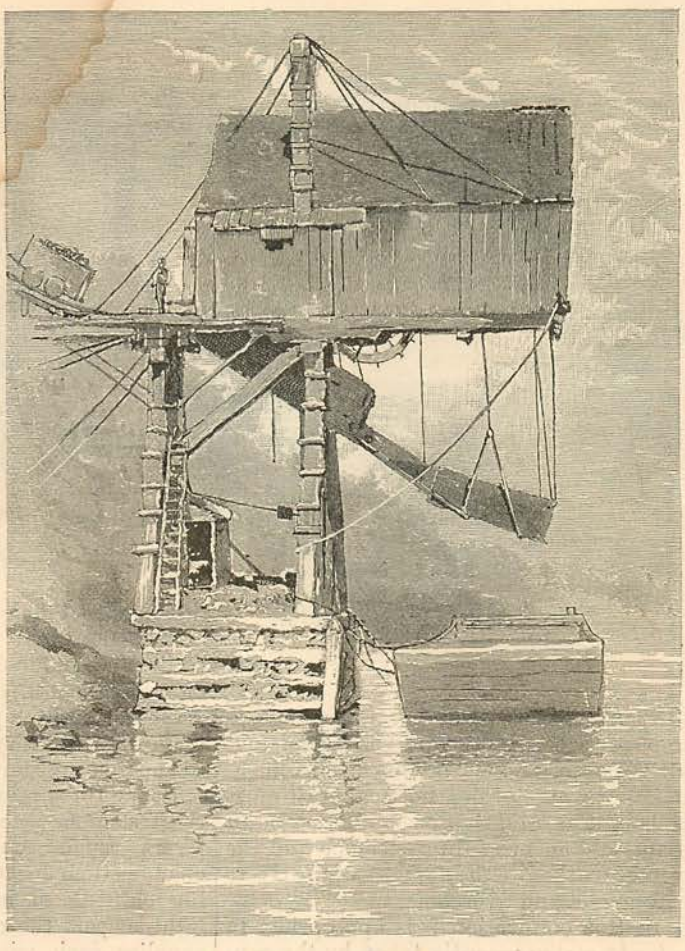
So much for the dangers surrounding the river coal trade of Pittsburgh; now as to the nature and extent of the trade itself. It is, in the first place, a trade which the most ambitious railway can not absorb. Nature's highway is here supreme, and time loses its monetary value as compared with the cheapness of transportation by water. To send a ton of coal from Pittsburgh along those two thousand miles of waterway and deliver it at New Orleans cost $1 30, or about five cents per bushel of seventy-six pounds. The freight-hungriest railway could not afford to carry coal more than one-tenth that distance for the same price. This extreme cheapness it is that has called into being this trade, that has caused its growth, and that will perpetuate its existence though the continent be cobwebbed with railways. The river transportation of coal has developed to such an extent that whereas in 1844 the coal from seven acres of Pittsburgh coal seam was floated from that city, there was left, year before last, a dark echoing void of 720 acres under the smiling farms of the Keystone State.

The intrinsic excellence of Pittsburgh coal as a heat, steam, and light producer must not be lost sight of as an element in the building up of the trade. It is a fuel as yet without a successful rival in the Ohio and Mississippi valleys, shut out, however, from all but river points, only by reason of the prohibitory bar of transportation charges. These rivers render it possible for the sugar planter of Louisiana to evaporate his syrup over Pittsburgh coal, the ocean steamer to fill her bunkers at New Orleans, and for that city, Baton Rouge, Natchez, Vicksburg, Memphis, and St. Louis to light their streets with gas. To these benefits must be added the enormous supply of coal for domestic purposes. Many of the consumers are as remote from the parent beds of the fuel they enjoy as New England is from old Ireland.

An open map of the United States will show the inland highway of King Coal to be an inky, tortuous line, extending from Pittsburgh to Cairo, Illinois, and labelled the Ohio, from Cairo north to St. Louis, and from the latter south to New Orleans, fourteen hundred miles along the Mississippi toward the equator. During the year 1880 there entered this highway at Pittsburgh ninety million bushels of bituminous coal and coke. The latter article comprised but a few million bushels. The term "bushel" is probably not a familiar one as applied to coal. Twenty-six and two-third bushels make a ton, so that the quantity given above means about 3,500,000 tons.

Of this much-sought-for fuel Cincinnati mills and homes take thirty million

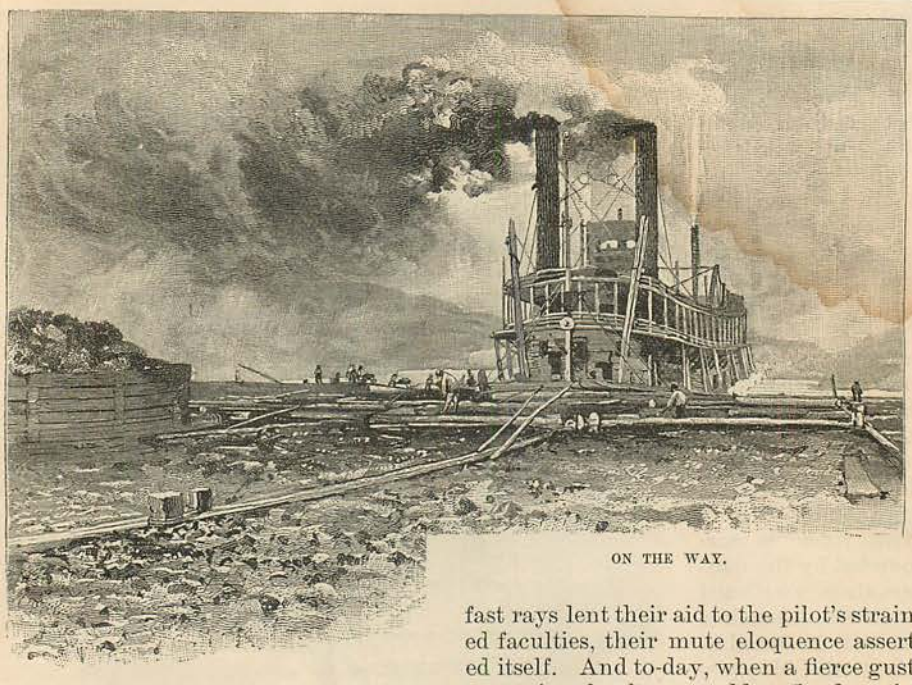
bushels yearly from the river, Louisville twelve million bushels, New Orleans eight million, Memphis and Vicksburg five million each, and smaller towns and villages along the two rivers absorb fifteen million more. And every pound of this coal, from the moment it first rests in boat or barge at the shute or tipple at the pit, until it leaves the water at New Orleans, or strews the bed of a great river, is surrounded by the dangers already outlined—vicissitudes such as can only be found in this trade; dangers that call forth the peculiar characteristics of the navigators of this treacherous highway. Moreover, the coal consigned to the care of a single steamer frequently amounts to 20,000 tons—enough to load five of the very largest ocean steamers to a dangerous depth. And the men in charge of this mass of fuel are expected to successfully overcome difficulties that would appall the most experienced navigators of deeper waters. This hazardous and peculiar nature of the trade has developed a race of navigators whose dominant traits are pluck, fertility of resource in times of disaster, and promptness to act at all times, united with an all-pervading disposition to take evils as they come philosophically.



