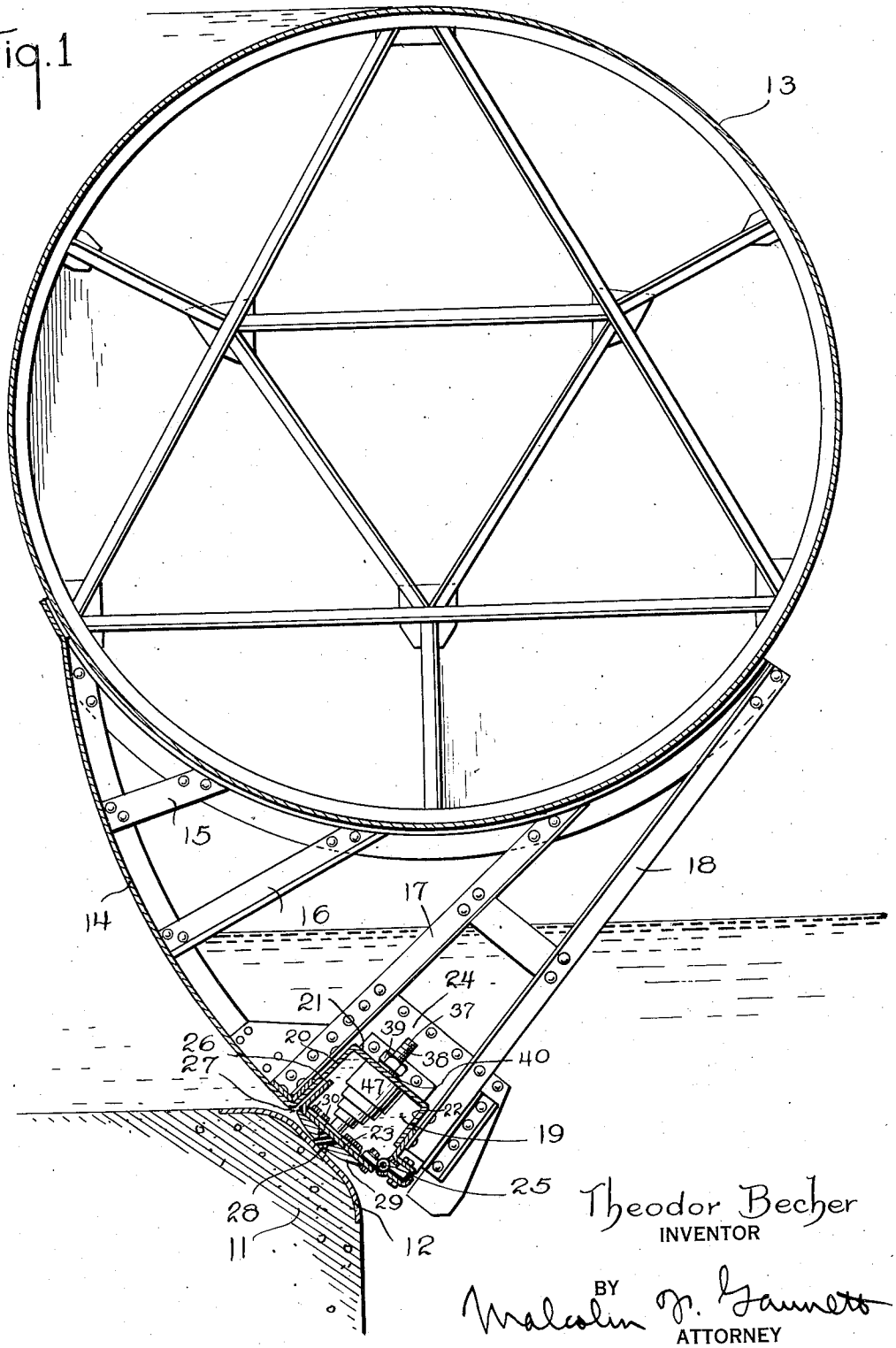
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PACKING FOR MOVABLE DAM STRUCTURES

