MODEL OF NORTH RIVER TO SOLVE HARBOR PROBLEMS

Miniature Liners in Miniature River Basin at Washington.

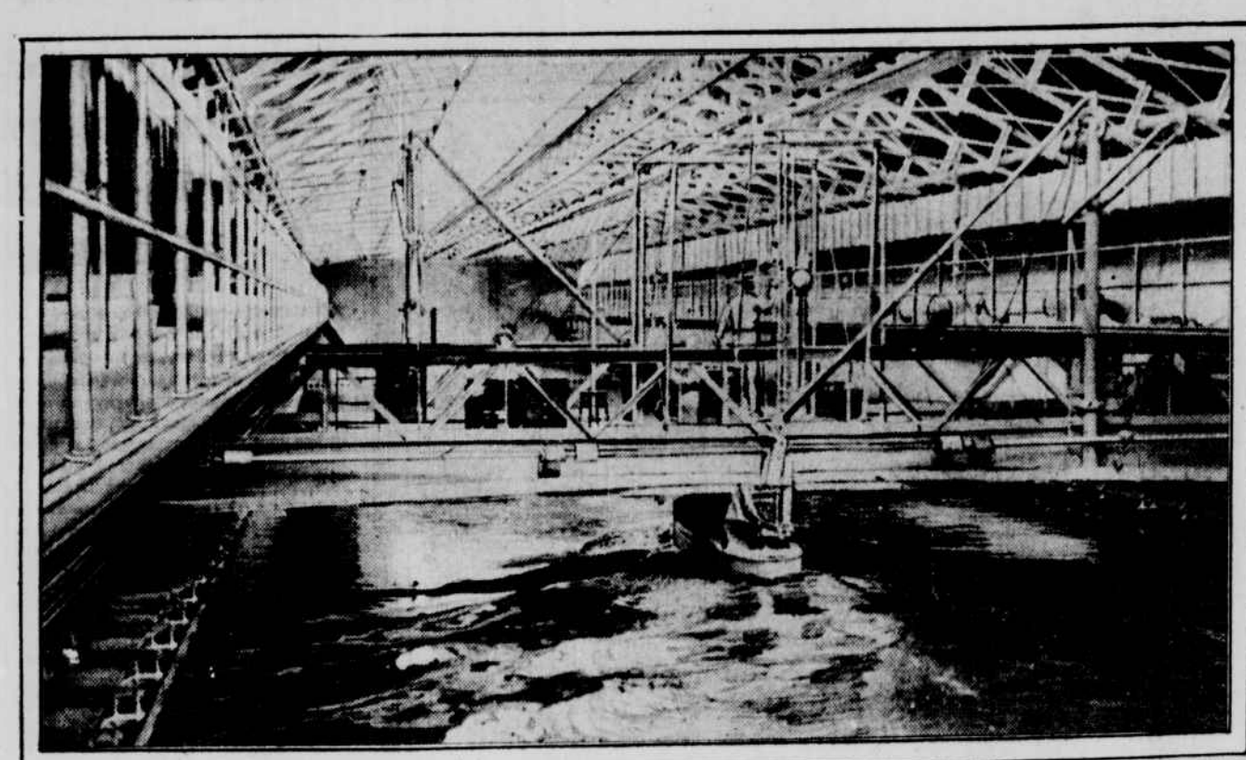
Many Puzzles in Movement of Big Ships in Narrow Channel.

DID you ever put your foot in a puddle and watch the way the water rose or spread further at its edges? Well, after a fashion this homely simile is very much akin to New York's harbor problem. Father Knickerbocker has put his foot in it, so to speak, already. The trouble the Vaterland had in docking on her arrival at this port brought out this fact in a striking manner.

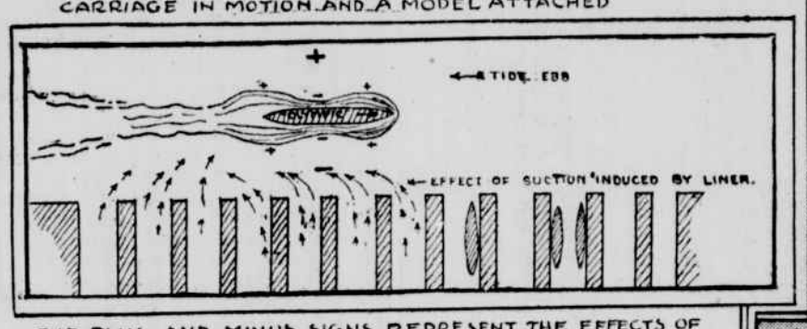
If this port is to be the prime centre for the transatlantic trade it is absolutely essential that we should have channels for the travel of these monster craft and also piers where they may load and unload. Equally necessary is it that they should be able to move within the relatively confined waters of the harbor without imperilling other traffic or other ships lying at the docks.