FIRST LOADING OF THE BARGE.

Let a sudden rise in the rivers swell the waters of the Ohio. At an hour's notice the cables must be slipped and the huge boats floated off on the crest of the rise. Else the chances are in favor of stranded boats and coal scattered along the bed of the stream.

It is this capriciousness of the Ohio, engendered by the vagaries of the weather, that renders the experiences of the coal-shipper unique. The Eastern navigator, who revels in a plenitude of water, can form no just conception of the skill necessary to guide a fleet of cumbersome coal craft of seven feet six inches draught through the windings of a channel where the unerring marks show there is just seven feet eight inches of water. Nor can the Eastern or other mind unfamiliar with this coal-shipping trade know of the brain and muscle and machinery and skill which must go hand in hand in order that a solid mass of coal afloat, longer than the *Great Eastern* by two hundred feet, and as wide as a city park, may be steered clear of besetting dangers, and safely borne along a route nearly as long as that traversed by a Cunarder. To



ON THE WAY.

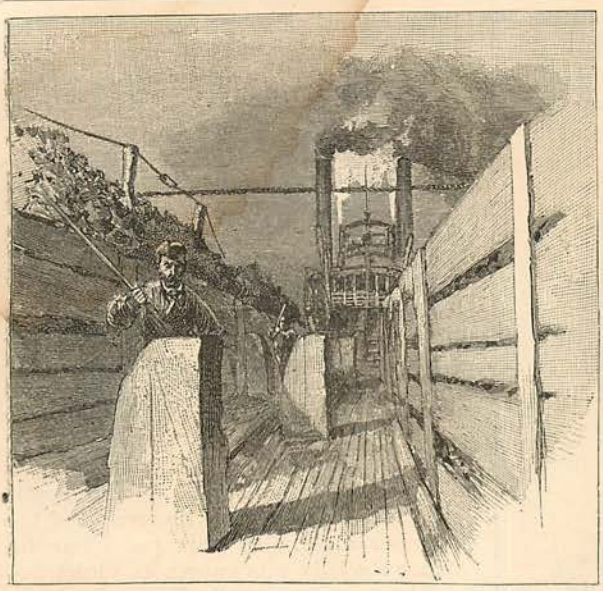
tow, in North or East River parlance, is to pull. On the Ohio and Mississippi, and all Western streams, towing means pushing. The acre of floating coal craft must be bound in solid rigidity, and must lie *in front* of the propelling steamer and the pilot's eye, before the dangers of the rivers can be met and overcome.

In this connection it is appropriate to refer to a step recently taken by the general government to lessen the dangers of the Ohio, Mississippi, and Missouri rivers. This consists in the establishment and maintenance of the "beacon-light" system on the rivers named. During nights of inky blackness of sky, when even the contour of familiar hills or clearings or bluffs escapes the keen-eyed pilot, the steady, clear radiance of the "beacon" indicates his whereabouts, and marks the ripple, or scantily covered bar, or the point at which the boat must aim in "flanking" around the serpentine loops of the erratic streams. The establishment of these lights, a few years ago, was looked upon with indifference by nearly every pilot engaged upon the tow-boats. Some went so far as to oppose the beacon on the ground that the pilots' duties would be simplified thereby, and thus the value of their labor reduced. But, as night after night, in storm or calm, over ice or flood, these calm steadfast rays lent their aid to the pilot's strained faculties, their mute eloquence asserted itself. And to-day, when a fierce gust, or caving bank, or sudden flood, extinguishes a light, a mighty growl goes up from the fraternity of the tiller-rope, until the missing star is restored.

Every three months, or oftener, a trim swift steamer sweeps up and down the rivers, repairs damages to the lights, changes their location to suit the unceasing shifting of bar or bend, pays the light-keepers their well-earned dues, and supplies each with the oil needed. A beacon-light is simply an inland light-house of modest proportions. A short wooden post, braced to withstand wind, and bearing a small hooded platform at its top, eight or twelve feet from the ground, forms the support of a lantern of superior construction. In general appearance the way-side shrine of the Old World is reproduced in the beacon-light of the New.

And in this connection it seems eminently fitting that Pennsylvania oil should light Pennsylvania coal on its way to market. In the 800 lights on the rivers named, elaine, a special preparation of petroleum, is used altogether, as being fully equal to lard-oil for light-house purposes. The Ohio has 324 of these lights, and the Missouri and Mississippi 480 more. The entire system is one whose benefits become yearly more apparent.