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Fig. 1



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Fig. 2

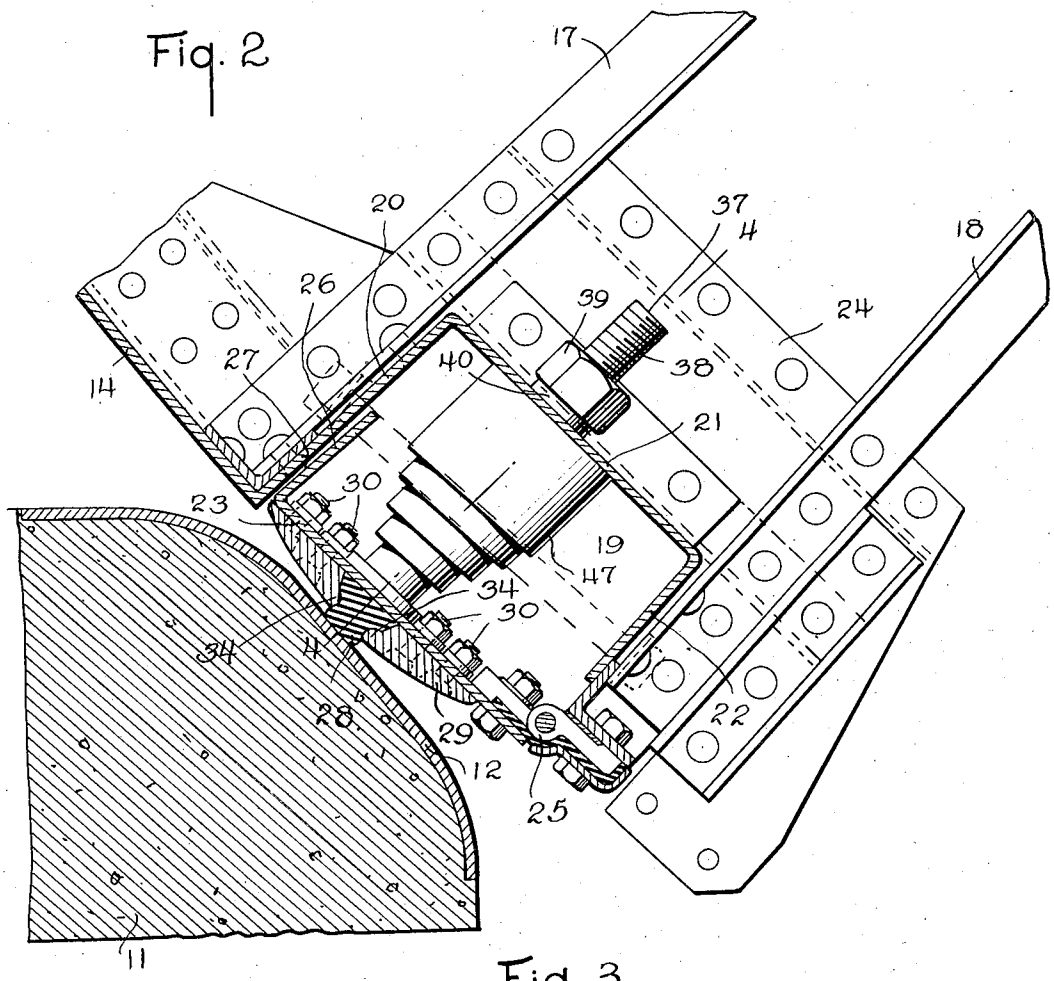
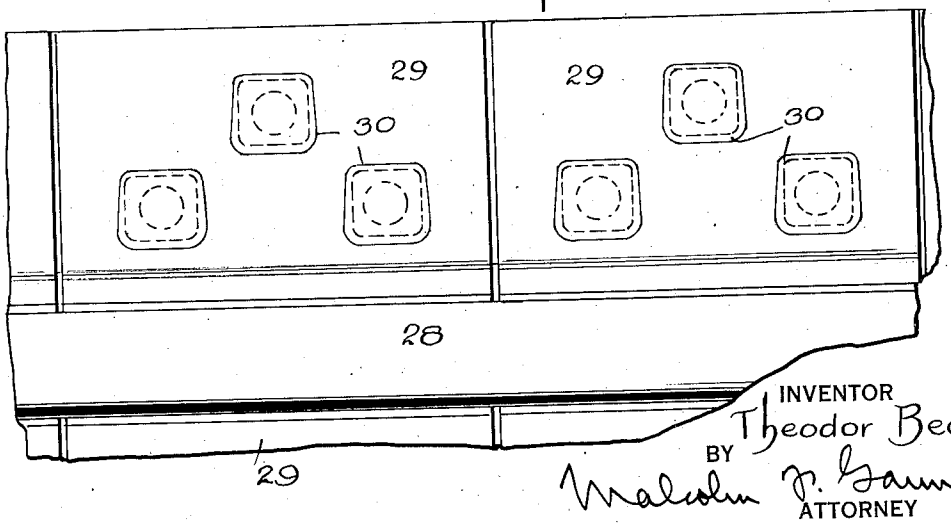


Fig. 3



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PACKING FOR MOVABLE DAM STRUCTURES

