

How Buildings are Moved.

BY JAMES WALTER SMITH.



TRUE story is told of an enterprising town in Kansas, which, after trying to induce a new railway company to run their line through the town,

woke up one morning to find that the railway had been located ten miles away. A town-meeting was immediately held, and with desperate enthusiasm the citizens unanimously decided that, if the railway would not come to the town, the town must go to the railway. The next day operations were begun. All the houses, shops, churches, and

heavy "shoes," in order that the building might slide easily over the ice and snow, and twenty oxen were attached. The building was hauled to a hill overlooking the lake, the oxen detached, and the building given a slide down hill for a quarter of a mile. It went down with considerable rapidity, and out upon the frozen lake. The oxen were again attached, and the journey down the lake was accomplished with speed.

A like interesting story can be told about the pretty wooden mansion shown on this and the following page, and the operation



From a Photo. by]

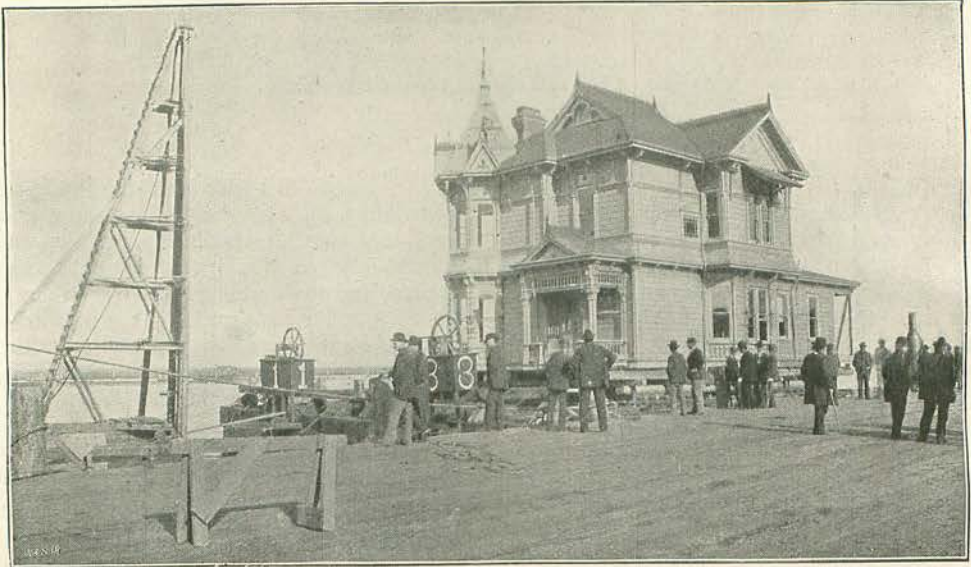
TOWING A HOUSE FOR EIGHT MILES ON HUMBOLDT BAY, CALIFORNIA.

[E. S. Chase.

lager-beer saloons were put on rollers, and, headed by dozens of pulling horses, a brass band, two clergymen, and the Mayor, the long procession of property started slowly across the prairie. The story does not tell how long the procession took, but it finally reached its destination, and with a prayer by one of the clergymen and general jubilation, the town was deposited in its resting-place by the railway, where it stands to this day.

The ingenuity of the Yankee is, indeed, of just repute. There was another house-moving feat three winters ago, near Damariscotta Mills, in Maine. A man in Muscongus wanted to take his house to Damariscotta Mills, by way of a lake. The house was placed on

was certainly one of the most picturesque and scientific feats of modern house-moving. The house belongs to Mr. Ernest Sevier, a prominent lawyer of Eureka, California. It was raised from its foundation in Arcata, a small town near Eureka, and moved on rollers to a marsh on the edge of Humboldt Bay. Here, two large lighters or flat barges, each competent to sustain 300 tons, were in waiting, securely joined together. A square opening had been cut into the edge of the marsh, and in this the lighters were supported with piles, so as to be perfectly stationary at low tide. The house was then shifted to the lighters, and at high tide the piles were withdrawn, and the house and lighters were afloat on Humboldt Bay.



