The Sawmill Changes of a Century.

Among the most marvelous of the many wonderful things which distinguish the United States from other nations, are the results which have grown out of the possessions of immense forests of valuable timber, in stimulating inventive genius to the preparation of an article of building material so cheap as to enable the poorest to have a comfortable home, while at the same time so excellent in character as to be not only suited, but indispensable, to the working classes. Those more readily accessible regions of the continent which possessed these forest growths in the greatest abundance were among the first to receive large accessions to their population, drawn together at those centers which presented the easiest access to cheap building material, not less than for their personal safety from a savage foe. It was not until the demand for lumber far exceeded the ability of the "greatest" mills of half a century ago to supply, leading the manufacturers to feel the need of a more extended system of production, that the star of empire made any progress westward, or it became a possibility to settle upon the prairies of the West, or to develop the mineral resources which have already shown our nation to be the peer of, if it does not excel, all others in the extent of its possessions. To possess is to need. And the cheap building material which the cheap mills of the days long gone by enabled a scanty population to utilize, stimulated a more extended immigration, with its increased needs, as well as a higher order of inventive genius to increase the supply.

The mills of the olden time were, first, the windmill, with its uncertain power, scarce exceeding that of the men who ran the pit saws which were then in a measure superseded, and whose indignation at the effort to lessen their manual labor caused them to mob the owner and tear down his machinery. Second, the adaptation of a current water-wheel of scarcely greater power, if more reliable, run by the natural current of a small stream. Next came the simple flutter-wheel, to impart motion to which required the building of dams to hold large bodies of water, which should at all times be available. But for large operations the flutter-wheel was found to possess too little power, and the overshot or undershot wheel became a necessity, to be superseded later by the adaptation of turbine-wheels, now so much in favor with mill owners who control water power. For the first fifty years of our national growth, as well as during the preceding portion of the world's history, none of the mills were equipped with anything more than a single upright saw working in a gate, and when another saw was added, as the inceptive idea of the gang, which quickly succeeded with its large number of saws, words could scarcely express the astonishment of all who saw the working of the bold innovation.

Up to this time, all the lumber which was manufactured had been edged upon the top of the log after it was turned down; an auxiliary saw was not thought of, for the buzz saw, just beginning to be used, was considered a most dangerous piece of machinery. But the increased manufacture growing out of an increase in the power and an increase in the number of saws, led to the introduction of the small circular or "buzz" saw, which was at once found to nearly double the capacity of the mill. It is needless for us to enlarge upon the introduction of steam power in the sawmill, or to follow the original idea of an engine, 6 x 8 inches, attached to the lower end of the pitman or saw gate, through its successive stages of development and enlargement to the present time, when the Corliss, or Estes, or other well-known engines, of a power from ten to one hundred times greater capacity than was the original device, are by the thousand in number engaged in turning out lumber, each in one season aggregating a greater manufacture than were all the sawmills of the country combined at a period scarcely fifty years in the past.

The old gate saw was superseded by the mulay, with a reduction of friction equal to thirty or fifty per cent increase in cutting capacity. The mulay gave way to the circular, and with its introduction may be dated the commencement of an era which has been prolific of innovation, improvement, and advantage to the sawmill world. As the use of the circular became better understood, and men became expert in so dressing it as to make true lines and smooth surfaces, they found themselves able to produce more lumber in the rough than they could properly edge and prepare for market. The old edging-table could not keep up with the cut of the saw. This was remedied by the introduction of gang edgers, which no mill doing any considerable business could now dispense with. Now the work of the main saw could be safely increased, for the gang—or, as it was at first known, "double"—edger was abundantly able to keep pace with it, and while at first a capacity equal to 1,000 feet per hour was doubtfully claimed, later developments have shown in not a few instances an entire season's work at the rate of 6,000 feet per hour.

