(No Model.) 3 Sheets—Sheet 1.

J. A. SUMOVSKI.

TUBULAR STRUCTURE FILLED WITH GASEOUS FLUID.

No. 511,472. Patented Dec. 26, 1893.

Fig. 1.

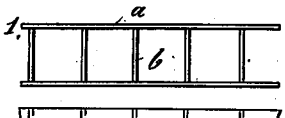

Fig. 2.

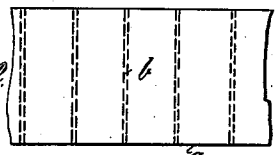

Fig. 3.

Fig. 4.

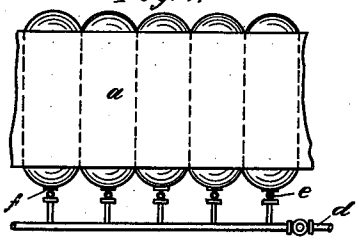

Fig. 5.

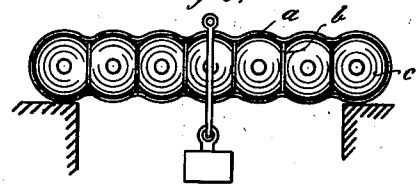

Fig. 7.

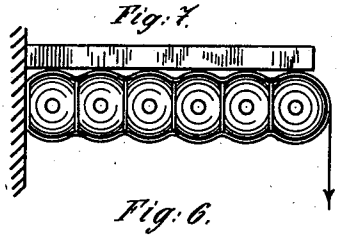

Fig. 6.

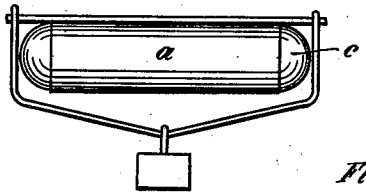

Fig. 9.

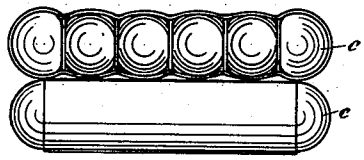

Fig. 10.

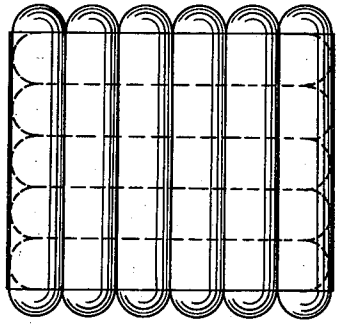

Fig. 11.

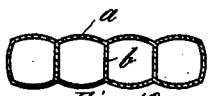

Fig. 12.

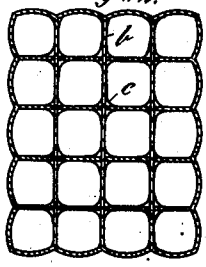

Fig. 13.

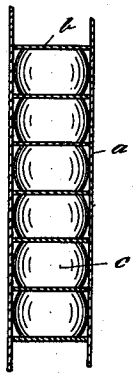

Fig. 14.

Fig. 17.

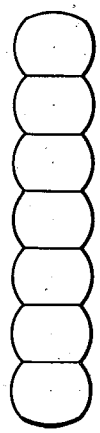

Fig. 8.

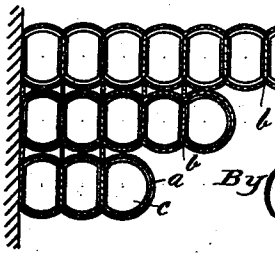

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Fig. 15.

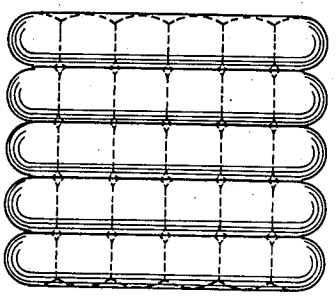

Fig. 16.

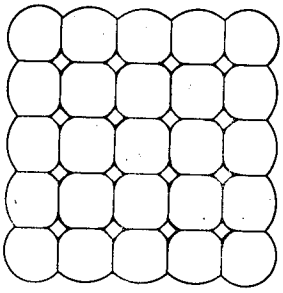

Fig. 22.

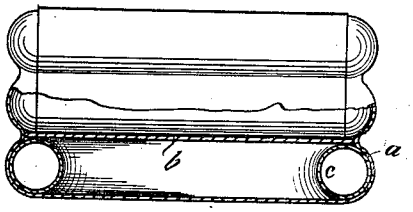

Fig. 23.

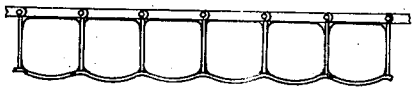

Fig. 18.

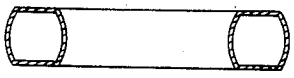

Fig. 20.

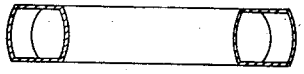

Fig. 19.

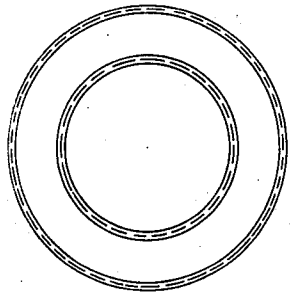

Fig. 21.