From a Photo. by]

THE HOUSE AFTER REMOVAL FROM THE LIGHTERS.

[E. S. Chase.

In this fashion, it was towed for eight miles with perfect safety. The house weighed over 100 tons, contained ten rooms, an outside chimney, and was hard-finished throughout. When it reached Eureka, it was transferred from the lighters to the land, in the presence of a crowd of spectators, and then rolled a half a mile within the limits of the City of Eureka. The first photo. on this page shows the house immediately after it was removed from the lighters, and the second photo. shows it rolling prettily along the street behind a donkey-engine, near its destination. The house was placed on pine timbers, 12in. by 14in., running fore and aft, and these again were crossed with other timbers running transversely. "The plastering," writes Mr. Sevier, "was broken in places, but two men repaired it all in

one day. Not a panel was started, not a pane of glass broken, and not a brick displaced." The contractors who moved the house were Messrs. H. M. Mercer and William Berry, and the work was finished in about two months.

Buildings, it may be added, are not always



THE HOUSE BEING PULLED ON ROLLERS TO ITS DESTINATION IN EUREKA, CAL.

From a Photo. by J. Vansant, Junr.



BRICK HOUSE IN BROOKLYN MOVING ON GREASED WAYS—HORSES AND CAPSTANS AT LEFT.
From a Photograph.

moved on wooden rollers. In 1832, the first building raised and moved, so far as can be ascertained, in the United States—a fair-sized frame-house in Boston—was moved on iron balls, operating in grooves or channels. The building was moved but a short distance, and at that time was considered a triumph of engineering. Previous to that time, small structures had been moved on greased slides, the idea having probably been copied from the process of launching vessels on lubricated ways. This method is still in existence, and still proves effective, as is shown at the top of this page.

This large square brick building was lately moved in Brooklyn by Messrs. B. C. Miller and Son. Large timbers, about 3ft. apart, were placed under the ground-floor joists, running through the building. Under these came a second row at right angles, and under these last timbers strong lifting jack-screws on timber foundations or "cribs" were placed, as shown in the small photo. at the bottom of the page. The ground over which such a building is moved is made perfectly level, and in many cases covered with boards

upon which tracks of heavy timber are laid. The motive power, except in the case of very heavy structures, is furnished by horses. Heavy ropes or chains and pulleys are so arranged between the building and a capstan as to gain the greatest amount of power with the least expenditure of force. The horse is then attached to the long wooden or iron bar of the capstan, and starts on a tour around the capstan, threading his way with trained feet over the ropes and chains, and leaving behind him a gradually deepening path. When rollers are used, each roller, as it comes out at the back of the house, is placed at the front, and when the house is near the capstan, the capstan is moved forward and again secured to the ground with strong spikes.

Thus the operation continues until the structure is near its destination. The new foundation is built up between the timbers or "needles," as they are often called. After the foundation walls are finished and have dried, the timbers are drawn out one by one, and the holes filled in.

It often happens that ordinary house-moving operations in the United States, such as those with horse and capstan, no longer arouse any interest in spectators, so familiar have these operations grown. The building passes along through the principal streets, sometimes for miles, without drawing