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Fig. 4

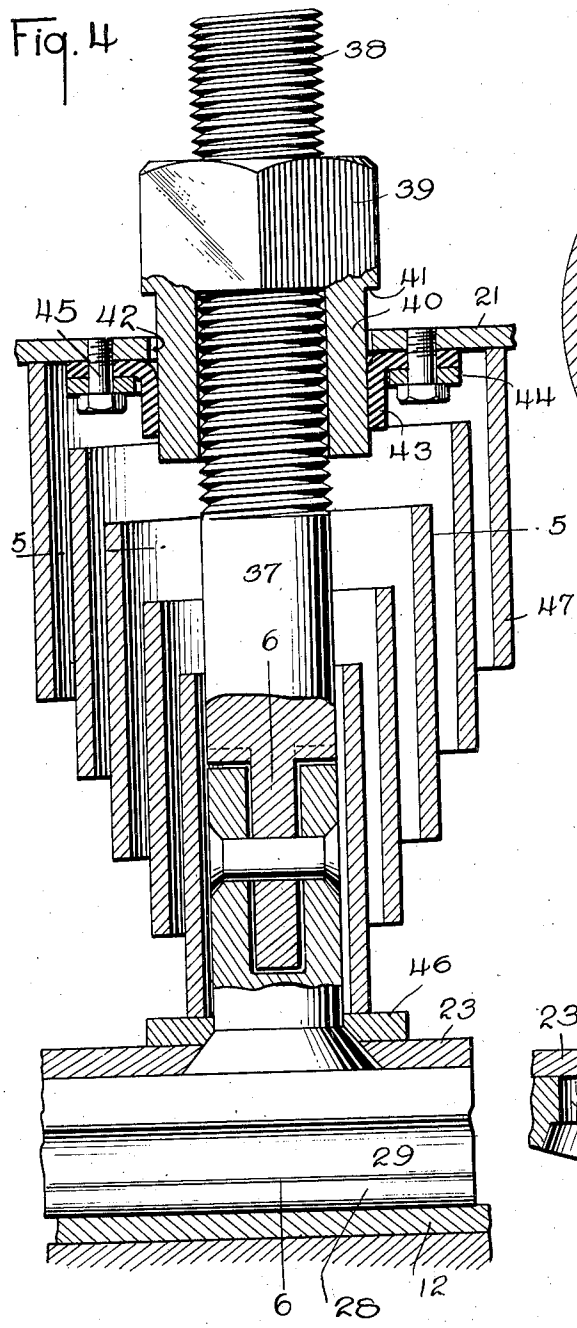


Fig. 5

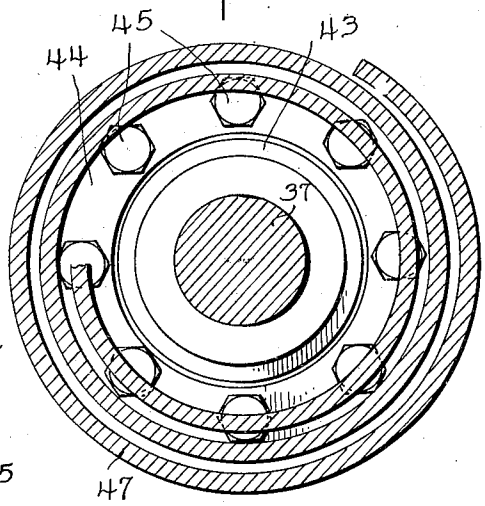
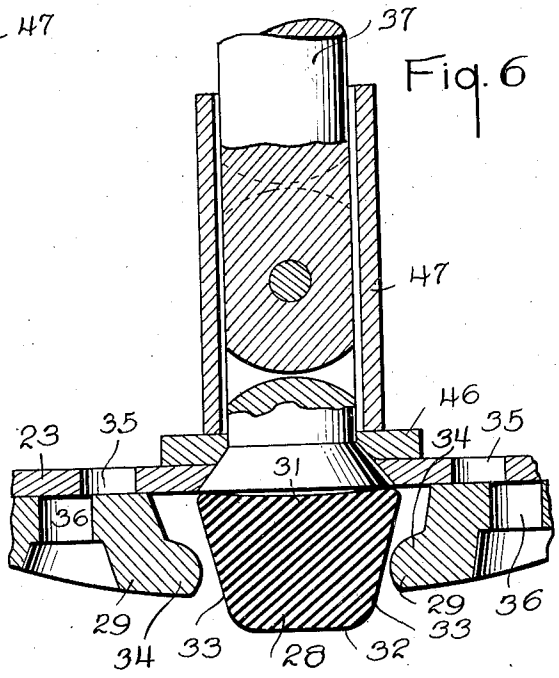


Fig. 6



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PACKING FOR MOVABLE DAM STRUCTURES

