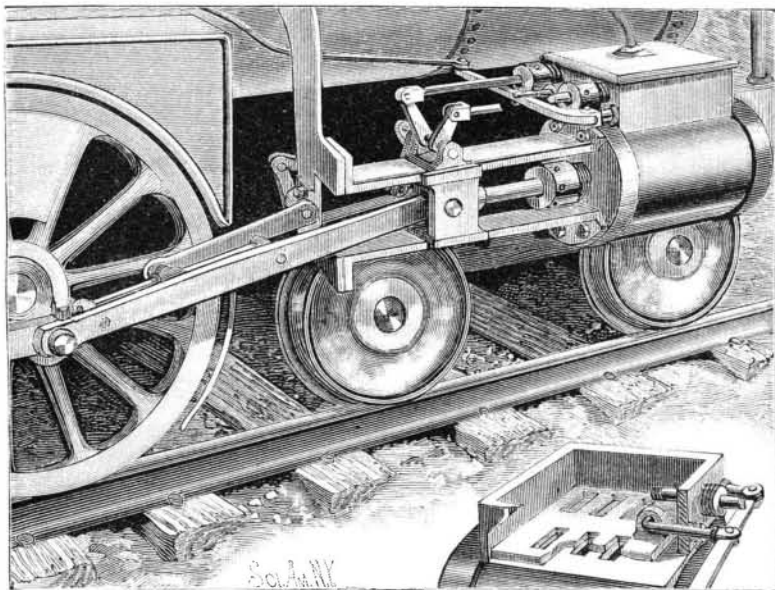


A REVERSING GEAR FOR ENGINES.

To facilitate the reversing of the engine without the use of the link motion is the object of the improvement represented in the illustration, which forms the subject of a patent issued to Messrs. Thomas F. Whittington and William A. Fishing, of Xenia, Ohio. The cylinder has the usual inlet ports, and the exhaust port adapted to register with sets of ports formed in a movable valve seat held adjustably in the



WHITTINGTON & FISHING'S REVERSING GEAR FOR ENGINES.

steam chest on the cylinder, as shown in the small view. A stem connected to the movable valve seat extends through one end of the steam chest, and is pivotally connected with a lever in reach of the engineer, when the improvement is applied to an ordinary engine, but in a locomotive this lever is connected to a rod which extends to within easy reach in the cab. On the movable valve seat, over the respective ports, are slide valves whose stems extend through stuffing boxes in one end of the steam chest, the outer ends of the stems being connected with arms, one of which is secured on a transverse shaft while the other is secured on a sleeve loosely mounted on the shaft. On the shaft and on the sleeve are arms connected by links with the ends of an arm secured at its middle on a rocking shaft, an arm secured to which is connected with a sleeve sliding on a rod on the pitman, the swinging motion of which imparts a longitudinal sliding motion to the valve stems in opposite directions. With the movable valve seat in one position one of the slide valves is rendered inactive, and with it in another position the other slide valve is inactive, and by giving but a half movement to the movable valve seat, the two sets of ports can be disconnected from the cylinder ports, enabling the engineer to shut off steam in case of accident to the throttle or other parts of the locomotive. As the movable seat can readily be changed whenever it is desired to reverse the engine, the usual link motion employed for reversing is entirely dispensed with.

A HANDSOME TEAM OF CATTLE.

To the Editor of the Scientific American:

After having your paper in our family since 1859 I take the liberty to send you a picture of three white cattle, the Jumbo team, weight 6,000 pounds, half brothers, not three days difference in age. All white as snow from three cows that were not alike. The breeding being remarkable. Names Jupiter, Saturn, and Uranus as they stand. They are used as a team for all heavy farm work, are quiet and thoroughly broken, making a powerful team. They were bred by me, and are six years old.

JAS. GALLOWAY.

Pontiac, Michigan, 1893.

Growth of the Great West.

The Mississippi River has 600 affluents whose courses are marked upon the map, and a drainage area of 1,257,545 square miles. The traveler embarking upon a steamboat can sail from Pittsburg, 4,300 miles, to Fort Benton, Mont., and from Minneapolis, 2,200 miles, to Port Eads, on the Gulf of Mexico. Should he choose to extend his voyage to the head of navigation upon its 45 navigable tributaries, his outward journey would exceed 16,000 miles, through 23 States and Territories of the Union, says the *Industrial World*.

This stupendous water system is equivalent to a land-locked harbor, an estuary or an arm of the sea, penetrating into the North American continent farther than from New York to Liverpool, with a coast line of 32,000 miles, having hundreds of populous towns and

cities, and innumerable ports and havens, from which the agricultural and manufactured products of one-third of the arable surface of the United States can be shipped to all parts of the globe. The territory which it drains is considerably larger than central Europe. Lying wholly in the temperate zone, equally removed from the languors of the tropics and the rigors of the pole, its climate favorable to health and longevity, its calcareous soil adapted to every variety of agriculture, it is the region where the elements of prosperity are most abundant and stable, and the conditions of happiness most permanent and secure among the habitations of men.