This increase in capacity called for a more speedy method of handling the logs on the carriage, and the lumber as it left the saw, and a multitude of inventive minds were concentrated on mill dogs, which should successfully take the place of the lever and pike, driven by a mallet, and the modern sawmill could not now be operated with the original method of dogging the log. The "nigger," for turning the log on the carriage, as well as rolling it on the skids, has superseded the cant-hook and muscular power formerly relied upon, while the lumber, as it leaves the saw, drops upon a system of live rollers, which does the work to much better advantage than it was formerly accomplished by a hard worked "off-bearer," who could not in these days by any possibility keep up with the work which would crowd upon him.

Plenty of lumber, cheaply manufactured and sold at reasonable prices, has enabled the settling up of a nation at the rate of nearly fifty per cent increase of population during each decade. This in turn has demanded a network of railroads, and carriage by them has not as yet been reduced to a science, which enables us to believe that rates have reached a minimum which they will realize in the future. The manufacturer of lumber, bearing this in mind, must reduce the weight of his product to the lowest possible point, and the trimmer became a prime necessity as an economizer, not less than for an advantage in an æsthetic point of view. And the old gang mill, from its original adaptation of two saws, hung in a cumbrous frame, upon monstrous posts which headed in a weigh beam, made from the largest stick of timber which the forests afforded, and footed in the mill foundations, shaking the structure and the surrounding country, and keeping the machinery about one-half the time in the repair shop from its everlasting jar, has been displaced by the neat, effective, and comparatively noiseless devices of more modern times, developing a sawing capacity of which the fondest anticipation of the original inventor of the idea had not the remotest conception. The heavy weigh-beams have disappeared, the monstrous wooden posts have given way to equally advantageous and strong but less cumbersome and more sightly iron supports, resting upon foundations independent of those which support the mill frame. The old, stiff, and full-of-friction gate has been superseded by oscillating slides, giving to the saws the same motion which the pit sawyer seeks to obtain in order to accomplish the most work with the least outlay of strength.

Time would fail us to trace out all the changes which a quarter of a century has developed in the sawmill. Should a Rip Van Winkle of the last century be suddenly awakened from his long sleep, still dreaming of the last act of dogging the log on his old-fashioned carriage, in the old mill, when he took long naps between the cuts, and esteemed a production of 1,000 feet per day something to brag of, and open his eyes on the floor of a modern mill of the smallest size, he would truly think that the world had turned upsidedown, and if he saw the army of men carrying off a quarter of a million feet of boards per day from the saws of some of the larger mills, he would not believe the evidence of his senses. All has changed; the water-wheel has given place to the steam engine; the single small cylinder boiler, to the monstrous tubular or flue in large batteries; the upright saws in a gate, to the mulay and the circular; the two-saw gang, to a forty-saw; the rag-wheel, to the steam feed, adding countless possibilities to the ability of the circular saw to cut up logs; the single buzz saw, to the double edger; the rough end lumber, to the well trimmed; the vast piles of worthless slabs, to a useful article of lath and pickets; and the final *débris*, in many localities, to usefulness in the manufacture of other commercial articles. The pioneer knew nothing of lath and shingle manufacture; live rolls had not entered his noddle; gang slab cutters would have been by him pronounced an invention of the devil to feed the flames of his insatiable furnace. Endless chains would have had no use in his mill economy; saw sharpeners and gummers would have had no value in his eyes, for he could cut all the lumber he expected to, and find plenty of time for dressing his saws by hand.

The modern sawmill is indeed full of improvements, down to the last device for sorting by machinery. The production in one day, by one saw, of more lumber than was accounted the work of a year in former times, is not only the result of the genius of invention such as marks the spirit of the age, but has rendered possible the remarkable development of the youngest in the sisterhood of nations, forming no unimportant factor in the influence of this country among the people of the earth. All hail to the modern sawmill, and the wise intelligence of nearly every man who is connected with it, either in the production of logs from the forests or the manufacture and sale of lumber, for each progressive step in the march of improvement has reduced the cost of manufacturing lumber, keeping pace with the inevitable increase in the cost of timber, due to the gradual decadence of the forests!—*Northwestern Lumberman.*

Shipping at San Francisco.