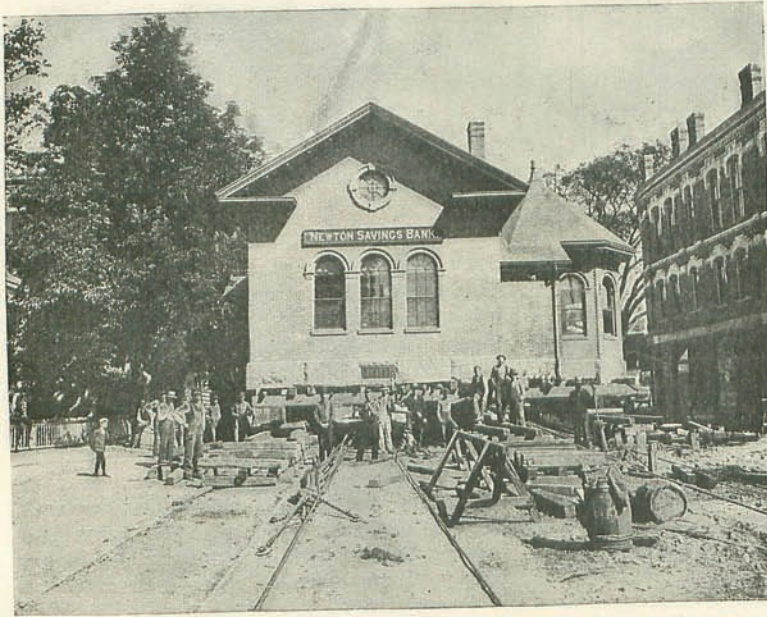


From a

LIFTING THE ABOVE HOUSE BY MEANS OF JACK-SCREWS.

[Photograph.]

crowds or disturbing traffic. When, however, the large savings bank at Newton, Massachusetts, was moved by Mr. John Soley, of Boston, across the local electric railway, traffic was entirely suspended, and large crowds witnessed the removal. The operation was particularly difficult, on account of the length of the building, the number of projections allowing little opportunity to truss the building securely. As here shown, the bank was moved on rollers.



MOVING A BANK 300FT. AT NEWTON, MASS., ACROSS ELECTRIC RAILWAY.
From a Photograph.

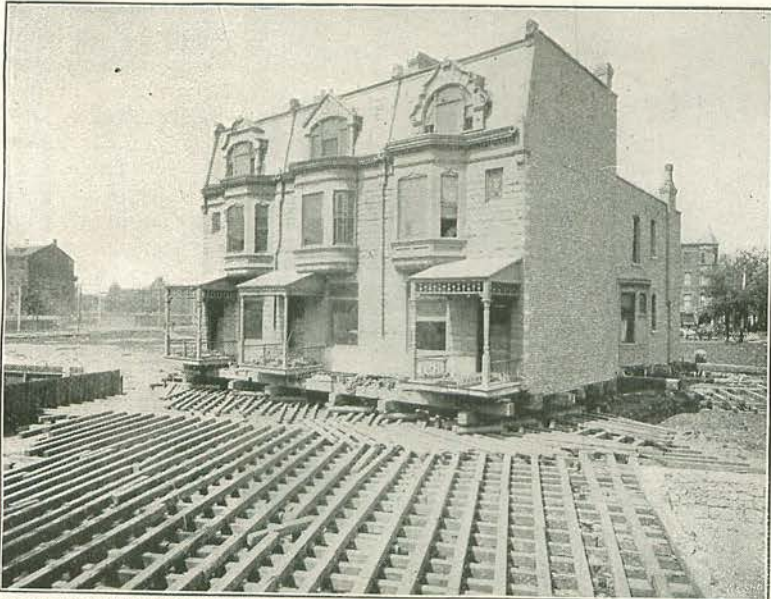
The handling of immense structures in the United States is no less a surprise to Americans than to foreigners, and people often travel long distances to see the moving carried on. The daily papers devote considerable space to a description of the process, and visiting engineers from England, France, and Germany continually marvel at its ease and seeming simplicity. The industry is purely American, although the appliances and the principles of the wedge, screw, cannon-ball, and roller are as old as the hills. It is the combination of these devices applied to the moving of buildings upon which the American house-mover prides himself for originality. And, as the coming pages will show, no structure of brick, stone, or iron, however large, has any terrors for him, so long as there are plenty of jack-screws in the market, and trees in the forests to get his timber from.