Within the past few years the growth



VIEW FROM THE HEAD OF THE TOW.

of the river coal-handling trade has received a fresh impetus by reason of the success attending the completion of the Eads jetties at the South Pass outlet of the Mississippi. New Orleans, heretofore a mud-blockaded port for vessels drawing over fifteen feet, is now easily approached by sea-going vessels of twenty-eight feet draught, and requiring a thousand or twelve hundred tons of coal to stock their capacious bunkers. Originally, and before the present perfectly appointed tow-boats were dreamed of, coal, to a limited extent, was floated from Pittsburgh to New Orleans and nearer ports in boats whose only means of propulsion were huge oars, or "sweeps," actuated by the muscles of the easy-going crew, whose patience was commensurate with an average speed of four miles an hour for weeks at a time. These primitive craft journeyed in pairs, and the owner and navigator who succeeded in bringing one of these safely to New Orleans was fully reconciled to the almost inevitable loss of the other through perils by the way.

Coal-towing by steam to Southern ports dates back about a quarter of a century. The civil war interrupted the young and promising trade, but with the cessation of hostilities, Pittsburgh capital and enterprise found a profitable field in supplying the cities already named.

To meet the increased requirements of the trade there was called into existence a class of steamboats not found elsewhere in the world. The boat designed and built for coal-towing along this highway must of necessity possess qualities difficult to combine in the same vessel. There must be immense power of engine, backed by enormous steam-making ability, to cope with the force of the mighty currents. There must be lightness of draught to enable the craft to reach her home port during seasons of low water, and there must be tremendously powerful steering apparatus, four times as much as that possessed by the largest ocean-going steamer. The latter quality is indispensable by reason of the inertia and momentum of the

FIRING UP.

VIOLET.

fleet of coal craft, which must be guided by the power of two men at the tiller. Speed is an element in a measure lost sight of in the construction of a coal tow-boat. What is required is that the completed craft shall be a good "pusher"; and supplementing the best work of builder and mechanic must come into play the cool, clear heads of the men whose duty it is to handle the boat and her tow, and with these to thread the aqueous mazes between the foot of the Alleghanies and the Gulf of Mexico.

Such a boat is the *Harry Brown*, that will push 20,000 tons of coal down the two rivers at the rate of nine miles an hour. Her hull, of the best white oak, measures 250 feet in length, fifty in breadth, and six in depth. Machinery and boilers occupy the greater portion of the first deck from stem to stern. The propelling engines are at the stern, and act directly upon an immense paddle-wheel revolving on a steel shaft from the hammers and crucibles of Fred Krupp. These engines turn the wheel with the combined power of 2000 horses, and draw their potent vapor from seven steel boilers that evaporate ten cubic feet of water every minute over furnaces that devour 1200 bushels every twenty-four hours. On the second or boiler deck are the comfortable and even elegant quarters of the officers and crew —a pretty cabin and state-rooms for the one, and homelier comforts for the other. Cleanliness and good living are enjoyed by the inland navigator, and to this end is provided a table comparing favorably with that of a first-class hotel, and a bath-room with a huge tub and a limitless supply of hot and cold water. Paintings, Brussels carpet, and other luxuries of furnishment give a home-like air to the cabin, and are in a measure consolatory to men who must be absent from home for months at a time.

The cabin of a tow-boat is at all times a comfortable place, and a favorite resort for the officers. It is the realm of the chamber-maid. In this particular instance the lady was known as Violet.

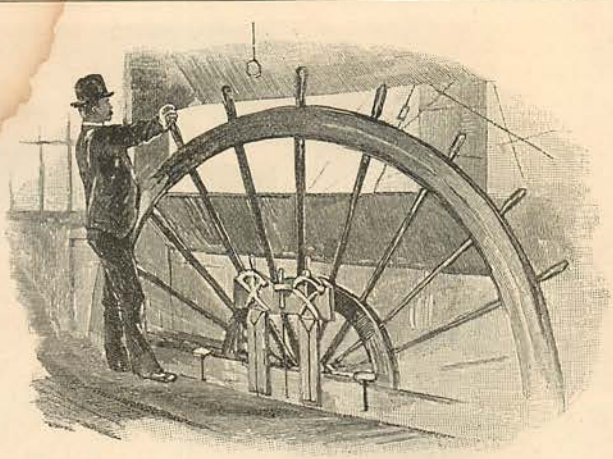
"Is your name really Violet?"

"No, sah; I tink my real name's Sal; but, law! *Sal* wouldn't p'serve de dignity ob my position for four days." Therefore Sal became Violet, and Violet reigned like a dusky queen over a kingdom of equally dusky deck hands.

Then there was Augustus, a table-boy, whose mouth expressed every imaginable phase of grin, and whose perennial good-nature it was impossible not to admire.

AUGUSTUS.