It is only a brief while ago that the city finished its splendid Chelsea piers, and the concrete upon them was hardly set ere along came the Olympic, so big that she overlapped the permanent dockhead by quite a hundred feet. What was done? Why, a temporary addition was built out for the required distance so that the stern of the ship should not be endangered by river traffic. That fabrication of open piling provoked an earnest controversy between the engineering experts of the Dock Department of New York City and the army engineers, who had previously drawn a line which put a limit to any further encroachment upon the flow of the North River between the Chelsea piers on one side and the dockheads over on the Castle Point shore. The extension for the Olympic overstepped this boundary fixed by the government authorities.

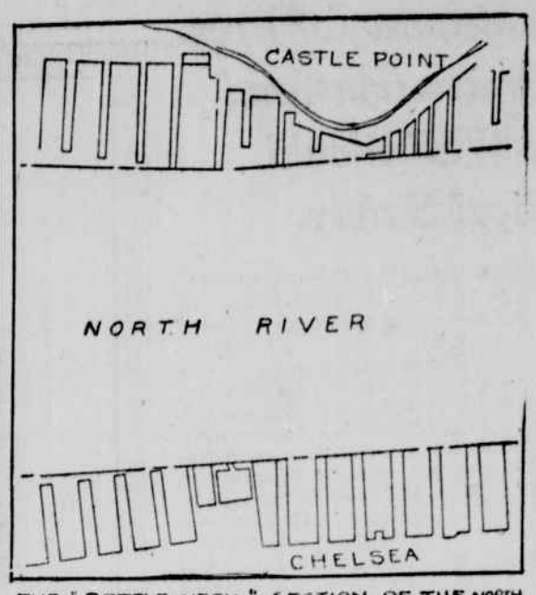
Now comes the Vaterland, the greatest of them all.



THE MODEL EXPERIMENTAL BASIN AT WASHINGTON WITH THE CARRIAGE IN MOTION AND A MODEL ATTACHED



THE PLUS AND MINUS SIGNS REPRESENT THE EFFECTS OF A LARGE SHIP IN MOTION WHEN STEMING A STRONG TIDE THE PLUS STANDS FOR AN AREA OF REPULSION AND THE MINUS FOR AN AREA OF ATTRACTION



THE "BOTTLE-NECK" SECTION OF THE NORTH RIVER WHICH THE GOVERNMENT EXPERTS HAVE BEEN EXAMINING IN MINIATURE AT THE MODEL TANK IN WASHINGTON

S. S. VATERLAND

WIDTH OF NORTH RIVER AT CASTLE POINT.

Just where the North River flows abreast of Castle Point the stream has a total width of 2,800 feet, and this, in fact, is a relatively narrow passageway for the tidal flow at the periods of greatest activity. In short, this section of the river is a veritable bottle-necking of the movement, and this is repeated in effect again at the Narrows, between Staten Island and the opposite Brooklyn shore. You have probably used a garden hose and found that when the nozzle was off the water pressure, or "head," was not enough to throw the stream any distance, but when the nozzle was in place the water was thrown much further by the same pressure.

Where the tide sweeps through the Narrows and the channel between the Chelsea and the Castle Point shores it moves a good deal quicker than through the intervening expanded areas of the river and the harbor, and, accordingly, vessels at these points have more to contend with when navigating against the stream. Of course, at the Narrows this is not a matter of so much concern, because shipping is moving in or out to other objectives and the volume of traffic is not so heavy. But at the Chelsea section matters are entirely different, because there it is that the great ocean liners must halt to dock or leave their piers and swing right across the channel and turn to start seaward. The state of the tide—whether running at normal full force, or when augmented by the outbound flood, due to heavy rains upstate—very much affects the problem of handling the ocean giant, and at times, for this reason, the docking of a ship that should be accomplished in an hour may take three times as long. Meanwhile, what happens?