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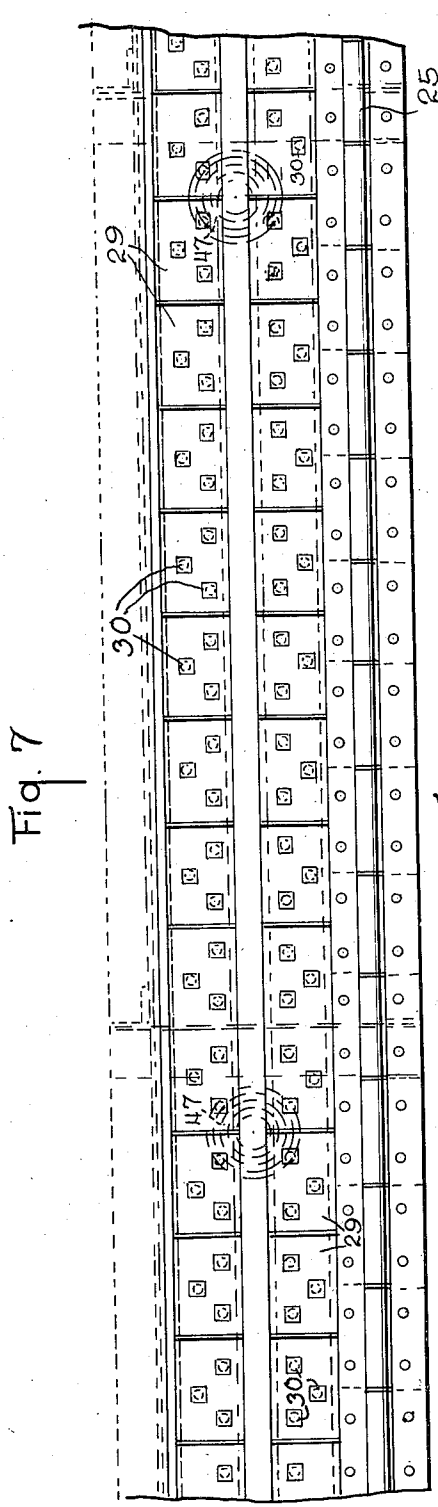


Fig. 7

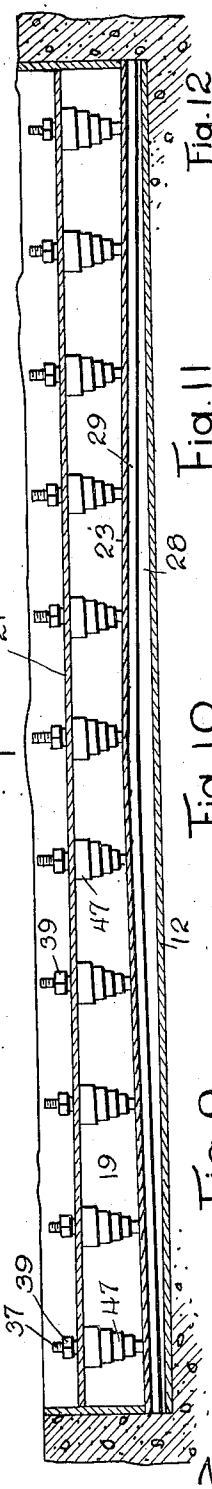


Fig. 8

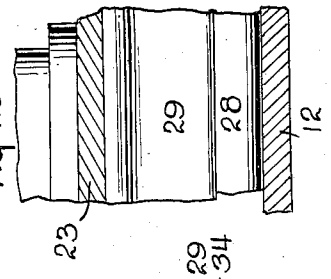


Fig. 12

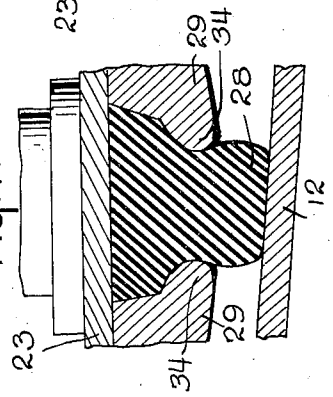


Fig. 11

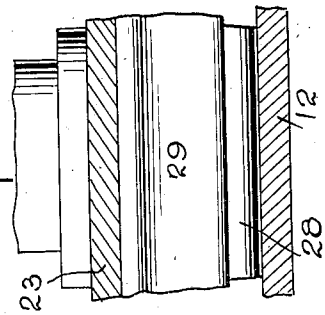


Fig. 10

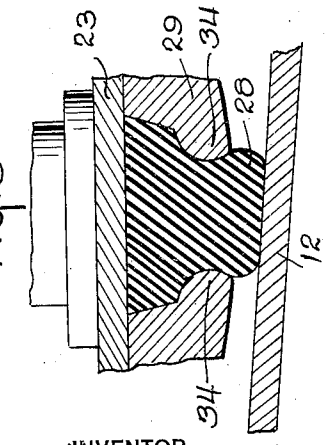


Fig. 9

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2,045,824

PACKING FOR MOVABLE DAM STRUCTURES

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Application July 18, 1935, Serial No. 32,093

2 Claims. (Cl. 61—22)

This invention relates to dams, and more particularly to sealing or packing devices for movable dam structures such as gates, roller dams and the like.