The remarkable thing about it all is that

the buildings do not get damaged, and that when fine residences are being moved, the people still occupy their accustomed apartments, eat their dinners without the sliding of a plate, and when the job is finished, find themselves looking at the sun set from the very place where they once saw it rise. The handsome stone block of three buildings shown at the top of the next page was turned from south to north by Mr. L. P. Friestedt,

one of the leading house-movers of Chicago, to whom we are indebted for this and the three following photographs of enormous buildings successfully moved in Chicago. The noticeable thing about the first Chicago photograph is Mr. Friestedt's method of laying timber foundations and of making the turntable. The exact direction of the timbers upon which the rollers are to run is calculated to a nicety, and we catch the building just upon the turn.

In the lower corner of the next page is shown the Normandy apartment building, formerly standing on Laffin Street, Chicago. It is supposed to be the largest building ever moved and turned round on rollers, the total weight being about 8,000 tons. Twenty-four men, with eight hundred jack-screws and six hundred rollers, were at work for ten weeks in 1893, and, without counting the turn, the whole distance travelled was 350ft. The lifting screws were divided between the men, so that each man had a certain number of screws to turn, the signal to turn being given by the foreman's whistle. Each man gave one turn to the screw each time the whistle sounded. The screws were tightened up in this way until the walls began to separate from the foundation, and when the structure had been lifted 3ft. 6in., blocking was laid across the cribs, and 4 x 5 hickory skids were laid lengthways of the building, the rollers being placed on top of these.



BLOCK OF THREE BUILDINGS BEING TURNED FROM A SOUTH TO A NORTH FRONT, WITH PEOPLE IN OCCUPATION—SHOWING TURN-TABLE AND OLD FOUNDATION IN FOREGROUND.

From a Photograph.

The building was then propelled to the turn-table by a very interesting method. When horses are useless, it is customary to push the building along by means of jackscrews placed parallel to the ground at the rear of the building, one end of each screw abutting against a piece of heavy timber secured to the ground—ways by heavy chains, while the opposite end of each screw works in a hollow log called a "pump," which presses against the timbers on which the building rests. In moving the structure, the men take their position at the screws, and, at the foreman's signal, the screws are given a quarter or half turn. The building moves forward with each turn, and when the screws are run out to their full length,

the chained logs are moved forward, and the operation begins again.

The turn-table upon which the Normandy partially revolved was a level mass of timber work, 132 ft. square and 4 ft. deep, built of 200,000 ft. of 6 x 6 timbers, laid on ground that had been scraped and levelled. The ground was sprinkled with sand, and then paved with planks laid closely together, as seen in the photo. The building was pro-

pped on to this floor, and the rollers pointed toward the centre of the building. Here a pivot had been placed, on which the building revolved.

As Mr. Friestedt, the mover of these enormous structures in Chicago, points out,



APARTMENT BUILDING OF 8,000 TONS IN CHICAGO BEING MOVED TO MAKE WAY FOR AN ELEVATED RAILWAY.

From a

Photograph.



MAKING WAY FOR THE METROPOLITAN ELEVATED RAILWAY IN CHICAGO—NEW FOUNDATIONS IN FOREGROUND. [E. L. Clements, Chicago.]
From a Photo. by]

the rapid growth of cities in the United States, the necessity for cutting new streets through old sections of towns, the tendency of railways to pierce the heart of a metropolis, as well as the necessity for great sewers, canals, viaducts, and elevated railways to meet the demands of increasing population and business, account for the rapid improvements in the science of house-moving. Either the buildings had to be torn down, as they have lately been torn down in London to make room for underground stations or great railway termini, or they had to be moved to a more remote locality. The destruction of this vast amount of property would have amounted into the millions, and although house-moving was costly, it was cheaper than complete destruction. The large