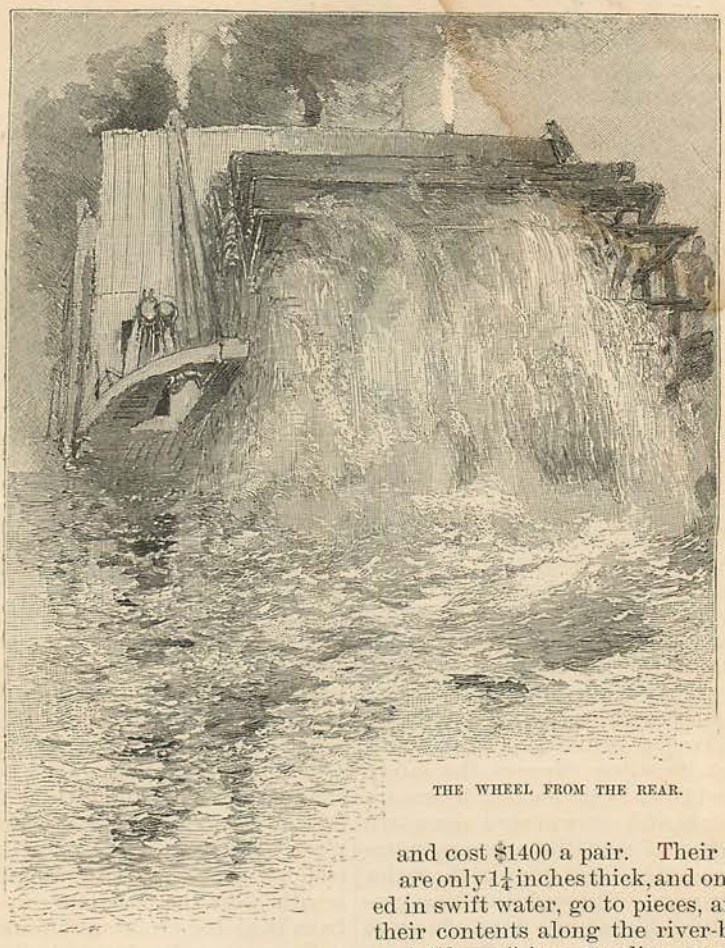
In the forecastle, or forward part of the cabin, the pilots are wont to congregate when off watch. Their memories, especially the older members of the fraternity, teem with anecdotes of hair-breadth escapes from hidden guerrillas, who during the war seemed to have a special weakness for perforating pilot-houses, and the veteran who can not add a blood-curdling yarn of a boiler explosion beneath him would be regarded by his fellows as having passed a too pastoral existence.



THE PILOT-HOUSE.

Above this deck is a structure which, seen ashore, would be taken for a conservatory, or queerly-shaped greenhouse. Three of its sides are formed of sliding glazed sash, and surround what may be termed the seat of the brains of the boat, the boilers being lungs, and engines heart. In this apartment is found a steering wheel twelve feet in diameter, upon whose intelligent handling depends the safety of boat and tow. Odd-looking levers are within reach, and serve to send along two hundred feet of wire the message, interpreted through bell and gong in the realm of the engineer. Through the floor projects an object like a huge pedal of a great organ, and the pressure of a foot upon it lets loose a flood of indescribable roars overhead; for this is the whistle lever, and your Western river whistle is a many-voiced demon, composed of a number of whistles, great and small, bunched on the apex of the steam-pipe, and blending in a most lusty howl—a blast distinguishable for miles, and known to all boatmen as men recognize the voices of friends. The front or fourth side of this crystal-walled structure, the pilot-house, is open—a great eye protected by swinging lids that droop in storm and lift in sunshine. Through this open space is viewed the double panorama of passing shore, of bend and hill, and all that goes to make up the ever-changing scene most familiar to the pilot's gaze. In the immediate foreground rise the black columnar proportions of the lofty "smoke-stacks," pouring graceful festoons of jet-black carbon cloud into the air. Further off, and midway between these tall cylinders, rises the graceful "jack-staff" from the bow of the boat, the slender index that serves the pilot as a guide and pointer. Ahead and beyond, stretching into the distance, extends the fleet of coal-laden boats and barges—a peninsula hemmed about by the river's bright surface during daylight; at night a blackness merged into the surrounding gloom for all eyes save the marvellously trained organs of the men at the wheel. Aft of the pilot-house the twin "'scape pipes" rise from the engine-room, and cough responsively, mingling their snowy breath with the inky torrents that roll from their big brethren the smoke-stacks.

From the pilot-house lead the tiller-ropes to a lever thirty feet long, swinging under the ceiling of the engine-room. This operates other levers that actuate the four massive rudders under the stern of the steamer. Two of these extend through the water thirty feet, and their shorter fellows are fifteen feet long. All sway in unison, and are moved at the will of the men in the pilot-house. Such a boat costs $65,000, and of this, $10,000 represents "outfit." Under the latter head may be mentioned 20,000 feet of ropes in coils of 1000 feet each, and of all sizes. Seven tons of ponderous chains, ratchets, blocks, and tackle come into play in binding a score of coal craft into a solid mass, making this mass, in fact, a part and parcel of the steamer itself. And such is the strain brought upon the steamers in this trade that the life of one of the fleet rarely extends over twelve years. And if by reason of strength they be fifteen, their add-



THE WHEEL FROM THE REAR.

ed years are only gained by constant repairs, ending in collapse and wrecking.

Pittsburgh is the home of a fleet of 140 tow-boats of the *Harry Brown* pattern, but varying in size, power, and finish, from the harbor tug of modest proportions, costing about $3000, to boats of the dimensions of the *Brown*. And of the latter there are at least fifty.

Important but humbler adjuncts of the trade are the homely craft whose only office is to receive coal at the Pittsburgh mines and retain the same until the distant market is reached. These are known as coal "boats" and "barges"—model and square. The coal "boat" is a most primitive-looking box-shaped affair, frail in make-up, and apparently as illy adapted to stand rough usage as a bandbox. These craft measure 180 by 26 by 9 feet, "draw" 7½ feet of water when loaded, hold 22,000 to 24,000 bushels (840 tons), and cost $1400 a pair. Their pine sides are only 1¼ inches thick, and once stranded in swift water, go to pieces, and scatter their contents along the river-bed. The coal "barge" is a sturdier, smaller comrade of the "boat," is 160 or 180 by 24 feet, and 7½ feet deep, drawing 6½ when loaded, is "raked" fore and aft, and will safely carry from 12,500 to 14,000 bushels (530 tons), and costs $1100 each, being made of heavy pine timber. There are other coal-carrying craft in use, but those described are the most important forms used in long-distance towing. After being unloaded at their destination they are known as "empties," and are towed back and refilled; and so on until their life is ended, gradually through successful toil, or suddenly through the dangers that lurk on all sides. From the earliest stages of their journey to the very latest these clumsy boats and barges seem the victims of untoward circumstances. In the sluggish pools of the Monongahela, during the winter months, ice surrounds and threatens them, and the coming of the spring thaw is certain to bring destruction. Fur-

ther along their southerly tour, the perils of the Upper Ohio surround them. A "lump" may break through their bottoms while gliding over a hidden bar covered with just enough water to float the craft, or a snag pierces the boat's frail shell, and

FLANKING.

