

of a breakwater, or sea wall, of sufficient strength and height to prevent the overflow of the city from the Gulf.

3. Plans and specifications and estimates of the cost for filling and grading the city, so as to protect it from overflow, and to secure sufficient elevation for drainage and sewerage.

The board of engineers selected for the purpose were Gen. Henry M. Robert, chief of engineers, U. S. A., retired; Mr. Alfred Noble, and Maj. H. C. Ripley, all

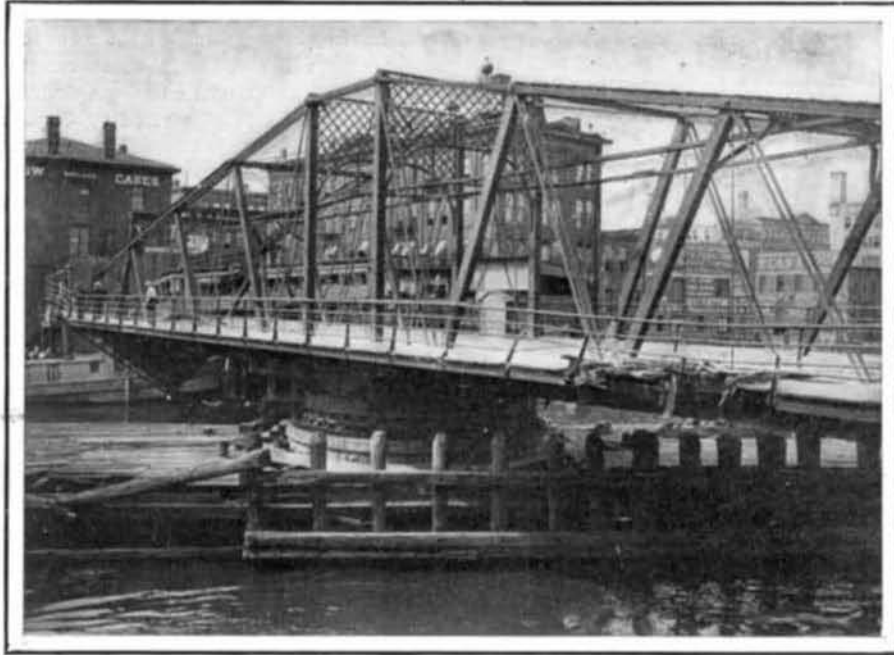
wall, and driven down to a depth of twenty-four feet.

In the 3½-mile county extension were placed 13,300 carloads of material—5,200 carloads of crushed granite, 1,800 carloads of sand, 1,000 carloads of cement, 1,200 carloads round piles, 400 carloads sheet piling, 3,700 carloads of rip-rap, and 5 carloads of rim-filling rods.

Work on the grade-raising has been in progress fifteen months and the entire undertaking is expected

The grade-raising necessitates the raising of 2,156 houses. The territory raised embraces private property as well as streets, sidewalks, and alleys, and there is no special tax or charge made against the private property for the filling placed thereon, although the expense of raising the houses is borne by individuals.

When the grade-raising is completed to the level of the top of the wall, the top of the embankment for about 50 feet from the sea wall will be protected by a



View Showing the Point at Which the Bridge was Rammed by a Steamer.



After the Collision; the Car is Resting Partly on the Bridge and Partly on the Street.

A CURIOUS DRAWBRIDGE ACCIDENT AT MILWAUKEE.

engineers of national renown. In January, 1902, this board submitted plans calling for the construction of a solid concrete wall and the raising of the grade of the city to the level of the top of the wall. Under the plans submitted, which were unanimously adopted, the total estimated cost of the sea wall and grade-raising was \$3,505,040. The wall was planned to extend 3½ miles around the Gulf side of the city, and the government later agreed to further extend the wall nearly a mile, at a cost of \$591,046.25, making the total length about 4½ miles. The sea wall was to be constructed by the county, while the grade-raising was to be done by the city, with the exception of 100 feet along the sea wall right-of-way, to be carried out by the county. The county issued bonds sufficient to carry out the building of the sea wall, while the aid of the State was sought in the grade-raising. The city was authorized to issue bonds to the amount of \$2,000,000 for grade-raising purposes, and the State legislature agreed to remit the taxes for eighteen years, the taxes to be paid as usual, but the share which formerly went to the State to be used as a sinking fund for the redemption of the bonds and to pay the interest.