The deep-draft liner acts to a considerable degree like a further extension of a pier—we might almost say like an island in the sweep of the stream—and because of this narrowing the waters must move through the channel just that much faster in order to keep up the volume of flow. So much is this the fact that the movement of some kinds of water-borne traffic, such, for instance, as towing, has been practically restricted to the hours of favoring tides. This is the result of Father Knickerbocker's missteps in the past.

Now, if we New Yorkers elect to extend Governor's Island, build out great piers on the Greenville shore, or run the city docks and those on the Jersey shore further and further into the channel way, why we are substantially placing a number of good-sized feet right into the puddle, which we will call the harbor basin. What follows?

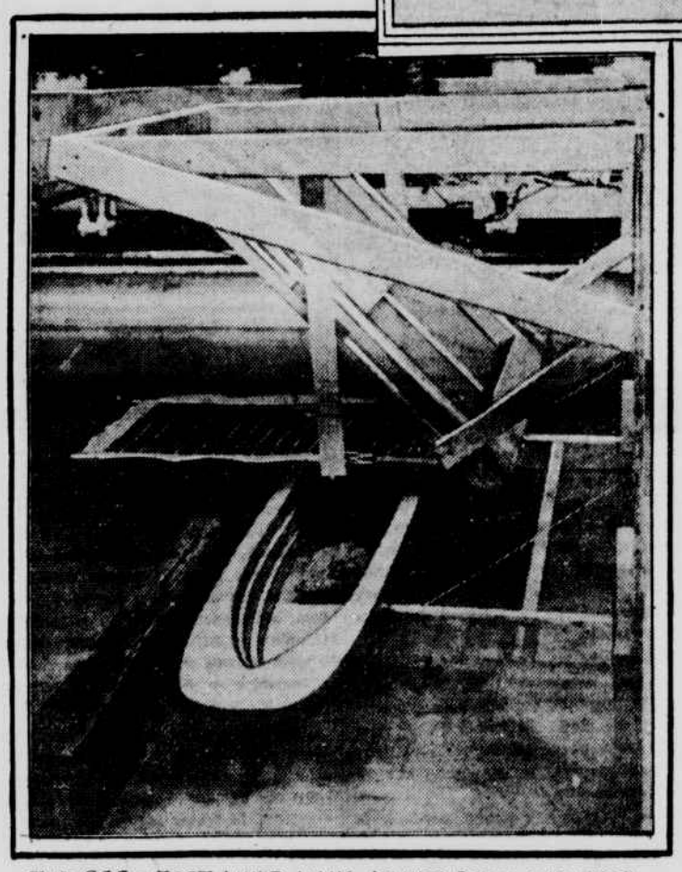
We can't displace the original water and push it oceanward, because the broad Atlantic offers a wall of opposition. Where, then, is the ousted water to go? Why, upstream, and that volume of the tidal influx which used to come to rest in the harbor must now move onward through the Chelsea bottle neck—increasing the velocity of movement there—as it speeds up stream to find a temporary halting place. Possibly you don't know how far these pier enchoachments, etc., have reacted upriver. Well, let us enlighten you, because this problem, while seemingly a purely local one, is quite the contrary.

WATERS FORCED 150 MILES NORTHWARD.

In fact, our so-called improvements have forced the water 150 miles further to the north, and what we have done here in half a century has measurably increased the rise and fall of the tide at Albany! This has also resulted in the flooding of certain low-lying sections of land along the river and has imposed added expenses upon the owners of docks and breakwaters from the state capital southward.

Any further encroachments upon the available area for the river's flow would unquestionably increase the tidal difficulties that have already arisen, and that the results would be undesirably farreaching can be gathered from what the army engineers have reported. "This increase of current velocities has required a corresponding increase of power for all self-propelled boats using the river, with an increased cost of operating expenses. This is no small item.

"For example, boats using the canal system of the state will be restricted in speed there to four miles per hour, and for economical reasons will be provided with power accordingly. Such a boat must have power sufficient to double this speed to be able to navigate with safety in the rapid currents now existing in the harbor. Any increase in such currents must cause a further increase of the power to be provided." In other words, these canal boats must have engines of at least double the power required for canal navigation in order to meet the local conditions for a short distance here. This means a much higher initial outlay and uneconomical running for the greater part of the time when the over-powerful engines are operating up river or through the canals.