Movable dam structures of the roller type usually comprise a body adapted to be positioned across a stream or water course for the purpose of damming up the water. It has been the practice to mount the two ends of dams of this type in masonry or concrete piers, and to utilize suitable hoisting mechanism for moving the damming structures into and out of damming position.

The main body portion of a dam of the roller type may have one or more aprons or flaps secured thereto and extending therefrom. The apron, which is usually arcuate in cross section, depends from the main body or drum of the dam and its lower longitudinal edge is adapted to rest on a sill or armature in the bed of the stream or water course.

Means of some kind have to be employed whereby the joint between the lower portion of the movable dam structure and the sill is made tight when the dam structure is in its damming position, so that water will not flow thereunder. In some instances the sills have been provided with a sealing strip for engaging the lower longitudinal edge portion of the dam structure. In other instances suitable sealing or packing means have been formed along the lower longitudinal edge of the dam structure for engaging the sill. Sealing and packing means of the latter type have been constructed in various ways. One form of such means which has gone into extensive use has comprised a water chamber formed along the lower longitudinal edge of the dam structure. Such water chamber may be substantially rectangular in cross section and it may have a movable and flexible front wall disposed on the upstream side of the dam structure. Furthermore, the front wall of the water chamber is so formed that said chamber is in communication with the water in the pool on the upstream side of the dam structure.

The front wall of the water chamber usually carries a sealing or packing strip for engaging the sill in the bed of the stream or water course, and suitable means are provided for maintaining the front wall of the water chamber in contact with the sill, when the dam structure is in damming position.

Since the movable dam structure is subject to considerable flexing or distortion as the result of the pressure of the water in the pool on the upstream side thereof, and since this deflection or distortion of the dam structure varies throughout the length thereof, being greater at the center of the dam structure than near its ends, obviously means should be provided for maintaining the sealing or packing strip uniformly and tightly in engagement with the sill, throughout the entire length thereof, and the present invention relates to an improved construction of the sealing or packing means.

An object of the invention is to provide an improved bottom sealing or packing means for movable dam structures and the like, wherein the sealed joint between the dam structure and its supporting sill will remain tight in the event the dam structure bulges or becomes distorted under the influence of the pressure of water thereagainst.

Another object of the invention is to provide improved means for resiliently maintaining the sealing or packing means of a movable dam structure against the floor of a water channel controlled by the dam structure when the dam structure is in damming position.

Another object of the invention is to provide an improved sealing or bottom packing means for movable dam structures and the like, in which the sealing or packing means comprises a sealing strip carried by a flexible plate disposed at the front of a water chamber on the upstream side of the dam structure and resiliently connected to a wall of the chamber for movement toward and away from the floor of the water channel.

Another object of the invention is to provide an improved sealing or bottom packing means of the above type, in which the sealing member includes a strip of rubber or other suitable resilient material, and means for detachably clamping the rubber strip on to the edge of the dam structure.

Another object of the invention is to provide an improved sealing or bottom packing means for movable dam structures and the like, which is simple in construction, and reliable and exact in function under all conditions of service.

The invention also comprises certain new and useful improvements in the construction, arrangement and combination of the several parts of which it is composed, as will be hereinafter more fully described and claimed.

In the accompanying drawings:—

Figure 1 is a transverse section through a movable dam structure of the roller type, having an improved bottom sealing or packing means constructed according to the present invention;

Fig. 2 is an enlarged cross section of the lower portion of the dam structure shown in Fig. 1,

showing the bottom sealing or packing means in detail;

Fig. 3 is a plan of the bottom of the sealing or packing means shown in Fig. 2;

Fig. 4 is a longitudinal section taken along the line 4—4 of Fig. 2;

Fig. 5 is a cross section taken on the line 5—5 of Fig. 4;

Fig. 6 is a vertical section taken on the line 6—6 of Fig. 4, the clamp for the rubber sealing strip being shown disassembled therefrom and the rubber sealing strip being shown in the form in which it is manufactured, preparatory to being fastened on the device;

Fig. 7 is an inverted bottom plan of a portion of the movable dam structure;

Fig. 8 is a diagrammatic view, partly in section, illustrating the manner in which the movable dam structure is sealed against the sill on the bed of a stream; and

Figs. 9, 10, 11 and 12 are detail views illustrating the manner in which the sealing or packing strip engages the floor sill on the bed of a stream.

Referring to the drawings and especially to Fig. 1, a portion of the usual floor formed in the bed of a stream or water channel to be controlled by a movable dam structure, such as a drum weir or roller dam, is indicated at 11.