Work on the sea wall was started in October, 1902, and the county's extension was completed in July, 1904. The government extension of one mile was finished this month. Some idea of the immensity of this undertaking may be obtained by considering the following figures: The wall is built of solid concrete made of Texas granite and Portland cement. It is 4½ miles long and weighs 40,000 pounds to the lineal foot. The

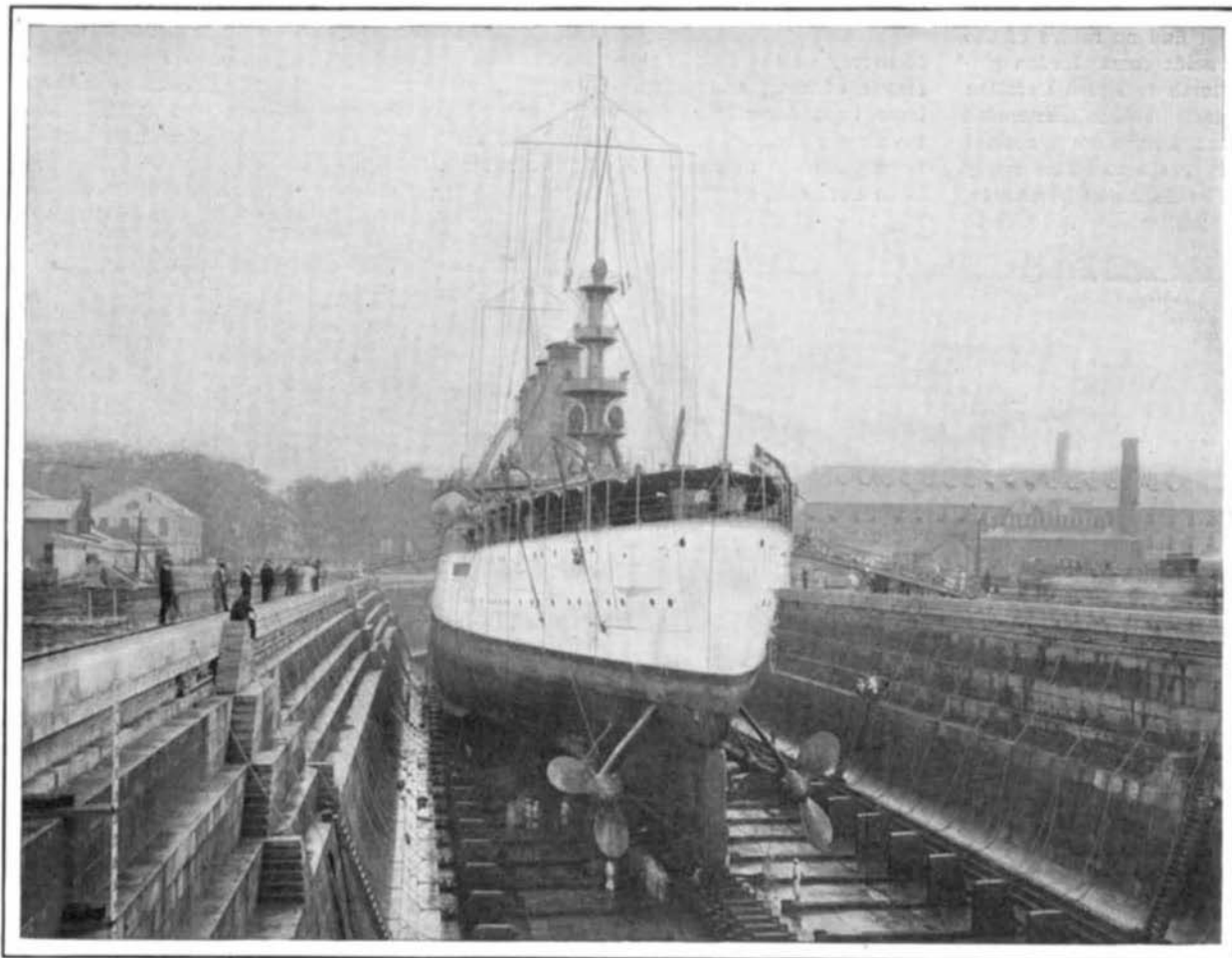
wall is built upon a round piling foundation, the piles being 45 feet in length, and not less than 12 inches at the top and 17 inches at the base in diameter. The piles are driven in four rows at intervals of 4 feet from center to center. The wall proper measures 16 feet at the base, is 17 feet high, and 5 feet across the top. It is protected from undermining on the Gulf side by an apron of rip-rap 27 feet wide, as well as by a row of sheet piling extending the entire length of the