A correspondent of the *Tribune*, writing from San Francisco, under date of December 18, says: It is a fine sight to see the wheat fleet lying at anchor here, or taking on cargoes at the wharves. There are ninety vessels now in port. They are the finest specimens of naval architecture afloat, at least among sailing vessels, and are of many different types. The handsomest are undoubtedly the oak ships lately built in New England. These vessels have very tall and slender spars and long yards, graceful hulls, and a style that elicits admiration at sight. No handsomer vessels are ever seen here than such ships as the Samaria, the A. J. Fuller, the Harvey Mills, and their sisters from the down-east yards. The British iron clippers come next. They are very seldom of large size. They average about 1,100 tons register. Along with the great ships in port here there are seen many smaller ones of Pacific coast construction which are as well worth looking at as any. The Pacific coast lumber schooner is the most beautiful craft of its rig in the whole country. The builders have made the evolution of this craft a specialty. They are as a rule keel schooners. The fore foot is cut away under the water like that of a yacht. The fore body is long and sharp, and the after body short and full, but with hollow water lines. The stern is elliptical and broad, and the top-sides fall lower from amidships away off with a grace, seldom, if ever, seen in a schooner on the Atlantic coast, and not often matched in a yacht. These schooners are often loaded down until the water runs over the deck; but whether light or loaded they make remarkably fast trips. With all their speed, they have an astonishing amount of stability, and they cruise along the coast northwards, on the return voyages, for lumber, without a pound of ballast or freight in them, carrying every yard of canvas there is in their outfit. When vessels of this model are put into the wheat trade the famous clipper of the olden times will certainly be surpassed for beauty and possibly for speed. There are eight hundred vessels now owned in the district of San Francisco, and a majority of them are of this class and model.

NEW INVENTIONS.

An improvement in shoes, patented by Mr. Daniel B. Felter, of Newark, N. J., is designed to simplify the construction of single-sole or turn shoes provided with a spring. The invention consists in a single-sole or turn shoe made by sewing the upper to the front part of the sole and to the spring, and then turning the upper and nailing the rear part of the sole to the spring.

An improved invalid bedstead has been patented by Mr. Asahel J. Goodwin, of Brookline, Mass. The improvement relates to the devices used for raising and lowering the hinged sections of invalid bedsteads, and are designed to obtain great power by conveniently operated mechanism. The invention consists in a rack and pinion combined with a cam on which the hinged section is supported; also, in a pawl for retaining the parts in position against downward pressure.

Mr. Martin Hubbell, of Mount Kisco, N. Y., has patented a clevis with a longitudinal groove in the inner edge of its end slot, and with a series of notches, forming teeth, in the opposite edge, this clevis being pivoted in the ordinary manner to a plow beam. The extremity of the latter is provided with a series of vertical grooves. The clevis and the ring are placed in the desired position, and are locked in the same by means of a key fitting in the slot of the clevis.

Mr. George A. Ramseyer. of Dobbs Ferry, N. Y., has patented an improved piano stool. This invention relates to the mode of securing the elevating screw and guide to the seat, and has for its object to obtain a firm and durable connection and a saving in the expense of manufacture.

Mr. Magnus J. Palson, of Elizabeth, N. J., has patented an improved machine for dressing fish—that is, to remove the head, entrails, and backbone—thus preparing the fish for salting and packing it for shipment. The machine is provided with a jointed reciprocating plate, upon which the fish is placed, and is held firmly by spring clamps, which are opened automatically to receive the fish by a beveled fork, a heart plate, and two fixed converging bars, between which the head of the fish is held, so that it can be cut off by an automatically released spring knife, that is drawn upward by a chain attached to a pulley on the main driving shaft of the machine, this shaft being provided with two cranks extending in directly opposite directions, one of these cranks being connected by a suitable connecting rod with the sliding plate for receiving the fish, and the other opposite crank is connected in a like manner with a reciprocating frame sliding above and in opposite direction to the fish holding plate, which upper sliding frame is provided with knives and scoops, that adjust themselves automatically, according to the size of the fish, and rip open its belly, tear out the entrails and backbone, and cut the latter off at half its length, and also tear out the liver and throw it into a chute. The fish is seized by a hook attached to a sliding plate connected with the upper sliding knife frame, and pulled out from between the spring clamps upon an inclined chute, down which it slides.