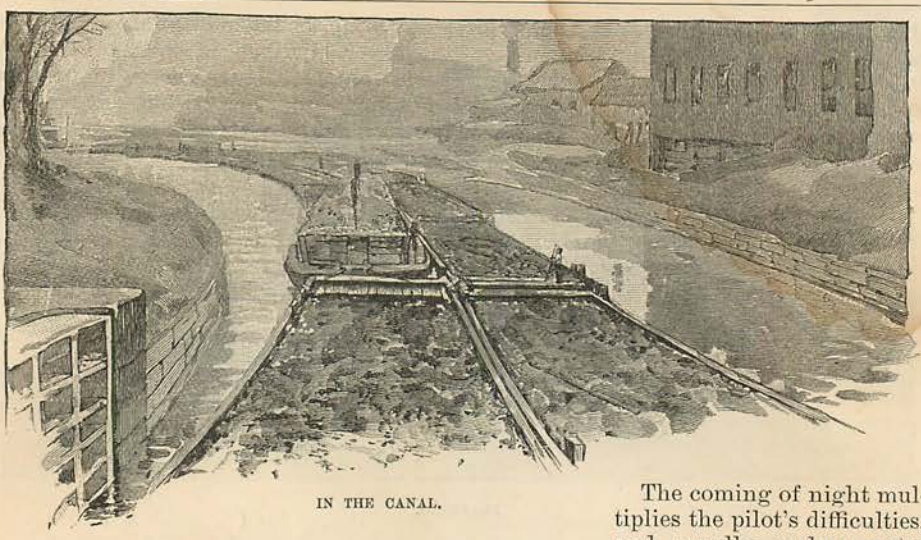
the vicious waters ripple cheerfully over her gunwales. A loaded boat sinks to within eighteen or twenty-two inches of the surface of the surrounding water, and the care and skill brought into play in order to guide and propel fleets of these deeply laden craft become apparent to the dullest observer.

Just at the point where the wedded streams Monongahela and Alleghany create the Ohio, a motley assembly of boats and barges are herded together during the greater part of the year, awaiting the pleasure of the clouds and the dropping of the rains, which must fall liberally in order to release the waiting craft. At adjacent landings the tow-boats are also grouped during the waterless or ice-bound months—the steamers, great and small, whose duties are comparable to those of the shepherd's collie. They must gather together the coal-bearing flock, keep them in solid phalanx, urge them along the devious highway, and restrain their desire to follow seductive cross currents, and finally aid in handing them over to the waiting purchaser. And most faithfully do these boats fulfill their mission. A stranger who chances to visit Pittsburgh on a day when the message, "Rising at head-waters," gladdens the heart of the coal-shippers of the Smoky City, may note in the locks and at the landings near the city scenes of stirring, often of surpassing, interest. These locks of the Monongahela are all too small for the wants of the coal men, to whom an hour's delay may mean a fortune lost. One by one the laden craft are dropped to the lower landings, where the tows are made up. Little tugs cleave the muddy water with one, two, or four barges, and transfer these to the waiting monsters. Smoke and steam roll skyward, voices hoarsely issue orders from the "hurricane-deck," mingling with the bang of gongs and tinkle of bells in the engine-rooms; capstans creak, big ropes swash across the swelling tide, and the din keeps up until the last tow-boat of a procession fifty miles long steams slowly out into the Ohio.

Such sights and sounds are familiar to every Pittsburgher when the marks show a rise in the rivers making a depth of anywhere over eight feet; and on such an occasion the writer and the artist began a two thousand mile voyage, whose gathered results are here laid before the reader.

The first spring month of 1881 was but a few hours old when the "tow," already made up and "hitched" to the steamer, lay in the deep shadow of "Coal Hill," awaiting the coming of daylight to be, with others, started on its long and hazardous journey. With the coming of keen, frosty dawn the signal bell sounded, and the ready steam filled each cylinder. The monstrous wheel, as big as a country church minus the steeple, churned the water, and $40,000 worth of coal and $60,000 worth of boats and machinery swung out into the current.

At the first sweeping bend the process of "flanking" excites admiration, and shows what can be accomplished by a wonderfully skillful co-operation of engines, tiller, and propelling wheel, acting as accessories to the force of the current. To retain boat and tow in the current, as is done when the river is straight, is found to be folly on a huge scale. The momen-



IN THE CANAL.

tum of the mass would drive the fleet ashore at the toe of the aqueous horse-shoe. To "flank" is to so handle the fleet that its onward march is checked before entering the curve, and so steered that, at the centre of the bend, boat and tow lie almost across the stream, with the forward barges exposed to the force of the current as it sweeps around the outer edge of the semicircle. The resistless tide, bearing against the distant end of the fleet, swings the mass around as if on a pivot, and the pilot, promptly seconded by the engineer, brings the full power of engines and rudders into play. Thus the solid fleet is headed down the lower half of the curve, and so on to straighter shores. Where the curves succeed each other until the river is a huge ox-bow, boat and tow seem waltzing sideways down the river in a manner incomprehensible to those unfamiliar with the mysteries of "flanking." From the pilot-house the feat possesses absorbing interest for the observer. This process must be repeated at every bend between Pittsburgh and New Orleans, and in a method peculiar to the handling of these coal fleets. In comparison the steersman's work on an ocean steamer is but child's play, and to be a successful tow-boat pilot on the Ohio or Mississippi calls for the exercise of rare judgment and the prompt co-operation of ready brain and trained muscle. A wrong interpretation of one of the thousand signs of water, shore, bar, or ripple, means the grounding, and often the loss, of a costly boat.