to be completed early in 1907. The plan for filling in, while unique, is very satisfactory and its practicability has been fully shown. The initial move was the digging of a canal parallel to the sea wall and intersecting the avenues of the city. The material taken from the canal was used for filling in the sea wall right-of-way. The canal right-of-way was leased for a nominal sum and all the houses removed. With the building of the canal the material for filling in the city is being obtained from the bay and from between the government jetties by self-loading and discharging and self-propelling dredges. These steam from the excavating ground through the canal to pipe-line stations at points where the canal intersects the avenues. At these points the excavated material is forced through pipes running down the avenues, the sand remaining

pavement, and 40 feet further by soil and Bermuda grass. Thus a fine driveway will be the result, 50 feet in width, which, added to the available part of the top of the sea wall after an iron railing has been placed upon it will give a sidewalk 9 feet in width overlooking the Gulf of Mexico.

A CURIOUS BRIDGE ACCIDENT.

An unusual combination of circumstances rendered an accident that recently occurred on a street car on one of the bridges of the Milwaukee River of very special interest. A large and heavy street car had just crossed the bridge, which was of the ordinary draw-span type, and its forward trucks were already on the abutment, when a steamer, through some misunderstanding, ran into the opposite half of the draw span, causing it to turn on its turntable and twisting the street car into the perilous position shown in our engraving. As the bridge swung round the side of the car carried away the end of the panel of the truss, and the floor of the bridge, having no support, sagged down, leaving the outer end of the car suspended in the perilous position shown. The street railway company immediately made the necessary arrangements to place the car back on the track, and this they did by floating a scow beneath the car and building up a mass of blocking, by means of which the car was jacked up and run on to the tracks on shore. A fortunate feature of the accident was that no lives were lost, and that all the passengers made their immediate escape. The forward set of trucks remained on the abutment, but the after set fell into the



The New Armored Cruiser "Maryland," 502 Feet in Length, on the Blocks.
OPENING OF THE BOSTON NAVY YARD DRYDOCK.

to fill up, the water running off through a discharging canal. In this manner very rapid progress is made. The harbor entrance is also deepened by the removal of the excavated material from between the jetties, which extend 5 miles out into the sea, and which were constructed by the government at a cost of \$8,000,000.

When the grade-raising is completed the dredges will back out of the canal, filling it up firmly as they go, and the houses removed therefrom will be restored.

river when the floor of the bridge collapsed.

OPENING OF THE STONE DRYDOCK AT THE BOSTON NAVY YARD.

Time was when all the drydocks of this country, including those built for the government, were constructed of timber. Considerations of economy of first cost alone determined this selection, for the timber drydock has proved in many cases to be a troublesome

structure, standing in constant need of repairs and liable to settlement and heavy leakage. Of late years both the government and the private shipyards, or rather those of them that can afford the more costly construction, have favored the use of masonry and concrete for drydock construction. The government, it is true, has built some masonry docks of the smaller size, and they have given most excellent service. It is pretty safe to say that all future drydocks built for the United States navy will be of the more durable construction; for although the first cost of the timber dock may be less, the cost of up-keep and the necessarily short life of the timber dock, to say nothing of the delay and anxiety incidental to its construction, more than offset the first cost.

In our issue of April 29 of the present year we gave an article which illustrated the various stages in the process of building the handsome stone-concrete drydock at the Boston navy yard, which has recently been opened by the docking of one of the largest ships in our navy. The new dock has a total length on coping, from the head to the outer end of the table, of 788 feet. From head to outer gate sill it is 750 feet in length, and on the floor from head to outer gate sill it is 729 feet. The width on the coping is 114 feet and on the floor of the dock is 72 feet. From the coping to mean high water, it is 5 feet 2 inches, and the depth of water over the sill at mean high water is 30 feet. The drydock is built on the site of an old basin, that was used in the early days of the dockyard. This resulted in considerable saving of excavation, and, fortunately, the dock everywhere is underlaid by an excellent quality of hardpan, which was so good that no piling whatever was necessary. The dock structure consists of a monolithic mass of concrete covering the whole of the floor and sides of the dock, upon which the cut granite facing has been laid. The concrete backing is 11 feet thick on the floor, and, in places, it is as thick as 18 feet in the side walls, the granite masonry being 4 feet thick over the floor and as much as 7 feet thick in the side walls and altars. In the construction of the dock it was necessary to excavate 170,000 yards of blue clay and hardpan and then lay in place 61,800 cubic yards of concrete and 21,000 cubic yards of cut granite.