As is customary, the floor 11 is formed with a sill 12 against which the bottom of the weir or movable dam structure is adapted to contact.

In the present instance the floor 11 is shown as being constructed of concrete or other cementitious material. However, it is to be understood that the floor may be constructed from any other suitable masonry material. In order to prevent undue wear, the surface of the sill 12 is usually formed from suitable metal, as shown in Figs. 1 and 2.

The movable dam structure or weir illustrated in the present instance is of the roller type comprising a hollow sheet metal cylinder or drum 13, which is adapted to be raised and lowered in any suitable or known manner.

Depending from the drum 13 is an apron 14, arcuate in form, and having its upper edge suitably secured to the drum body. The lower edge of the apron 14 is disposed a suitable angular distance from the body of the drum and any suitable means may be employed for rigidly bracing the apron to the drum, such as struts 15, 16, 17 and 18, or the like (see Fig. 1).

The lower or free edge of the apron 14 is formed with a suitable water chamber 19 which extends longitudinally of the apron for the entire length thereof, as shown in Fig. 8. This water chamber may be substantially rectangular in cross section, as shown best in Fig. 2, and said water chamber has rigid walls 20, 21 and 22, and a movable front wall 23.

The walls of the water chamber 19 are preferably formed of sheet metal, wall 20 being suitably secured to the struts 17, wall 22 being suitably secured to the struts 18, and wall 21 being secured to cross members 24 connecting struts 17 and 18, as shown in Fig. 2.

When the damming structure is in the position shown in Figs. 1 and 2, the wall 20 of the water chamber 19 is disposed uppermost and accordingly in order to clarify the description this wall will be referred to as the upper side wall of the water chamber. Likewise wall 21 will be referred to as the rear wall of the water chamber, and wall 22 will be referred to as the lower side wall of said water chamber.

The front wall 23 of the water chamber 19 is preferably formed from a flexible plate having one of its longitudinal edges pivotally connected to the lower edge of wall 22, by hinges 25, as shown in Figs. 1, 2 and 7.

The front wall or plate 23 bridges the space between the outer edges of the side walls 20 and 22. However, the edge of plate 23 adjacent side wall 20 is bent or turned inwardly, as indicated at 26, Fig. 2, so as to provide a gap or slot 27 between it and said side wall.

When the movable damming structure is in submerged position as shown in Fig. 1, the front wall 23 is disposed along the bottom of the water chamber 19 and the inturned edge 26 is disposed adjacent to the top of said water chamber, so that water may enter into the chamber 19 through the slot 27.

Mounted on the underside of the plate 23, is a sealing or packing strip 28.

The sealing or packing strip 28 is preferably formed from rubber, rubber composition, or some other suitable material which will, when in contact with the sill 12, provide a tight seal for preventing leakage of water through the joint between the movable dam structure and the floor of the water channel.

As shown in Figs. 2, 3, 6, 7, 9, 10, 11 and 12 the sealing or packing strip 28 is fastened to the plate 23 by means of a plurality of clamping members 29, disposed on opposite sides of said strip and detachably fastened to said plate 23 by means of bolts 30.

As shown in Fig. 6, the sealing strip 28 is preferably made substantially in the form of a trapezoid, having an inner edge surface or base 31 which engages the plate 23, an outer or sealing surface 32 which is adapted to engage with the sill 12, and inclined side edges or surfaces 33.

For the purpose of enabling the clamping plates 29 to firmly retain the rubber sealing strip 28 in position on the plate 23, the clamping plates are formed, along the sides thereof which engage the sides 33 of said sealing strip, with a head or rib 34 which is adapted to be forced into the rubber sealing strip 28 and compress or deform the same, as shown in Figs. 2 and 9.

In order to effect such gripping or compressing of the rubber sealing strip 28 by the clamping plates 29, the front wall or plate 23 is formed with a plurality of openings 35 for the shanks of the clamping bolts 30. These openings 35 are formed in plate 23 on opposite sides of the portion of said plate occupied by the base of the rubber sealing strip 28.

When the device is being manufactured, the rubber sealing strip 28 in its natural form (see Fig. 6), is laid upon the plate 23. A pair of clamping plates 29, one on each side of the rubber sealing strip 28, are next assembled on the plate 23. In assembling the clamping plates 29 on the plate 23, the rib or head 34 of each plate is forced into the side 33 of the rubber sealing strip 28 until the openings 36 in the clamping plates are alined with the openings 35 in the front plate 23. The bolts 30 are then inserted through the alined openings and nuts applied thereto.

When the ribs or heads 34 of the clamping plates 29 are forced into the rubber sealing strip 28, the latter will be deformed from the cross sectional shape shown in Fig. 6 to the cross sectional shape shown in Fig. 9, in which the rubber sealing strip 28 is made to entirely fill the cavity between the oppositely disposed clamping plates 29. Due to the form of the opposed inner edges

of the clamping plates 29, having the inwardly extending ribs or heads 34 thereon, the rubber sealing strip 28 will be firmly gripped by said heads or ribs and held from dislodgment from the plate 23, as will be understood.