The coming of night multiplies the pilot's difficulties, and usually, unless water and weather are extremely favorable, the floating island of coal, wood, and vibrating mechanism must "tie up." This is an operation full of difficulties, and requiring extreme care. Slowly the forward motion of the mass must be checked, and on nearing the selected spot along the shore the most agile of the crew must land with cables, and make fast "breast" and "stern" lines. These are tied to some convenient and sturdily rooted tree. Then comes a tug of war, the more exciting if the current be pretty swift. It is steam and good hemp and Manila pitted against the might of a river. The ropes grow taut as piano strings, the smoke curls from the massive "check posts" in the boats as the coils are eased to check the fleet's headway gradually, and the ruddy light from the coal-burning torches lights up the weird scene. Finally boats and tow lie immovable, and silently await the coming of another dawn. And when drifting ice-cakes pile against the boats, or a howling wind adds its strength to that of the river, "tying up" is a labor full of danger, presenting a scene of peculiar excitement, not unfrequently ending in the swamping of thousands of bushels of coal, or the crippling of a "deck hand" by the untimely snapping of a cable.

As the voyage continues down the Ohio, the banks between which glide river and boat and tow fall further apart. Side streams add their quota of muddy water impregnated with soils of divers hues. Day and night the big boat with her charge of black diamonds continues her course,

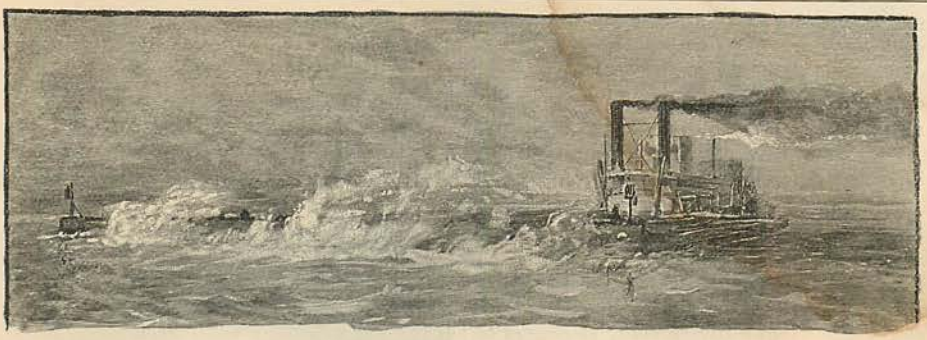
unless, indeed, the nights are starless, moonless, and blustery. Towns and cities drift by on either hand, for the south-bound coal fleet recognizes but one halting-place—busy, pretty Louisville—and only halts at this fair Kentucky city when the water does not permit boat and tow to "run the falls," and forces the fleet to pass through the narrow confines of the Louisville and Portland Canal, or when the size of the tow must be increased by adding the tows of smaller boats which follow the larger lower river steamers to this point.

Let a New-Yorker imagine all the wheeled traffic of Broadway obliged to pass through two pairs of country "bars," and obliged, moreover, to await the putting up and taking down of these bars before and behind each vehicle, and he can form a pretty clear idea of the adequacy of the Louisville Canal to the wants of the river coal-shippers. The Ohio at Louisville, six hundred miles from its source, is three-fourths of a mile wide, and a bold ridge of transverse subaqueous rock gives the stream a fall of twenty-seven feet in a distance of two miles, and a current of twelve miles an hour dashes among bowlders in such a way that a flood of over thirty feet stage is necessary to enable river commerce to be independent of the thralldom of locks. This stage of water in the fickle Ohio is by no means common. During the 366 days that dawned in 1880, but 103 days saw "falls water," and during the 263 comparatively waterless days coal-carrying craft representing half a million tons passed through the well-regulated but tedious little ditch. A coal tow will measure from 500 to 800 feet by 200, while the capacity of the canal is limited by its available space in the locks, which are 340 feet by 80, so that the descending tow must be pulled apart and marched at funereal pace through this canal, two miles, to its lower end. Here deep water and a convenient shelter for re-arranging tows for southern ports are found. Very often, when falls water is not, there may be noted at Louisville a solemn, immobile line of great tow-boats awaiting their turn to pass the narrow portal that comes between them and distant ports. And the cabin of these craft as well as the levee at Louisville will on such occasions be haunted by rueful-visaged men whose boats are far from the head of the line, and from whose unwilling pockets each day of delay to each steamer draws two $100 bills, to which are to be added the neat little bills of harbor tugs for towing. And this is not all. Right at the gateway to the canal, where on the one hand there is the crest of a foaming, roaring

A PILOT.

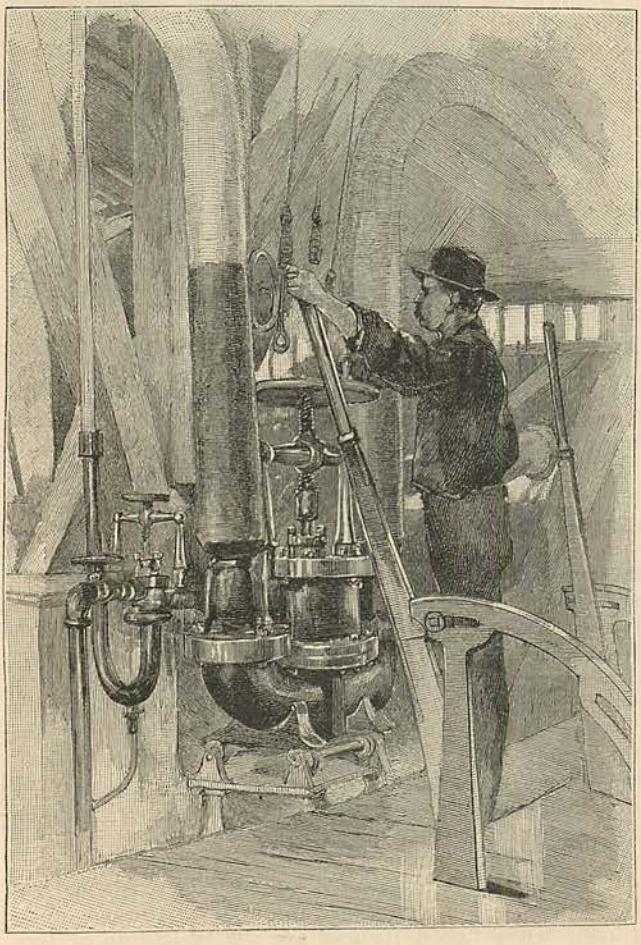
dam, drawing all floating things to destruction, and on the other the encroaching shore, there is permitted by the municipality of Louisville a half-dozen clumsy "floats" or coal-landing platforms, these also flanked and made more obtrusive by barges and other coal craft in process of emptying at the wharf. To make use of simile once more, it is as if New York city were to allow pea-nut stands to block the junction of Fulton Street and Broadway. The government has abolished tolls, and has done much to improve the Louisville Canal of late years. It can make the work complete by condemning and absorbing that portion of the Louisville wharf extending from the mouth of the canal up a distance of one-quarter of a mile.