The placing of the dock in actual service was accomplished when that fine armored cruiser, the "Maryland," was floated into position over the keel blocks;

and the accompanying illustration is of particular interest since both the ship and the dock are examples of the latest and best work that has been done by the two bureaus of construction and of yards and docks. The "Maryland" was built by the Newport News Shipbuilding and Dry Dock Company, and on her trial she easily exceeded the contract speed of 22 knots per hour. She and her sisters are the longest warships in our navy, measuring 502 feet over all. On a mean draft of 24 feet she displaces 13,680 tons. She is protected by a waterline belt 6 inches in thickness, and she has a further protection of from 6 to 6½ inches over her barbettes and turrets, the central battery being protected with 5 inches of steel. Her main battery consists of four 8-inch guns in twin turrets, and fourteen 6-inch guns mounted in casemates.

Another Experiment With Ludlow's Airship.

Israel Ludlow, the lawyer-aeronaut-inventor, made five attempts to fly his dirigible man-carrying kite on Thursday, August 17. The big aeroplane, constructed after the fashion of an Eddy double box-kite, was transported from a vacant lot at 78th Street and West End Avenue, where it was built, to an open place on the North River front, near the railroad tracks, by a horde of willing helpers, including nearly all the small boys of the neighborhood. Charles Hamilton, a professional aeronaut, was the passenger, and it is generally conceded that he was fortunate to have escaped without injury at the conclusion of the trial. The machine was placed upon the ground facing the wind, and attached by means of a long rope to an 80-horse-power automobile. Three times the rope broke or became disentangled under the strain, and, with the exception of the first attempt, the aeroplane refused to rise. At the mentioned initial trial, when the rope parted the structure had risen some 10 feet and fell with a crash, rudely bumping Hamilton, but leaving him otherwise uninjured. The fourth time the airship was sent aloft without a passenger. It soared for a few moments and then fell, breaking its rudder and otherwise somewhat damaging the framework. At the fifth trial, with Hamilton aboard, the aeroplane rose gracefully into the air under the powerful tractive effort of the giant automobile and continued to glide as long as the pull on the rope was maintained—some two or three minutes. As soon as the automobile stopped, however, the motion of the aeroplane became very erratic, and despite

Hamilton's efforts to keep it righted, fell with a crash from a height of approximately 100 feet, hopelessly smashing its framework. To the astonishment of the numerous spectators, Hamilton emerged smiling and uninjured from the wreckage.

Notwithstanding the seeming failure of the experiment, Mr. Ludlow expressed himself as satisfied that the brief flight had demonstrated the practicability of his design, and that within a few weeks he would be ready for further tests with a new and greatly improved machine.

Vagaries of the Gulf Stream.

The exceptional resistance encountered by transatlantic steamers on their journeys to this country has aroused not a little interest among oceanographers. So great, indeed, has been the resistance offered that some of the vessels fell short of their usual daily runs by 25 to 40 miles when within two days of the United States. Along the southern Atlantic coast the velocity of the Gulf Stream fluctuates between one and one-half and two knots an hour. As it travels northward the speed gradually reduces until when the stream reaches Nova Scotia it is so far widened and grown so shallow that it is almost imperceptible. It sometimes happens, however, that the speed does not diminish and that it even increases as the current changes its course. At times the northwestern limits of the Gulf Stream approach New England and Nova Scotia more closely than at others.

Naturally, such marked changes are not without their effect on climate. A change is noted in the movement of the air over the ocean. Indeed, it is not improbable that the change in the direction of air motion is the direct cause of the change in the Gulf Stream's motion. And since the winds in turn are controlling factors of our weather, it follows that a change in the Gulf Stream's direction of flow must be accompanied by some modification in our climatic conditions. The present phenomenon is merely a temporary aberration.

Jupiter's Seventh Satellite.

Harvard Observatory officials have received a telegram from the Lick Observatory at Mount Hamilton, San José, Cal., that a seventh satellite of Jupiter has been observed. On August 8 the satellite was seen at 289.07 deg. distant 54.05 minutes; on August 9 298.05 deg.; on the 10th, 289.04 deg.

RECENTLY PATENTED INVENTIONS. Electrical Devices.