THE 666-FOOT LINER LYING AT HER DOCK AND FREE TO MOVE ACCORDING TO THE INFLUENCES OF THE PASSING 1000-FOOT LINER.- THE CHECKERED SCREEN ABOVE IS REFLECTED IN THE MIRROR OF WHICH WE SEE ONLY THE BACK.-ANY MOVEMENT OF THE MODEL IS GAUGED BY ITS RELATION TO THIS SCREEN

INFLUENCE OF GREAT LINERS ON NEIGHBORING CRAFT.

But quite apart from the effects of pier extensions are the influences that the great liners entering and leaving New York exert upon neighboring craft—these influences growing in proportion to the size of the liner, her speed and the speed of the tide at the time. Here we are face to face with that erstwhile mysterious problem of suction between ships—something that even the Admiralty courts of this country refused to recognize until Naval Constructor D. W. Taylor made the first of his experiments.

The army engineers knew of these investigations and believed that they had a suggestive value in the case of our pier problem. In fact, Colonel William T. Rossell, more than a year ago, as senior member of the Harbor Line Board, urged that the model experimental basin at Washington be used to settle points upon which that government body and the dock experts of the city could not agree.

Colonel Rossell said: "It has long been observed that vessels moving in constricted waterways set up reactions dangerous to themselves and to other vessels. Hitherto, by reason of disparity between the widths of fairways of this port and the dimensions of the vessels using them, questions as to the nature and intensity of the reactions have been of comparatively small import. But now recent incidents indicate that these questions have become of urgent concern. Thus the collision between the Olympic and the cruiser Hawke in Southampton water illustrates one possibility; the narrowly averted collision between the Titanic and the New York at Southampton indicates another; while the disaster to the Titanic passing a berg perhaps suggests a third.

"The immediate question is that of the minimum permissible width of the fairway in the Hudson River opposite New York City. Having at present a width of 2,800 feet, it may, when used by 1,000-foot ships, be looked upon as a 'constricted waterway.' It becomes advisable to take account of the hydraulic reactions set up by these large ships. . . . Professional literature furnishes no sufficient discussion of the conditions involved."

Accordingly, Naval Constructor D. W. Taylor, collaborating with Colonel H. C. Newcomer, of the corps of engineers of the United States army, set about transforming the model experimental basin at Washington into a miniature replica of the prime physical features of the North River, between Chelsea and Castle Point. Models were prepared to represent a 1,000-foot liner, and flanking piers were arranged upon a corresponding scale in which models could be placed for the purpose of seeing how they were affected by the passage up or down, at right angles, of the supposed giant liner. The elaborate provisions made for observing and recording all of the phenomena were essentially novel and upon an extensive scientific scale never before attempted. The object was to leave the determination of certain moot questions to the absolutely impersonal or unbiassed disclosures of the experimental apparatus. In this Naval Constructor Taylor and Colonel Newcomer were eminently successful.

Among the things to be observed were the movements of individual particles of water, and these were to be traced at varying depths as they flowed around and by the moving vessel. In fact, this was not done, but the motions of small rods, attached to moored submerged buoys, answered well enough. But you will probably wonder how these swayings were recorded so that they could be studied at leisure and properly evaluated. Well, this was done by means of a moving picture apparatus capable of taking pictures of the sub-surface paths of the little rods. Naturally the camera was not under water, but was ingeniously placed in front of the towing carriage, and in such a position that it could photograph the images of the swaying rods reflected in a mirror just above the water and beneath the towing carriage or platform.

Afterward, when these films were developed and run through a picture projecting machine, the movements of the rods simulating particles of water could be followed perfectly. The results were of the utmost interest and showed just where the areas of repulsion and attraction were set up in the surrounding water, and also the reach of these influences, sidewise and ahead and astern of the towed model. By means of a large clocklike dial set upon the towing carriage—the markings indicating stages of travel along the miniature river area—it was possible thus in each picture to show exactly at which point the records on the film were made.

The model representing the 1,000-foot vessel was actually fifteen feet long, and it was upon this ratio to reality that the channel way in the model basin was made to represent the river between Castle Point and the Chelsea piers. Also, a false bottom was suspended in the basin, which could be raised or lowered to indicate the differences in cross sections of the river and the volume of water flowing at either high or low tide. In order to typify restricted channels below the surface of the water, panels, or partitions, held in place by bags of ballast, were placed upon the false bottom of the tank, so that the effects likely to follow the still further narrowing of the Chelsea-Castle Point section of the river could be studied progressively.