Tow-boat life is an odd existence, and in a measure soothing to those who by good fortune are the recipients of tow-boat hospitalities. In the pretty cabin



AGAINST THE WIND.

there exists an air of perpetual hush, broken only at meal-times—6 A.M., 12 M., and 6 P.M. The tow-boat man takes his slumbers and labors in equal portions of six hours each, and between meals (when the "watches" change) half the crew sleep the sleep of the weary, and the other half respect their rest. Only the pilots enjoy a less than six-hour subdivision of the twenty-four. Their day consists of two six-hour watches, a five, a four, and a three hour watch, so arranged that the knights of the tiller wheel do day and night work alternately.



IN THE ENGINE-ROOM.

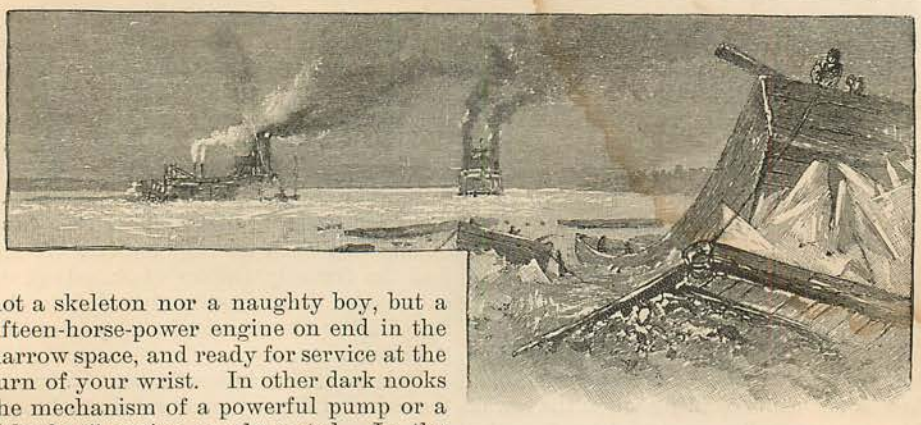
And so the great boat and her crew of forty men and the mass of fuel move on, the river growing wider and the air milder as the Ohio approaches the Mississippi. The stalactites of ice that at the start lent the wheel and "fan-tail" a novel beauty fall off or melt away. Snow appears only here and there in shaded places among hills that grow less bold in outline. Then the willows that make beautiful the waste places on either hand show a deeper and more definite verdure. And as the low-lying roofs of Cairo are sighted, the forest oaks give way to cottonwood, with buds swollen to bursting. The tow which at Louisville had grown to a mass 800 feet long and nearly 200 wide, swings into the Father of Waters a fortnight

after leaving the landing at Pittsburgh. There are still a thousand miles of water ahead, with an unknown quantity of fog and wind to be met and overcome in this distance. Fog proves a subtle, swift foe. The ice-cold waters of the Ohio and upper Mississippi and Missouri are swept by a warm, moist air from the south, and lo! there springs up on all sides fog—fog everywhere; thick, penetrating, and shutting out the nearest shores, and even the tow, from view; an opaque wall of shifting mist. The pilot-house seems to its occupants the car of a cloud-riding balloon floating miles above anything tangible. Such a visitation, coming when the tow is flanking around some grand bend in the noble river, is fraught with danger. The floating island of fuel and boats seems suspended in mid-ocean, with only clouds of whirling vapor for companionship, and nothing to recall earth save the flash of unseen water. The solid vertical bank may be five feet from the head of the fleet, or it may be five hundred—who can tell? Overhead, the vernal sun sheds bright but ineffectual rays. Underneath, ten fathoms of turbid water or one? Not even the wily pilot can tell. The yawl must be hastily launched and sent ahead, the engines stopped, the lead heaved—every precaution taken. These are moments of deep anxiety, subject, happily, to a speedy termination, for the watery veil lifts or drifts away as rapidly as it came.

In some cases, however, speedy landing is the only salvation for boat and tow. Another terror to the tow-boat man is a high wind. Such a wind sweeping over the mile-wide Mississippi converts its surface into a yellow prairie whereon myriads of muddy-wooled sheep seem disporting themselves. Every sheep is, however, an angry wave that seems bent upon leaping the low wooden walls that guard the coal, and sending boat and contents to the bottom. At the same time the wind bearing against the towering form of the steamer complicates matters by making it almost impossible to properly guide the boat and her charge. Happy is the pilot, and equally happy the captain, who can, on meeting such an importunate breeze, find the friendly shelter of an island or calm eddy, there to serenely await in the lee of tall cottonwoods the abatement of the storm.