In the treatment of gold and silver ores containing copper the object is to obtain a matte or regulus which shall contain all the valuable metals. It is, however, found that with the usual methods the slag contains a certain amount of gold and silver, which is lost. To obviate this loss, by insuring a more complete separation of the precious metals, Mr. Richard Pearce, of Denver, Col., has patented a process of smelting ores of gold and silver by precipitating the particles of gold and silver held in suspension after the smelting is completed by throwing upon the slag as soon as the charge is perfectly smelted fine powdered oxide of copper, then closing the furnace a short time before drawing the slag. The effect of this application is that a reaction takes place between the oxide of copper and particles of gold and silver, in whatever combination they may exist, and a rich heavy matte is formed, which descends and carries with it the precious metals.

A novel exhibiting-bracket for stuffed animals has been patented by Mr. James Hobson, of Ann Arbor, Mich. The invention consists of a wire twisted to form a slot, bent upwardly to form a projection, twisted downwardly to form a loop, and having one end passed into a name plate or block.

Mr. Charles E. Trask, of Hastings, Mich., has patented an improved electric clock, wherein the impulse is given alternately by two magnets and the movement controlled by a pendulum. The objects of the invention are to provide for ready and accurate adjustment, to obtain equal tension on the vibrating armatures, to simplify the circuit closing devices, and to obtain the required movement of the impulse lever by a limited movement of the armatures.

Mr. Thomas Trebell, of Limehouse, County of Middlesex, England, has patented a paint for ships' bottoms and other submerged structures, consisting of rosin oil, black lead, French chalk. white zinc, oxide of iron, and tallow, mixed with turpentine, linseed oil, rosin, Gallipoli oil, tallow, shellac dissolved in alcohol, Venetian red, red lead, zinc paint, and tar spirit.

An improvement in the class of police nippers which are employed for seizing and holding the wrists or arms of prisoners, and the curved jaws of which are so connected that the movement of one of them in opening or closing it will cause a like movement of the other, has been patented by Mr. John B. Craig, of St. Louis, Mo.

HORIZONTAL STEAM ENGINE WITH AUTOMATIC SLIDE VALVE CUT-OFF.

In the construction of steam engines, the progress of improvement has been steady rather than remarkable; for, since the steam engine left the hands of James Watt, who invented separate condensation, expansion, steam jacketing, superheating, and the governor, it has advanced principally by improvement in details and construction, and not so much by the development of new principles. At the present time there are certain excellences sought after by nearly every builder of steam engines, namely, economy of fuel, regularity of speed, simplicity of construction, durability, and freedom from derangement, the greatest power with a given size of cylinder and pressure of steam, and, lastly, elegance of design and finish. In stationary engines we find an infinite variety of construction—some of unsymmetrical form, roughly constructed, with slight finish; and, again, others having every improvement that is considered really such by the designer, with elaborate finish, and beautiful but simple mechanism.

As an illustration of the latter class, the horizontal engine, with an automatic slide valve cut-off, constructed by Mr. Robert Whitehill, of Newburg, N. Y., may be considered an excellent one. By the accompanying engraving it will be seen that the general appearance of this engine is attractive in design, correct in proportions, and compact. But among its best features is the simple and positive automatic slide valve cut-off, which can be adapted to any plain slide valve engine with excellent results. From direct experiment it has been proved that with the use of this valve an increase of twenty per cent of power is gained, and a more perfect regularity of speed is secured.