One hundred years ago, the pioneers from New England, the advance guard of the great column of Anglo-Saxon migration that has during the interval marched to the Pacific, abolishing the frontier and conquering the desert, descended the western slopes of the Alleghenies into the valley of the Ohio and disappeared in its solitudes. Chicago, Cincinnati, and St. Louis were outposts of civilization, exposed to the brand and the tomahawk. A few log huts, trading stations and mission houses were scattered along the crumbling banks of the rivers and in the profound depths of the forests. There were neither highways nor public conveyances, commerce, agriculture nor manufactures, no schools, churches, nor society, nothing but nature and its vicissitudes, the savage and his prey. From that unsurveyed wilderness, in less than a century, 21 States have been admitted into the Union, having an area of 800,000,000 acres, a population of more than 35,000,000, and wealth beyond measurement or computation. Sparsely inhabited, with rude and unscientific methods, its resources hardly touched, the States of the Mississippi Valley last year produced more than three-quarters of the sugar, coal, corn, iron, oats, wheat, cotton, tobacco, lead, hay, lumber, wool, pork, beef, horses, and mules of the entire country, together with a large fraction of its gold and silver. Their internal commerce is already greater than all the foreign commerce of the combined nations of the earth.

China supports 400,000,000 people upon an area smaller and less fertile. The civilization of Egypt, whose monuments have for forty centuries excited the awe and admiration of mankind, was nourished by the cultivation of less than 10,000 square miles, in the narrow valley and delta of the Nile. The delta of the Rhine, and the adjacent lands reclaimed from the Zuyder Zee, less than 15,000 square miles, have long sus-

meted of the past has no logarithms with which to compute the problems of the economic and commercial future of the West. It will be predominant in the development, not of this country alone, but of the hemisphere, and will give direction to the destinies of the human race.

When the first furrow was broken on the prairies of Illinois, there was not an iron plowshare in the world. Men are yet living who might have seen the first steamboat on Western waters, on her trial trip from Pittsburg, in 1811, and who were in active life when the first passenger rode in a railway train, and the first telegraphic dispatch was sent. The early settlers of Missouri had to depend on flint and tinder for fire. Most of the inventions in machinery, nearly all the appliances for comfort and convenience, were unknown to the pioneers of the West. Their victories were won with few of the methods and devices now regarded as indispensable in even the humblest walks of life. When its agricultural, mining, and manufacturing resources are fully developed by steam and electricity, the Mississippi Valley will support and enrich, without crowding, 500,000,000 people, and be not only the granary but the workshop of the planet.

The Railroad Y. M. C. A.

The railroad department of the Young Men's Christian Association now has a membership of 20,000 railroad employes, and is organized at over one hundred division points. The railroads appreciate the value of the Y. M. C. A. to the men and contribute over \$100,000 annually to its support. The officials of the railroads desire to provide influences to counteract the saloon and other evils which tend to debase and demoralize the men, and thus render them unfit for service in the responsible positions in which they are placed. The privileges of the association include reading rooms, libraries, bath rooms, parlors, gymnastics, bowling alleys, lunch rooms, educational classes, entertainments, religious services, and social receptions. Some of the privileges are free to all employees of express, telegraph, railway, and palace car companies and mail clerks, but certain privileges, such as baths, etc., are exclusively for members of the association. The Pennsylvania Railroad Company has contributed \$10,000 toward a railroad Y. M. C. A. building in Philadelphia, besides donating a lot worth \$22,000. An interesting pamphlet is published by the International Committee of Young Men's Christian Associations at 40 East 23d Street, New York City. It is entitled "A Railroad Problem and its Solution." Mailed to those interested on receipt of postage.

Trial of the Bancroft.

The third and final trial of the United States steamer Bancroft took place in Long Island Sound July 13. A speed of 14.4 knots was attained, although the contract only called for 12 knots. The battery tests were



A PRIZE TEAM OF CATTLE.

tained the United Kingdom of the Netherlands, and given to a dense population wealth, comfort, and contentment. The delta of the Mississippi, below its junction of the Ohio, richer than the Nile or Rhine, exceeds the combined area of Holland and Egypt, and is destined, under the stimulus of free labor and the incentives of self-government, to build a fabric of society more opulent and enduring. Add to this the inexhaustible alluvium of the streams above, and the fertile prairies from which they descend, and the arith-

very successful, as was also that of the Williamson steam steering apparatus. A complete circle was made in four minutes thirty-three seconds, with both engines running at full speed; and in seven minutes forty-two seconds, with starboard engine going ahead and port engine backing hard. The compasses showed, upon testing, a marked deviation, owing to the fire of the batteries. This phenomenon is not new, but rarely has the change been so clearly shown to be due to battery fire as in this case.