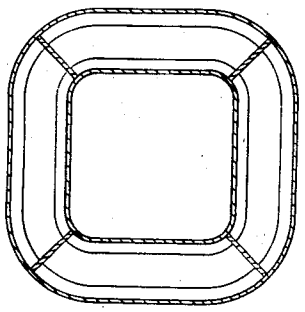

Fig. 24.

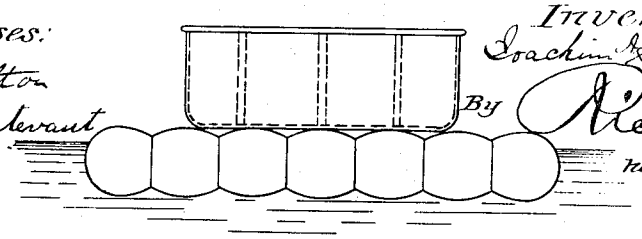

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Fig. 25.

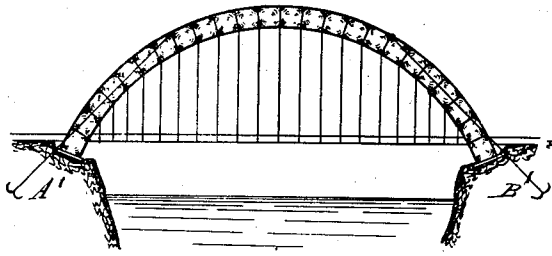


Fig. 26.

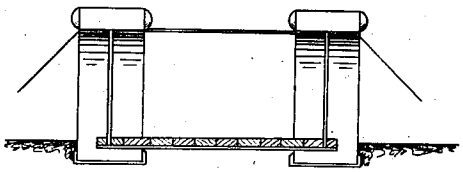


Fig. 27.

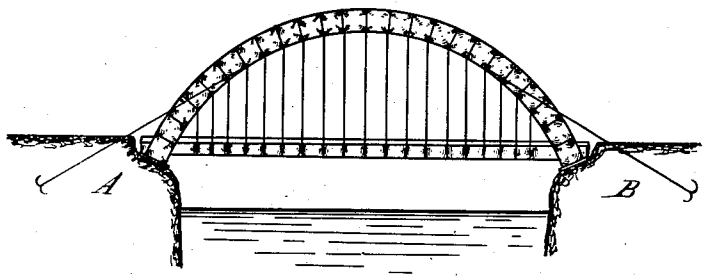


Fig. 28.

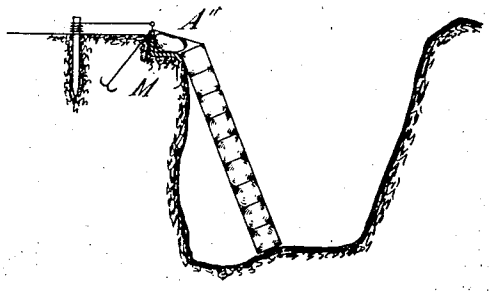
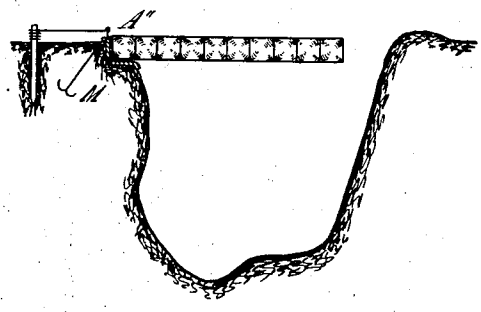


Fig. 29.



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UNITED STATES PATENT OFFICE.

JOACHIM ADOLFOVICZ SUMOVSKI, OF ST. PETERSBURG, RUSSIA.

TUBULAR STRUCTURE FILLED WITH GASEOUS FLUID.

SPECIFICATION forming part of Letters Patent No. 511,472, dated December 26, 1893.

Application filed October 17, 1892. Serial No. 449,179. (No model.)

To all whom it may concern:

Be it known that I, JOACHIM ADOLFOVICZ SUMOVSKI, a subject of the Emperor of Russia, residing at St. Petersburg, Russia, have invented certain new and useful Improvements in Tubular Structures Filled with Gaseous Fluid, of which the following is a specification.

The subject matter of the present invention is a bearer, which consists of flexible hollow bodies of whatsoever shape, but of same shape relatively to each other, and located next to each other and filled with air or gas. The hollow bodies are surrounded by a common casing and are separated the one from the other by partition walls connecting with said casing; the separation being made in such a way that each of the hollow bodies for itself is located in a chamber of the casing. A bearer constructed in such a way out of hollow bodies connected with each other offers sufficient resistance to bending and pressure so that it can be used with success for diminishing the draft of ships, for constructing bridges over precipices and rivers and for building purposes.

In annexed drawings I have shown several constructions and applications of the invention.