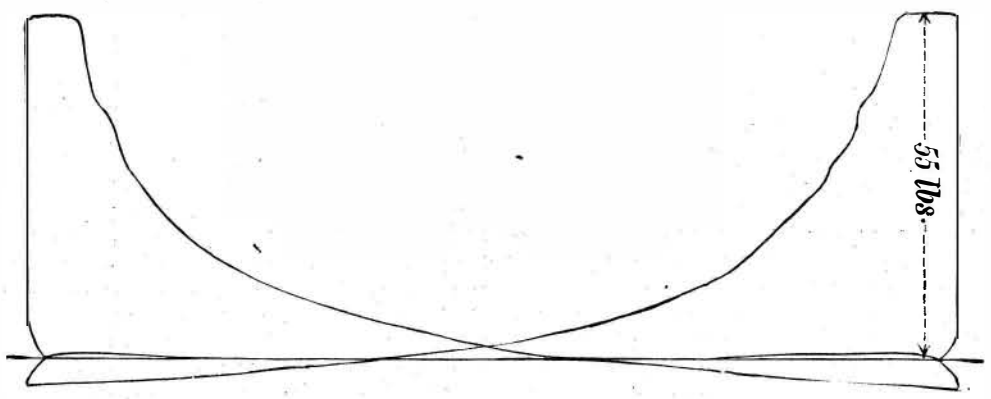
This engine has three valves—the main valve, the cut-off valve, and the "grid" or governor valve. The main valve is the same as usually employed, and regulates the admission and exhaust. It can be adjusted independently of the cut-off valve. The "cut-off," or intermediate valve, slides on the back of the main valve, and is provided with a number of ports which are controlled by the governor valve.

The main and intermediate valves are driven by eccentric, in the usual manner, the intermediate having a motion coincident with the piston.

The cut-off valves are attached to the governor in such a manner that the governor, in rising by reason of an increase of speed, thrusts the valves apart and effects a cut-off or closure of the steam ports in the intermediate valve at an earlier period of the stroke. If the speed of the governor is decreased the cut-off valves are brought closer together and steam is admitted to the piston for a longer portion of the stroke. The range of the cut-off is from the closest point to full stroke, therefore when the engine is at a standstill the cut-off is out of action entirely, and the engine can be started at almost any point of the stroke.

Above is given a certified copy of an indicator card taken from a 16 x 36 engine, fitted with this cut-off, at the American Institute Fair, and is a proof of the efficiency of the mechanism.

For further information address the builder, as above, at Newburg, N. Y., or at 142 Greenwich street, New York.



INDICATOR CARD TAKEN FROM A 16x36 ENGINE.

MECHANICAL INVENTIONS.

Mr. Atley W. Ale, of Caro, Mich., has patented an improved door and sash clamp for clamping tables or benches for holding doors and sashes during the process of manufacture. The invention consists in a novel combination of levers and locking devices, whereby the door or sash can be clamped equally upon all sides and at one operation.

An improvement in mechanical movements has been patented by Mr. Peter Broadbooks, of Batavia, N. Y. The object of this invention is to provide mechanical movements which, in their operation, shall exert great force of compression in the performance of any kind of work. The invention, which has its principal application to punching and shearing machinery, consists in supporting a roller provided with a pin or axle on one end between a reciprocating plunger and a cam lever, so that the pin shall move in an inclined or curved mortise in the frame of the machine, and gradually nearer to a right line with the fulcrum of the lever, and the point of contact of the roller with the reciprocating head or tool holder, to increase the compression as the operating tools are doing their work, and in so combining the frame of a machine which supports its operative parts with an upright post or standard that the compressive force exerted by the operating parts shall be increased by the addition of the entire weight of the frame and operating parts.

Mr. Elmer P. Newman, of Dimondale, Mich., has patented a metallic hub for vehicles having such construction that all escape of oil from the outer end of the axle is prevented, the hub being of cheap and simplified construction and adapted to be held upon the axle by a nut and collar fitted upon the axle at the rear end of the hub.