In less exciting hours the boat is herself the object of the voyagers' greatest admiration. She is the embodiment of prodigious power. Her steel boilers are seething over roaring fires that keep the needle of the steam-gauge to 165 pounds, and the twin monsters that turn her vast wheel know no such word as rest. The engine-room is a place of polished steel, gleaming brass, curved pipes—beauty of a Titanic order. At the throttle, the heart of the engines, stands a quiet, intelligent fellow, to whom one shining lever near at hand means "back her," another, "stop her," and another, "go ahead," and whose ear is ready to interpret the tinkle of the bells as the pilot intends; and the engines know his touch, and obey it as trained elephants follow the slightest motion of their master. Other engines are grouped about, and still others are found in various parts of the boat. In the dead hours of the night, if one's ears are greeted with a horrid sound, as of the grinding of coffee in a mill as big as a barn, it means that one of the "nigger" engines is suddenly called into service to tighten a two-inch rope, or wind up a discarded cable. Open an innocent-looking closet, and you will see,

THE ELECTRIC LIGHT.



TO THE RESCUE.

not a skeleton nor a naughty boy, but a fifteen-horse-power engine on end in the narrow space, and ready for service at the turn of your wrist. In other dark nooks the mechanism of a powerful pump or a "donkey" engine can be noted. In the engine-room a quaintly named machine, the "doctor," is constantly at work pumping water into the boilers. The "doctor" is possessed of dignified slowness of motion, and halts not day or night while the fires roar in the furnace. If it did, the good steamer would be in danger of ascending skyward piecemeal. The prettiest occupant of the engine-room has the power of half a dozen horses, and possesses owl-like traits. Its strength goes forth at night only, and its whirr is the signal for a stream of lurid, intense light to pour from the locomotive reflector on the "hurricane roof," two hundred feet away. It is the radiance of electricity, that shames the brightest glare of the furnaces, and pales the gleam of the ordinary lamp. Workmen far out on the tow go about their labors as in mid-day, or are assisted in their arduous labors when a landing is made as no other light has yet been able to assist them. In fact, the entire boat is a magazine of pent-up power, a floating arsenal of energy, and it is not to be wondered at that owners and officers learn to love their boat as one does his home.

As indicating this trait, as well as the more important one of fertility of resource possessed by tow-boat men, a single instance may be cited. One pleasant day in April, 1879, the towing steamer *John A. Wood*, of Pittsburgh, was coming up the Mississippi twenty-five miles below New Orleans in fine style. Then came mishap the first. Her ponderous wrought-iron shaft cracked, and disabled wheels and engines. Swinging out of her course she struck the iron works of a sunken war vessel, the *De Soto*, which tore a great hole in her hull, and she sank immediately. Able engineers pronounced her case a hopeless one, for no boat ever survived twenty-two feet of Mississippi water and resultant deposits of heavy mud. The owner and godfather of the ill-fated steamer, Captain John A. Wood, visited his pet a few days afterward. His $90,000 beauty was in a serious plight. She leaned toward the great river at a far more desperate angle than the famed Tower of Pisa, and her upper works and chimneys alone were visible above the whirling water. The man made up his mind to save his boat, and he did it. She had 200 tons of coal on board, weighed four times that much besides, and mud was settling in every nook and corner. A thousand yards of circus canvas and fifteen thousand feet of good plank, fashioned into a water-tight box or caisson, were built about the entire boat, and the most powerful pumps in New Orleans set agoing. For four weeks the work went on with varying success. Such was the interest felt in his unwonted wrestle with the river that ocean-going steamers slowed their engines in passing the spot, that no waves might add to the trials of the divers, and dipped their colors in token of their recognition of pluck and energy. Three times the river reclaimed its prey and the boat sank. But the fourth effort resulted in the triumph of man's ingenuity and perseverance. To-day the resurrected boat is one of the best steamers in the trade, and her rescuer considers the $20,000 devoted to the work as well spent.

As the days roll on, and Northern chill and fogs give way to balmy skies, the labor of the tow-boat man grows less irk-

some. His fears of shoals and bars diminish as the river rolls a mile wide and there is fifty feet of water under his keel. As his deep-laden craft nears the Crescent City he feels that his coal, worth $2 per ton at the start, will be eagerly sought for at $6 per ton by ocean steamers and waiting planters, and the reflection is a soothing one, an offset against the grim fact that every day of his voyage implies an expenditure of $200.

At length cottonwood and canebrake give way to moss-draped cypress and broad level acres of cotton plantations. The verdure of the distant shores is that of full, joyous spring, and finally there drifts into view the forest of masts that environ the levee at New Orleans.

At various points boats and barges have been dropped from the tow to replenish the wasted stock at different landings, and when the last day of the voyage dawns, but a fourth of the original fleet remains. The greater portion of this remnant goes to coaling ocean steamers, and some slips by, and at the river's mouth evolves steam for the work going on at the jetties. And from a thousand chimneys in the Crescent City ascends the smoke familiar to Pittsburgh eyes, leading to the reflection that the chill and gloom in store for all, should the sun be blotted out, would in a measure be the lot of New Orleans, and other cities, were Pittsburgh's coal to be annihilated, or the rivers permanently obstructed.

ANCIENT AND MODERN VENETIAN GLASS OF MURANO.

No. 1.—[See Page 188.]

THERE is no substance which lends itself with more facility, variety, and durability of form, color, and use to the service of man than glass. Composed of the simplest and commonest materials of nature, it is transformed by human skill and taste into objects which both serve the humblest needs and gratify the most refined tastes.

It is not my purpose in this article to enlarge on the manufacture and history of glass in general, but to confine it to a brief summary of its Venetian phase, as illustrated in part by the collection in the Metropolitan Museum, New York. Having formed and given this collection myself, numbering nearly three hundred pieces, I may be permitted to say a few words as to its origin and scope.

Chance at first threw in my way a few specimens of the earlier Venetian glass. These suggested the idea of attempting to obtain a sufficient number to fairly illustrate the various types which have given celebrity to Venice in this line from the fourteenth century to the nineteenth inclusive, representing, as far as possible, its mediæval rise, its best and most flourishing period of the later Renaissance, its gradual changes and decline at the extinction of the republic by Napoleon I., and the revival of the art in our own time. Specimens of the two earlier periods are not easily found now; consequently the decadence and revival or modern period are more conspicuously represented than the ancient. Nevertheless there are a suf-