## 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. Fishering, 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
cities, and innumerable ports and havens, from which the agricultural and manufactured products of onethird 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 habitaticns 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 manufac tures, no schools, churches, nor 0 tures, no schools, churches, nor so
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 dis connected 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 as snow from three cows that were not
alike. - The breeding being remarkable. alike. The breeding being remarkable. 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. Gallowat.
Pontiac, Michigan, 1893.
Growth or 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 milea, having hundreds of populous towns and
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 Nilp 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-


A PRIZE TEAM OF CATTLE
very successful, as wss 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 fortytwo 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.