An improvement in pipe tongs has been patented by Mr. Deloss Worden, of Oil City, Pa. This invention is an improvement upon the improved pipe tongs shown and described in Letters Patent No. 240,067, granted to the same inventor April 12, 1881; and it has for its object to provide improved means for holding the bite-block in the bite-chamber, such construction as to the relative size of the bite-block and bite-chamber that the durability of the block is increased, and such construction of the bite-tong and its chamber that any length of bite-block may be used for increasing the bearing surface of the bite-block upon the pipe, and thus removing all danger of crushing the pipe.

An improved mode of setting saw teeth by means of rotating wheels provided with projections for engagement with the teeth of the saw, has been patented by Mr. Emanuel Larson, of South Pueblo, Col. When the machine is properly adjusted the setting of a saw is simply a matter of rolling it through the machine.

Mr. George F. Sawyer, of Liberty, Texas, has patented an improvement in bench planes. The object of this invention is to prevent dulling the cutting edge of a plane iron by the backward movements of the plane. The improvement consists in a stirrup pivoted to the sides of the plane in such a manner that the transverse piece of the stirrup passes through a transverse groove in the under surface of the plane, this groove increasing in height toward the rear of the plane, so that when the plane is drawn backward it will be slightly raised by this stirrup, so that the cutting edge of the plane iron cannot slide on the board being planed.

The Shaw Locomotive.

The Hinkley Locomotive Works of Boston, Mass., have lately built a locomotive after the designs of Henry F. Shaw, of Roxbury, Mass., intended to obviate those strains on the frame of the ordinary locomotive that are caused by the alternating thrusts of the unbalanced moving parts on each side of the machine. The impulse of the change of direction of the heavy side of wheel, etc., is in a "fore-and-aft" direction on one side of the engine, while it is vertical, either upward or downward, as the case may be, on the other side at the same instant, the former tending to rack the frame and the later cause lateral oscillations, which it actually does, more or less, to the great damage of the road bed. The effect is far greater if the engine is rocking from side to side than what would be due to the simple impulse of the preponderating weight of the reciprocating and revolving parts. The plan of the Shaw locomotive is to place a duplicate set of revolving and reciprocating parts on either side of the engine, so connected that one set on each side will be thrusting in the same direction at the same instant, and thus tend to correct this hitherto unavoidable objection to outside cylinder locomotives.