ELECTRICALLY-ENERGIZED FENCE.—A. D. McNAIR, Dallas, Texas. The invention refers to fences and admits of general use, but is of special value as applied to fences intended to prevent the escape of animals—such as cattle, horses, and hogs—therethrough. It further relates to means for exciting the wires of the fence electrically, so as to give the animals the sensation of pain upon making proper contact with the wires. Also relates to time-controlled mechanism for rendering the electric action of the fence intermittent, so as to save the battery current.

PHOTOPHONE.—R. W. HARTMANN, deceased; B. SAENGER, administrator, Berlin, Germany. The present invention relates to improvements in photophones, whereby the conveyance of speech over greater distances than hitherto is rendered possible and the size and the weight of the photophone are kept within moderate limits, so that the latter can be easily transported, while a greater secrecy of the conversation both at the sending-station and at the receiving-station is insured.

SYNCHRONIZING SYSTEM.—P. RIBBE, Halessee, near Berlin, Germany. In this system the objects are, to provide at each station the rotary operating-disk of the clockwork with one or several radial slits, and a corresponding number of armatures on the periphery; to dispose an electro-magnet for attracting either of these armatures, the former being connected with line of transmission and may be connected at will with ground or local circuit; to dispose at each station on one side of disk a stationary screen with a slit, the latter adapted to register with the one or several radial slits of the disk periodically and consecutively; to provide a selenium-cell behind the screen slit and inserted in local circuit; and to provide at each station a source of light on the other side of the disk in line of the screen slit.

RUHMKORFF COIL.—J. McINTYRE, Jersey City, N. J. The invention relates to coils for use in electro-magnet apparatus—such as shown and described in application for letters patent of the United States, formerly filed by Mr. McIntyre. His object is to provide a coil arranged to allow continuous running of the apparatus without requiring retuning of the contact platinum portions and insuring a proper readjustment and contact between the platinum portions without danger of quickly burning their registering faces.

RECEIVER FOR USE IN WIRELESS TELEGRAPHY.—E. BRANLY, 3 Rue Boursault, Paris, France. This receiver essentially comprises two metallic parts in contact, one polished, one oxidized, contact of the latter with the polished surface preventing the passage of the current under normal conditions, but of

immediately becoming conductive on emission of electric spark at a distance, and instantly resuming its resistance under action of very slight shock. One of the parts is constituted of metal rods, whose blunt points are oxidized and rest upon polished metal plate, or conversely the plate oxidized and points polished. By means of the device operation of receiver is always insured, as always at least one contact is capable of being rendered conductive under the influence of electric waves.

Of Interest to Farmers.

SELF-PROPELLING COMBINATION HARVESTING-MACHINE.—J. J. TRÖGER, Chicago, Ill. This improvement comprises self-propelling means, a cutter, a reel, and means for conveying the cut material from the cutter and elevating it from the machine to a threshing, which is to be connected to it, an auxiliary force-feeding device for the conveyer, and other features. The invention relates to each of these features separately, as well as to the combination as a whole.

DITCHING-MACHINE.—H. W. SARGENT, Near Fond du Lac, Iowa. The invention comprises a wheeled-frame mounting a cutting and elevating mechanism, so that these parts may be vertically adjusted, the cutter turning on a vertical axis and being adapted to extend into the ditch and cut away earth, while the elevator takes up the dislodged earth and disposes of it, discharging it either at one side of the ditch or back into the ditch in rear of machine. The depth dug may be regulated by vertical adjustment of cutter and by adjustment of a shoe which follows the plow at base of cutter and may be operated to control the position of the cutting apparatus.

GRAIN-SEPARATOR.—L. T. MANN, Moline, Kan. One purpose of the inventor is to provide a series of lifting-fingers over the chaffer having reciprocating movement in a vertical direction and means for conducting the straw and grain from the concave and cylinder, into the said fingers, the rear most of which fingers deposit the threshed straw upon the raddle, which in its turn conducts the straw to the delivery end of the threshing.

DEVICE FOR CATCHING AND HOLDING HOGS, ETC.—D. P. FUNK, Monroe, Wash. In this case the invention relates to an improvement in devices for holding hogs, sheep, calves, or other animals while applying rings to their noses and for other purposes. The object is to provide a cheap and efficient device which can be applied to the nose or leg of the animal while the ringing operation is taking place and one which shall be positive in its action.

PNEUMATIC COTTON-HARVESTER.—W. F. HARBOR, Atlanta, Ga. The object of the invention is the production of an implement

which is adapted to be advanced over a field of cotton and operated so as to gather the cotton and separate it from the leaves or other foreign objects which may be gathered therewith. The invention contemplates the employment of pneumatic means for effecting both gathering and separating operations. The construction especially facilitates the manipulation of the gathering member.