When the parts are assembled on the front plate 23, the outer portion of the sealing strip 28 will project a suitable distance beyond the clamping plates 29 (see Figs. 9, 10, 11 and 12).

Due to the pressure of the water held in the stream by the movable dam structure and bearing against the upstream side of said dam structure, it is obvious that the movable dam structure is subject to considerable bending, from end to end.

Damming structures of the type herein shown and described have been constructed with lengths 100 feet and more, and when such damming structures are installed in a stream, they are supported only by piers at each end thereof. The damming structures may have a damming height of 20 or more feet, and, therefore, the pressure of the water against the upstream side of the drum 13 and apron 14 flexes the same, so that the middle portion thereof is disposed downstream a slight distance from the ends thereof.

With the drum 13 and apron 14 thus flexed or bowed, obviously the parts constituting the water chamber 19 will also be bowed or flexed, as shown in Fig. 8, and with the central portion of the water chamber 19 thus flexed downstream, it will be appreciated that the sealing means for the bottom of the damming structure will not engage the central portion of the sill 12, as firmly as at the end portions of said sill.

Therefore, in order to maintain the sealing strip 28 uniformly in engagement with the sill 12 throughout the length thereof, individually adjustable spring means are provided, said spring means being constructed in the manner next described.

Connected at one end to the movable front wall 23 and extending upwardly through the water chamber 19 and passing through the wall 21 of said water chamber, is a plurality of rods 37.

As shown in Figs. 7 and 8, the rods 37 are spaced apart at suitable intervals throughout the length of the movable dam structure.

Preferably the rods 37 are composed of two sections, hinged together, as shown in Figs. 4 and 6.

The upper end of each rod 37 is formed with threads 38 for the reception of a nut 39.

As shown in Fig. 4, nut 39 is formed with the usual head by means of which said nut may be engaged with a suitable tool, such as a wrench, and turned upon the threads 38. Below its head, the nut 39 is formed with a tubular extension 40 which is smaller in diameter than the head of the nut, so as to form a shoulder 41, the purpose of which will be hereinafter more fully described.

Where the rods 39 pass through the wall 21 of the water chamber 19, said wall is formed with openings 42 of a size to permit the free passage of the portions 40 of nuts 39.

However, in order to prevent the escape of water through the openings 42, a suitable packing 43 is mounted on the water chamber side of the wall 21, around each opening 42. Preferably, the packing 43 may comprise a rubber gasket, L-shaped in cross section, which is fastened to the wall 21 by an annular clamping plate 44. The clamping plate may be secured in place by screws or other fastening elements 45, as shown in Figs. 4 and 5.

The construction of packing 43 is such that said packing tightly engages the tubular portion 40 of the nut 39 and prevents leakage of water through opening 42, as will be understood.

Encircling each rod 37 and bearing at one end against the wall 21 of the water chamber 19 and at the other end against a washer 46 surrounding the rod 37 and disposed against the flexible front wall 23 of the water chamber 19, is a volute expansible spring 47.

The nut 39 is adapted for cooperation with the wall 21 of the water chamber 19 to place the spring 47 under any desired normal compression, and to predetermine the permissive amount of swinging movement of the movable flexible front wall or plate 23 of said water chamber, depending upon the water pressure which the plate 23 must withstand.

In the drawings the shoulder 41 of the nut 39 is shown out of engagement with the wall 21 of the water chamber 19. This is due to the fact that the movable front wall 23 of the water chamber 19 has been swung inwardly of the water chamber on the hinges 25, due to the engagement of the sealing or packing strip 28 with the sill 12 when the movable dam structure is in its submerged position.

With the parts in the position shown in Figs. 1 and 2, obviously the springs 47 will be compressed more than will be the case when the device is out of engagement with the sill 12 and the front wall 23 is in the extended position above described. In the latter case the pressure exerted by the springs forces the rods 37 forwardly until the shoulders 41 on nuts 39 engage the wall 21, and consequently the outward swinging movement of the front wall 23 of the water chamber 19 will be limited.

Augmenting the action of the springs 47 is the pressure of the water in chamber 19 against the front wall 23, since the water in chamber 19 transmits the pressure of the head water which enters the chamber 19 through slot 27 to the plate 23, whereby the sealing or packing strip 28 is pressed against the sill 12.

Preferably the plate used in forming the front wall 23 should be constructed from suitable resilient sheet material, and the characteristics of the material used in forming the plate 23 should be such that the plate will withstand the tensional and crushing strain to which it is subjected. By employing suitable inexpensive but strong sheet metal in constructing the plate 23, and by pivotally connecting one edge of such plate to the apron 14, it has been found that a satisfactory sealing or packing means will be provided for the device, which packing means will have a life substantially equal to the expected life of the dam structure without requiring replacement thereof.