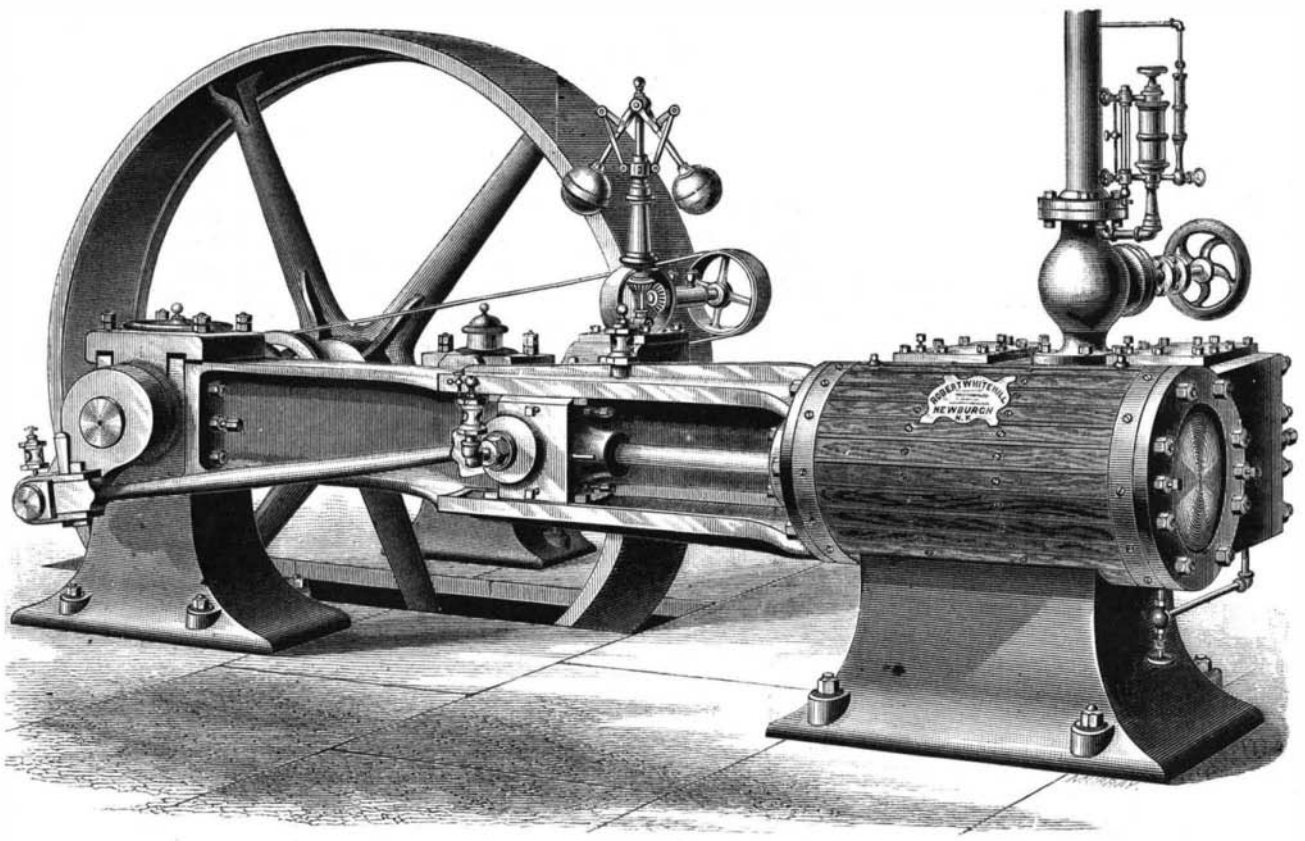
A trial trip was recently made with this new machine on the Camden and Atlantic railroad. The Philadelphia *Inquirer* gives the following as the dimensions of the four cylinders, etc.: They are "10½ inches in diameter, 24 inches stroke, equal to a 14⅞ x 24 of the ordinary locomotive. The cylinders are placed side by side in the same place. Four cylinders are contained within two castings, and do not increase the width of the locomotive as much as might at first be supposed.

"One slide valve admits and exhausts steam to and from each pair of cylinders, which are placed side by side; the valves are operated by the usual link motion and rock arm (as is customary upon ordinary locomotives), thus avoiding the complication that would arise from the use of a separate slide valve for each cylinder. This engine, when running, cannot be distinguished from the ordinary locomotive having only two cylinders, as the steam is taken and exhausted from the opposite ends of two cylinders simultaneously.

"Many experiments have been made in balancing, reciprocating with rotating parts to run steadily with each other, on locomotive engines, as they are now built, involving some of the finest mechanical calculation; but all of them have been unsuccessful.

"This locomotive is built for fast running, and it is claimed that there is an increase in the area of wearing surfaces, perfect balancing of the revolving parts, due to dividing the work between four steam cylinders. One of the remarkable tests that have been applied to this locomotive is to place it on four jack screws and elevate it clear of the track, and then to open the throttle valve and run the engine at a speed of two hundred and seventy-five revolutions per minute in this position without disturbing it, while an ordinary locomotive in this position would be disturbed at three revolutions per minute.

"The time made between Camden and Atlantic was seventy-seven minutes, which included two stoppages of six



HORIZONTAL ENGINE CONSTRUCTED BY ROBERT WHITEHILL, NEWBURG, N. Y.