A TEN-FOOT MODEL FOR FURTHER INVESTIGATION.

A second model, 10 feet long, was built, representing a vessel 666 feet in length. This little vessel was used to find out what might be the effect upon craft lying at the wharves when the model of the 1000-foot liner passed by. This 10-foot model had no motive power of its own, and there was no need for it, because its part in the experiments was a passive one. The reason for its making lay in the narrowly escaped accident when the suction set up by the Titanic in backing out of her dock at Southampton was strong enough to pull the New York away from her pier and make her break her heavy mooring cables. The army engineers wanted to know what might happen to our shipping at the docks if any of the great new ocean-going giants swept by and near them in moving to and from their own piers.

The 10-foot model was so placed beside her wharf beneath a checkerboard screen that any movement of the little vessel could be photographed by the picture machine—the checkerboard serving to give an indication of the direction of the motions and their speeds. The information obtained in this fashion was of an exceedingly interesting and valuable nature, and had to do with the actions set up between solid piers or those of open construction like the temporary extension allowed for the Olympic.

PIERS OF OPEN CONSTRUCTION FOUND OBJECTIONABLE.

One other vital point to be cleared up was the effect of the big liners, moving in restricted channels, when passing other shipping also in motion. In other words, to discover how strong might be the forces set up in the water tending alternately to repel or to attract other craft—thus drawing them away from their courses and inviting collision either with the liner or with other neighboring vessels. In substance, the experiments showed that a big liner moving at any considerable speed set up disturbing forces in the water reaching away upon either side for a distance four times as great as her own beam or width. That is to say, a vessel a thousand feet long and having a breadth of 104.5 feet, would have a total danger zone on both sides of 836 feet. The measure of these disturbances was found to increase with growing speed on the part of the liner and with the narrowing of the channelway. Therefore, as the army engineers declared, any further encroachment upon the path of the river at the critical section, especially with bigger liners, would mean that much more danger to other craft. Even in the less active seasons of the year as many as 120 boats an hour pass up and down the river opposite West 23d st.

MAY IS THE MONTH OF FLOODS

THERE seems to be no particularly convincing reason why the month of May should be marked with floods, unless it be the old rule that the month is so called because it may rain, it may snow, it may freeze, it may anything, which pretty well describes it in this and the adjacent parts of the world. But yesterday's fortieth anniversary of the Mill River flood and the ride of Collins Graves recalls the fact that this month has been made memorable by at least three of the most notable inundations in American history—to say nothing about Noah and the Ark.

Concerning the last mentioned, we must recognize the existence of some differences of opinion. Chronologists vary as to the date of the Flood by as much as 1,000 years. Besides which, there are the rival flood tales of Gilgamesh and the Satapatha Brahmana, and what not else. But as John Blair was the only one of them who had the moral courage to fix not only the year but the month and day on which the Flood began, and on which it ended, let us give him the honor which such assurance deserves. According to him, then, the big rain began on December 7 A. M., 1656; it was on May 6 A. M., 1657, that the Ark grounded on top of Ararat, and it was on December 18 of the latter year that Noah and the folks got out.

One of the greatest floods in May time was forty years ago, in the hills of Central Massachusetts. At Williamsburg there was a great dam on the Mill River, a tributary of the Connecticut, constructed to supply water power for a number of manufacturing towns. The melting snows and heavy rains on the Hampshire County hills brought unwonted pressure upon it, and it burst, letting the confined waters rush in a devastating flood down the narrow valley.

Several towns were annihilated, and the property loss was millions of dollars. Nearly two hundred human lives were lost, but the roll would have been several times that number had it not been for the heroism of one man, Collins Graves, concerning whom John Boyle O'Reilly wrote one of his most spirited ballads—a sort of complement to Buchanan Read's "Sheridan's Ride."

Graves rode on horseback down the valley in front of the flood, in a literal race with death, shouting warnings to the people as he galloped by. For several miles he rode, until the flood overtook him and he was just able to spur his jaded steed up the hillside to safety. But through the jeopardizing of his own life he saved the lives of many hundreds.

The greatest of all our May floods, however, and one of the greatest ever suffered at any time, was that of twenty-five years ago. The scene was among the mountains of Western Pennsylvania, where Conemaugh Creek and Stony Creek plunge along their rocky channels and join to form the Conemaugh River. Across the south fork of the latter stream a huge mud dam had been built to form a lake, once used as a reservoir for canal supply and later as the preserve of a fishing and hunting club.