By employing the series of springs 47 and by spacing said springs at suitable intervals apart, unduly strong bending of the front wall 23 will be obviated, since said springs will function to brace the wall 23 throughout the length thereof and thereby prevent undue distortion of the same.

By adjustably tensioning the springs 47 by means of the rods 37, various tensions can be imparted to the several springs throughout the length of the device, so as to impart sufficient pressure against the front wall 23 to firmly seat the sealing strip 28 against the sill 12.

Obviously, the portion of the sill 12 which is engaged by the sealing strip 28 may have an uneven surface, and by employing a flexible plate 23 provided with a suitable rubber sealing strip

28 and by urging the sealing member towards said sill by a plurality of adjustable springs 47, the sealing member can be made to conform to the surface of the sill 12. Also, unequal pressures exerted by the sealing means throughout the length of the device will be taken care of by the resilient sealing strip 28, as shown in Figs. 8, 9, 10, 11 and 12.

By constructing the sealing strip 28 in the manner heretofore described, said sealing strip is formed with a projecting portion in the form of a head or the like which is susceptible of being flexed under the pressure exerted thereagainst. When the device is being installed in position in a stream the tension of the springs 47 is set a predetermined amount so that the sealing strip 28 will be forced into tight engagement with the sill 12 when the device is in submerged position, (see Fig. 9). In this position the head or outer projecting portion of the sealing strip will be flattened out. On the other hand should the pressure of the water against the upstream side of the drum 13 and apron 14 tend to bend the same downstream, obviously the lower portion of the apron will also be flexed (see Fig. 8), in which case the water chamber walls will likewise be bent slightly downstream, thereby tending to withdraw the sealing strip 28 away from its engagement with the sill 12. However, as has heretofore been explained, the pressure of the springs 47 against the front wall 23 will maintain the sealing strip 28 in engagement with the sill 12, although the amount of pressure exerted against said sealing strip may be slightly less through the middle portion of the device than near the ends thereof, and consequently the head or outer portion of the sealing strip may not be flattened out as much as the portions thereof near the ends of the dam, but still said sealing strip will engage the sill 12 with sufficient force to provide a tight seal between the bottom edge of the movable damming structure and the sill 12, as shown in Figs. 11 and 12.

While the present invention is particularly useful in conjunction with water gates of the roller type, it is in its broader aspects, however, not limited in its application to gates of any particular specific design. In adapting the invention to various types of roller gates and gates of other types, the arrangement and design of its component elements may naturally be considerably modified without departure from the spirit and scope thereof.

From the foregoing description considered in connection with the accompanying drawings, it is believed that the construction, operation and advantages of the invention will be clearly understood. It is desired to point out, however, that while a certain specific embodiment of the invention has been illustrated and described the invention is readily capable of various other mechanical embodiments within the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim is:—

1. A movable dam structure comprising a water chamber having rigid side and rear walls and a flexible front wall hingedly connected to one edge of a side wall, a packing strip on the outer side of said front wall for engaging the sill of a dam, a plurality of threaded rods, each secured at one end to said flexible front wall and extending through an opening formed in the rear wall of said water chamber, a volute expansible spring encircling each rod and bearing at one end against the rear wall of said water chamber and at the other end against the flexible front wall of said water chamber, a nut mounted on each rod, said nut having a head disposed exteriorly of said water chamber and a tubular portion surrounding said rod and extending inwardly through the opening in the rear wall of said water chamber, and packing means disposed within said water chamber and engaging the tubular portion of said nut for preventing leakage of water through the opening in the rear wall of said water chamber.

2. A movable dam structure comprising a water chamber having rigid side and rear walls and a flexible front wall hingedly connected to one edge of a side wall, a packing strip on the outer side of said front wall for engaging the sill of a dam, said packing strip comprising an elongated resilient member of trapezoid form in cross section, a plurality of clamping plates mounted on the flexible front wall of said water chamber for gripping the opposite sides of said resilient member and compressing the same in a zone intermediate the inner and outer portions thereof, a plurality of threaded rods, each secured at one end to said flexible front wall and extending through an opening formed in the rear wall of said water chamber, a volute expansible spring encircling each rod and bearing at one end against the rear wall of said water chamber and at the other end against the flexible front wall of said water chamber, a nut mounted on each rod, said nut having a head disposed exteriorly of said water chamber and a tubular portion surrounding said rod and extending inwardly through the opening in the rear wall of said water chamber, and packing means disposed within said water chamber and engaging the tubular portion of said nut for preventing leakage of water through the opening in the rear wall of said water chamber.

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