Of General Interest.

PROCESS OF TREATING STONE.—H. RYAN, Seattle, Wash. This invention relates more particularly to a process for treating building stone—such as granite, marble, sandstone, etc.—in order to remove stains therefrom and to change and improve the color thereof. It further relates to means for hardening the stone. Also, to a process for removing stains from various objects—such as stone, wood, and other building materials—and from fabrics, and more particularly stains caused by iron-rust.

TABLE.—E. MURRAY-AARON, Chicago, Ill. This invention pertains to improvements in tables of the adjustable and folding type, the object being to provide a table so constructed that by moving the top forward or rearward the height may be adjusted, maintaining the top in horizontal position, thus providing a table desirable for various purposes. It may be tilted and held at any angle to provide a drawing-board, book-rest, or the like.

WATER-TIGHT BUTT-JOINT.—F. C. KELSEY, Salt Lake City, Utah. Mr. Kelsey's invention relates to stove-pipes, his more particular object being to produce a type of butt-joint for connecting the ends of the staves together so as to prevent leakage and also to hold the adjacent abutting ends of the staves rigidly in predetermined positions relatively to each other.

STUFFING-BOX FOR HYDRAULIC CYLINDERS.—T. E. HOLMES, 63 Sheldon road, Sheffield, England. The object of the invention is to obviate the necessity of either withdrawing the ram or dismounting the cylinder in order to allow of the leather being renewed, the construction whereby this end is attained also permitting of the use of leather packing in situations wherein, owing to the impracticability of dismounting the cylinder, or withdrawing the ram, hemp or other readily renewable packing has been heretofore employed in place of leather packing, notwithstanding the fact of the latter being preferable in itself.

SCREW LIFTING-JACK.—E. H. GOODWIN, Olympia, Wash. In the present patent the object of the invention is to provide a new and improved screw lifting-jack arranged to reduce the friction between the members of the head to a minimum, to increase the lifting-

power of the jack, and to prevent backing up of the screw-rod when the jack is under a load.

DEVICE FOR STRETCHING PAPER OR OTHER SUBSTANCES.—RACHEL GAUGUET, 6 Rue de Savoie, Paris, France. The invention relates to improvements in reglets designed to be engaged in connection with a stretcher-frame provided with channels or grooves to receive the reglets; and the object is to provide a reglet that will have a lateral spring-yielding tendency at its ends, the said spreading action being materially assisted by means of springs arranged in the reglets. The frame is designed for stretching sheets of paper, fabric, leather, and similar materials.

SPITTOON.—A. GARFEIN, New York, N. Y. In the present patent the object of the inventor is the provision of a new and improved spittoon which is sanitary, inoffensive to the eye, and arranged to completely conceal the accumulating sputum and to allow convenient cleaning whenever desired.

FRAUD-DETECTING BOTTLE.—S. E. BELL, Represa, Cal. In this instance the improvement relates to fraud-detecting bottles, the object being to provide a bottle of this class which is simple in construction and adapted to prevent effectually the fraudulent sale of liquors of all kinds. Openings having their outer edges in substantial alignment with the inner side of the cylindrical wall insure that the entire contents of the bottle may be removed. The bottle is constructed in a form so that no waste space occurs in packing.

DRESS-SUIT-CASE COVER.—S. BOTTEESE, Washington, D. C. In his improvement Mr. Botteese seeks to provide a protecting-cover for cases which can be secured snugly upon the case, does not interfere with the opening or closing of the case, and will afford means for carrying magazines, newspapers, or the like on one side and a pair of rubbers or the like on the other side.

CRATE.—H. H. CUMMER, Cadillac, Mich. The present invention refers to crates, and is an improvement on the crate formerly patented by Mr. Cummer. The improvements relate especially to the construction of the crate at the bottom and the cover. While the invention seems to be most applicable in connection with a folding crate or box, the parts may have substantially the same construction in a box which does not fold and so that the cover and bottom will be capable of connection and disconnection in a convenient manner.

BEDSTEAD FOR INVALIDS.—J. C. ANDERSON, Victoria, Canada. The purpose of Mr. Anderson's invention is the provision of a mattress attachment to the frame of bedsteads, which mattress is provided with a hinged head and foot section capable of being independently or simultaneously raised to stand at an angle