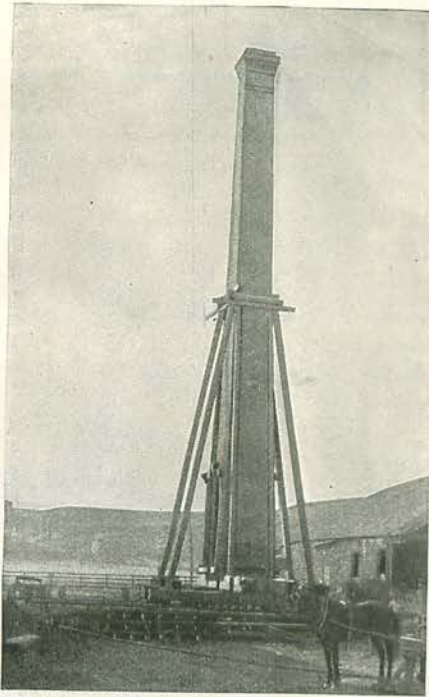
building shown at the top of this page, with the new foundation in the foreground, was removed to make way for an elevated railway. The Normandy was moved for a like reason. In the view below, which represents a double brick residence being turned from a north to a south front, while people are residing in it, the method by which the building is shoved along with a screw braced against chained timbers is clearly shown,

especially at the near corner.

The material used in handling these heavy structures is selected for its strength, timber being used for light brick structures, and steel beams where the strain is great. The weight of the whole building is first estimated, which means separate estimates per cubic foot of the different materials of which the



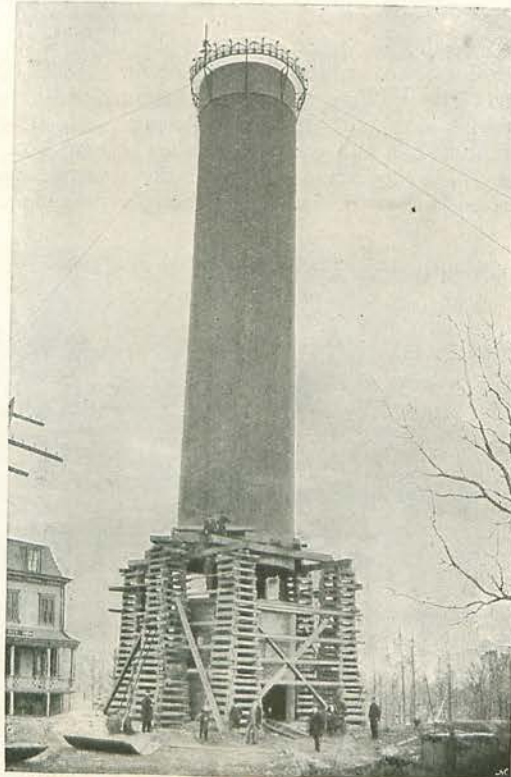
DOUBLE BRICK RESIDENCE IN CHICAGO BEING TURNED FROM NORTH TO SOUTH FRONT, WITH PEOPLE IN OCCUPATION. [E. L. Clements, Chicago.]
From a Photo. by]



CHIMNEY 125FT. HIGH MOVED ACROSS A STREET IN CHELSEA, MASS.

From a Photo. by C. Hayden, Chelsea, Mass.

building is constructed, whether of wood, brick, stone, iron, or steel. When the maximum weight is obtained, an estimate is made of the tension or fibre strength of the steel beams, timbers, and blocking upon which the structure is to rest. The lifting capacity of the jack-screws is then estimated, the number of screws necessary to lift the weight being thus ascertained. Accidents are guarded against by rigid tests of the material. The breaking of a beam from overstrain might mean the wrecking of the structure and the death of a number of men.



RAISING A WATER-TOWER AT MOUNT VERNON, NEW YORK.

From a Photograph.

A house-mover must needs have a large capital behind him. His yard is usually full of timber, iron, capstans, derricks, pulleys, chains, ropes, clamps, rods, etc., etc., all of which represent an amount of money not easily to be reckoned up. This mass of material is rarely in disorder, but when a big job has been completed, the yard often looks as if a playful cyclone had danced through it, juggling with jack-screws, ladders, and derricks. The necessity of capital is proved by the fact that nearly all house-movers are required to furnish bonds for the speedy and safe performance of their work. Before he was allowed to move the Immanuel Baptist Church in Chicago, Mr. H. Sheeler gave a bond for 50,000 dollars, scheduled from his own property. Special contracts are also made for removals within a certain time, which means the hiring of an extra number of men and the ability to pay their wages.