In the drawings:—Figures 1, 2 and 3 are views of the casing for containing the inflated bags. Fig. 4, is a plan view showing the manner of inflating the bags. Figs. 5, 6, 7 and 8, show different arrangements of the bearers to sustain different weights. Figs. 9 and 10, show two series of bags placed at right angles to each other. Figs. 11, 12, 13 and 14 are sectional views of modifications. Figs. 15, 16 and 17 show further modifications. Figs. 18, 19, 20 and 21 show bags in the form of rings. Fig. 22, shows the rings arranged together. Fig. 23, is a modified form of casing. Fig. 24, shows how the structure can be used for floating a vessel. Figs. 25, 26 and 27 show the structure embodied in a bridge. Figs. 28 and 29 show how it may be used for crossing a ravine or the like.

Figs. 1 and 2 show a casing divided into chambers formed by two longitudinal bands *a*, and several cross bands *b*, connecting those two bands the one to the other. These bands are made of an ordinary tissue sufficiently resistant, for instance linen, or of tissues with a wire netting or of flexible metallic tissue. A bag *c* of flexible and impermeable tissue is drawn through each of the chambers formed by the bands in such a manner that an equal part of said bag projects outside from each side of the casing or chamber. These bags are filled with air and assume the form shown in Figs. 3 and 4. The filling is done by means of a tube *d*, Fig. 4, which is provided with cocks and carries small branch tubes, the extremity of each of which is connected with one of the bags *c*. After the filling is completed each of the bag extremities through which the filling took place is shut tight in any convenient way and they are removed from the tubes. The bags are preferably made of rubber, gummed linen or of a tissue covered with linseed oil, varnish and gum lac. In order to make the bags very strong and impermeable it is advisable that each bag consists of two or more bags put the one into the other and connected by gum lac, so that the wall of each bag consists of two or more layers of tissue. A bearer thus constructed of inflated bags and bands can when resting with both ends on supports, carry a large weight without sagging and without any bursting of the bags. If said bearer is fixed to a wall by one extremity, Fig. 7, it can carry a weight evenly divided upon its upper part and moreover another weight hanging down at its free extremity. Such free bearing bearers, as Fig. 7, can be elevated the one above the other in the way as shown in Fig. 8, in order to make the same more resisting against sagging.

If it is desired to construct a bearer which offers still greater resistance against sagging, it is possible to obtain it in the following manner: Two bearers of the kind as shown in Figs. 3 and 4 are put together in such a manner that the bags of one of them cross those of the other at a right angle, Figs. 9 and 10; or, instead of cylindrical bags I may use spherical bags and I locate the same in a flat casing divided into chambers by longitudinal and cross partition walls, Figs. 11 and 12, or in a tubular casing divided into chambers by cross walls, Figs. 13 and 14. Bearers of the latter kind can be put together as shown in Figs. 15 and 16.

Instead of the cylindrical bags, Fig. 3, or of the bearer in the shape of a column, Fig. 13, it is possible to use tubes, Fig. 17, which are divided in separate chambers by cross partition walls and of which each chamber is filled with air separately, for the construction of a bearer the form of which corresponds to what is shown in Figs. 4, 10, 12, and 16. It is also possible to dispose hollow rings of the shape as shown in Figs. 18 to 21, or constructed from the tube shown in Fig. 17, the one above the other or the one next to the other, combining the same by longitudinal and cross bands, Fig. 22.

In certain cases, when the bearer must be used as a floating bridge said bearers as shown in Figs. 3 and 4 instead of being connected by one longitudinal flexible band only, are connected by a longitudinal band consisting of stiff pieces connected to each other in an articulated way, the articulations or hinges of which are located between the two bags being next to each other.

Fig. 24 represents a ship lifted out of the water by a raft like bearer of the kind shown in Figs. 3 and 4. The raft like bearer is fixed to the keel of the ship when not inflated and is then inflated with air. Vessels can be lifted very high by so doing, and so high that they can easily pass through shallow places, &c., without it being necessary to unload previously part of the cargo.

Figs. 25 to 27 show a bridge constructed of the described bearers. In this case the bearers are of an arched shape. The ends of the same rest at A′ and B′ on the banks of the stream and are fixed by the means of anchors. The platform instead of being constructed of boards can also be made of a bearer of the described kind, covered with a flooring, as shown in Fig. 26.

Figs. 28 and 29 show how the bearer can be used for constructing a bridge over a precipice. The first bag A″ or the part of the casing surrounding the same is connected with an end abutment M, which is fixed in the ground by an anchor. First all the bags are filled except the bag A″ and the bearer is put in the position as shown by Fig. 28. The bag A″ is then filled and the bearer is brought in the position shown in Fig. 29.

The described bearer can be used further for the construction of tents, barracks, wind motors, &c.

I claim—

A bearer comprising the casing divided into a series of compartments by flexible partition walls connected with and extending between the opposing sides of the casing and the inflated bags in the compartments filling the same and bearing against the partitions to form a continuous bearer, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOACHIM ADOLFOVICZ SUMOVSKI.

Witnesses:

KOTALEL MIECZYSTAEVOEVIEL MOVZYELZ,

STANISLAW KONSTANDINOWITSEL SWIZTUK.