Below the dam, at intervals down the narrow, winding valley, lay Mineral Point, Conemaugh, Johnstown, Sang Hollow, Cambria, Nineveh and other populous and prosperous industrial towns. Johnstown was the chief of them all, founded just a hundred years before by Joseph Johns on the site of the Indian village of Kickenapawling.

It was Friday, May 31, 1889. The day before had been the nation's holiday. For many days there had been much rain, and Stony Creek and Conemaugh Creek were raging torrents, swelling South Fork into a turbulent flood. The lake was filled to the brim, and over it. But the spillway was not enough. The pressing flood had bored its way into the dam far below the surface until the whole mass was honeycombed. At 2 o'clock that afternoon the water was pouring over the crest of the dam and spurting in jets from holes near its base. Herbert Webber, an employe of the club, saw this and stood for a moment transfixed with horror as he realized its meaning. Thirty feet in air, like the jets of a mighty fountain, spurted the deadly streams.

The property loss was $10,000,000. The lives lost were 2,142. The whole world was shocked and moved to sympathy. From the President, the Queen of England and from myriads in all parts of the world came messages and gifts for the surviving sufferers, the cash contributions aggregating nearly $3,000,000. To 124 widows the sum of $1,500 each was given, while 965 orphan or half-orphan children received pensions of $50 a year each until they were sixteen years old.

MISS MURPHY AND HER LATEST

MISS MURPHY has had her thirteenth child and broken all Zoo records. In doing this she has earned for the Central Park menagerie some $50,000. A lady hippopotamus who can earn the salary of a magnate is a living backer for the argument of the "antis" that the place of the gentler sex is in the home.

In the cool seclusion of her concrete boudoir Miss Murphy nuzzles her latest with tender care, brushing his back with a mustache that makes a walrus's seem like a Yale senior's as to fluffiness. If you think that she is clumsy, click a graflex at her at close range. Have one hand on the bars and be ready to vault them—or, better still, do as the writer did and poke your camera through the grating. Mother love has made Miss Murphy peevish.

To photograph her is embarrassing as well as difficult, for she stays the whole day in her bathtub. And the only way to take her is to let the water out. When the last dying gurgle has been uttered Miss Murphy poses for the photographer just as she is.

"She is a fine beast," said Keeper "Bill" Snyder, "and in justice I want you to say that her real name is Mrs. Caliph. She was a widow when she married him, but just for old time's sake we called her Miss Murphy. It isn't quite fair.

"She came here twenty-eight years ago. She was caught on the River Nile and we bought her from Hagenbeck. She's sat in this tank ever since. Had thirteen children and reared nine of 'em. Young hippos cost from $5,000 to $10,000 apiece, but an expedition to get them direct from Africa would bring up the total considerably. They've been sold from this park to zoos all over the world. There's a great demand for them."

"She's a nice, quiet, tractable beast," said Keeper Sichert, who has charge of giving Miss Murphy her fifteen loaves of bread and bucket of carrots per diem, "so long as she doesn't think you intend to worry the kid. But she's very suspicious. I've had to give up going into her cage, for she's chased me out four times already.

"When she's good tempered you can do what you like with her. When she's up on the upper level of her cage all that you've got to do is to say, 'Murphy, downstairs!' and she goes as quiet as a lamb. She likes to lie in the sun, and the hotter it is the better. It's a curious sight to see her, for a hippo perspires blood, and on a sunshiny summer day it trickles all over her.

"I can't just recollect the names of all of her children. There were Fatima, Pete, Caliph II, Iris, Lotus, Heiney, Lulu and Sirius. We haven't made any plans to christen the youngster yet. Maybe some one will suggest a suitable name. I've thought myself that Marguerite would be a good one—or possibly General Huerta.

"Maybe you don't remember the letter that Mayor Gaynor wrote when somebody told him that a hippo had no right in the world to bear the grand old name of Murphy. The Mayor said—I can't recollect the wording of it—at any rate he said that he was deeply concerned at the writer's kick, but the hippo didn't mind it in the least. I always liked the letters that Gaynor wrote. They went right to the point of things.

"If you haven't a good photograph come up again. A picture of a baby hippo is worth getting. We're going to open up the house to the public soon, and the pair will be some popular, take it from me."

MISS MURPHY AND HER YOUNGSTER IN CENTRAL PARK