Certain American movers make a speciality of raising and moving chimneys, which are particularly wobbly in their tendencies. The chimney shown in the top left corner was 125ft. high, and was successfully taken across a wide street in Chelsea, Massachusetts, the

power being obtained from a horse and capstan.

A huge water-tower in Mount Vernon, New York, was also raised by Messrs. Isaac Blair and Co., of Boston. The structure was 100ft. high, and weighed about fifty tons. It was raised bodily by means of screws, and although the high winds caused it to sway slightly, it was strongly held by steel guys. The object of the work was to secure additional force to the water supply. The tower was 20ft. in diameter, and was raised about 4ft. a day until it was 125ft. high.

"Scarcely a perceptible crack in any part of the building." Thus wrote a reporter



From a]

MOVING RAILWAY STATION BACK 50FT. AT MOTT HAVEN, NEW YORK.

[Photograph.

about the moving in 1893 of the big 1,700 ton railway station at Mott Haven, in the suburbs of New York City. The building, as shown in the accompanying photo., was 185ft. in length, with a tower 80ft. in height, and was successfully carried back by Miller a distance of 50ft. The station was pushed to its new foundation on skids or ways, in the manner already described.

A more remarkable feat — one which may be said to mark an epoch in the history of American house-moving — was the removal of the Brighton Beach Hotel in 1888. The hotel was raised from its foundations, placed on flat trucks, and by means of locomotives hauled one-tenth of a mile back from the sea. The hotel was first

opened to the public in July, 1878. It stood 600ft. away from the water, but it was soon threatened by the encroaching Atlantic, which gradually washed its way under two-thirds of the hotel. The total loss of the structure was predicted. It was first thought possible to move the building



MOVING THE BRIGHTON BEACH HOTEL, IN 1888, AWAY FROM THE ENCREACHING ATLANTIC—SHOWING THE TRUCKS UNDER THE HOTEL. [J. H. Beal, New York City.

back, but its enormous length of 460ft., its five large towers six and seven stories high, and its weight of 5,000 tons, strongly pointed to a failure.

A contract to move the hotel was, however, soon signed, and on April 3rd, 1888, Messrs. B. C. Miller and Son had the huge building ready to start. The hotel had been raised, twenty-four lines of rails had been placed under it, and upon the rails rested 112 flat trucks. The arrangement of these trucks, or cars, is shown in the illustrations. Huge timbers were then laid from end to end of each line of trucks, and upon these timbers transverse beams were stretched. It was carefully arranged that no part of this platform of timber could be moved unless the movement was common to the whole. The locomotives were on two lines, or tracks, three on each line, and the cables attached to the hotel extended from the locomotives like the ribs of a fan.

To witness the moving of this immense structure, crowds of people came from the neighbouring cities, and great enthusiasm

reigned. Nothing like it had ever been known before in the United States, and when the engines were ready to start, the excitement was at its highest point. Mr. Miller gave the signal to start, and, in the glowing words of a Metropolitan reporter, "simultaneously six throttles were thrown open—first gradually, then to their full. The music of the guy-ropes and tackle was weird and Wagnerian; then the tug of war began. Panting and puffing, the iron horses strained every fibre of their mechanical muscle. For a moment, and a moment only, they tugged in vain; their immense drive-wheels revolved with perceptible swiftness; then, as if with a mighty effort, they forged ahead. Slowly, but surely, the mammoth structure followed. The puzzling problem as to what was to be the fate of Brighton Beach Hotel had been solved. Shouts of joyous approval and triumph arose from the small army of workmen and spectators, which were caught up and echoed by six brazen throats in shrill and prolonged blasts."



SIX LOCOMOTIVES PULLING THE BRIGHTON BEACH HOTEL BACK FROM THE OCEAN, APRIL 3RD, 1888—THE ENTIRE BUILDING RESTING ON 112 FLAT TRUCKS. [Photograph.]