

Oct. 8, 1940.

G. A. KLIMEK

2,216,747

BLADE CONSTRUCTION FOR FLUID POWER TRANSMITTER

Filed Sept. 6, 1935

3 Sheets-Sheet 1

Fig. 1.

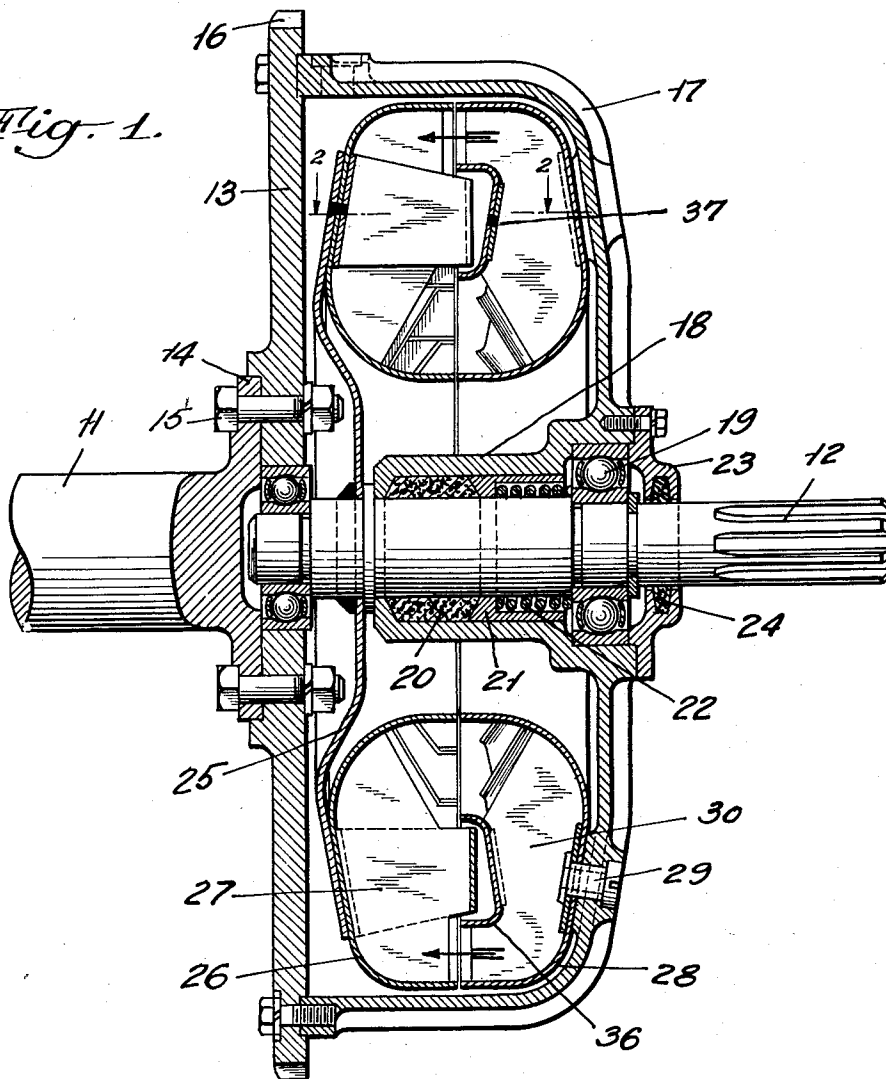
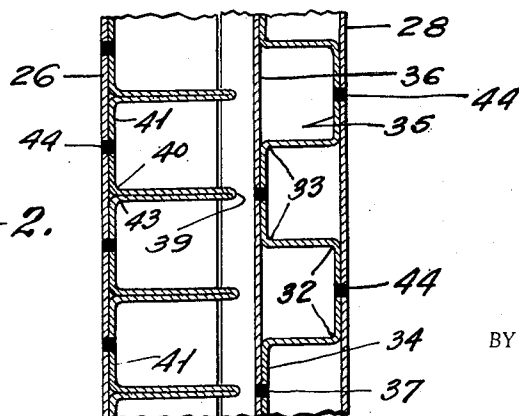


Fig. 2.



INVENTOR.

Gustav A. Klimek

BY Hoguet, Peary & Campbell  
Attorneys

Oct. 8, 1940.

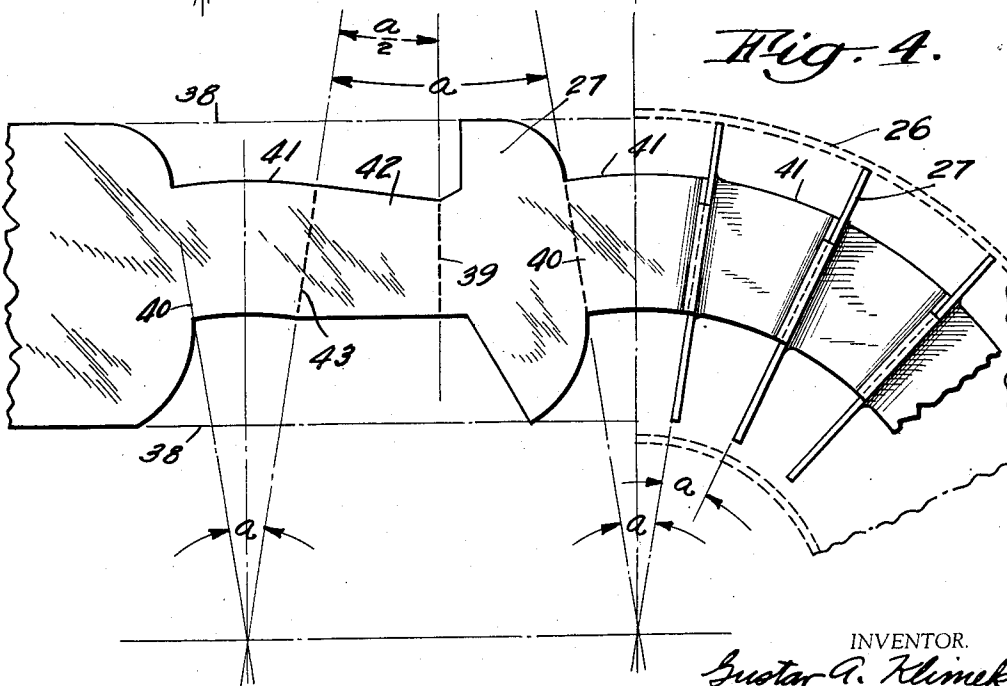
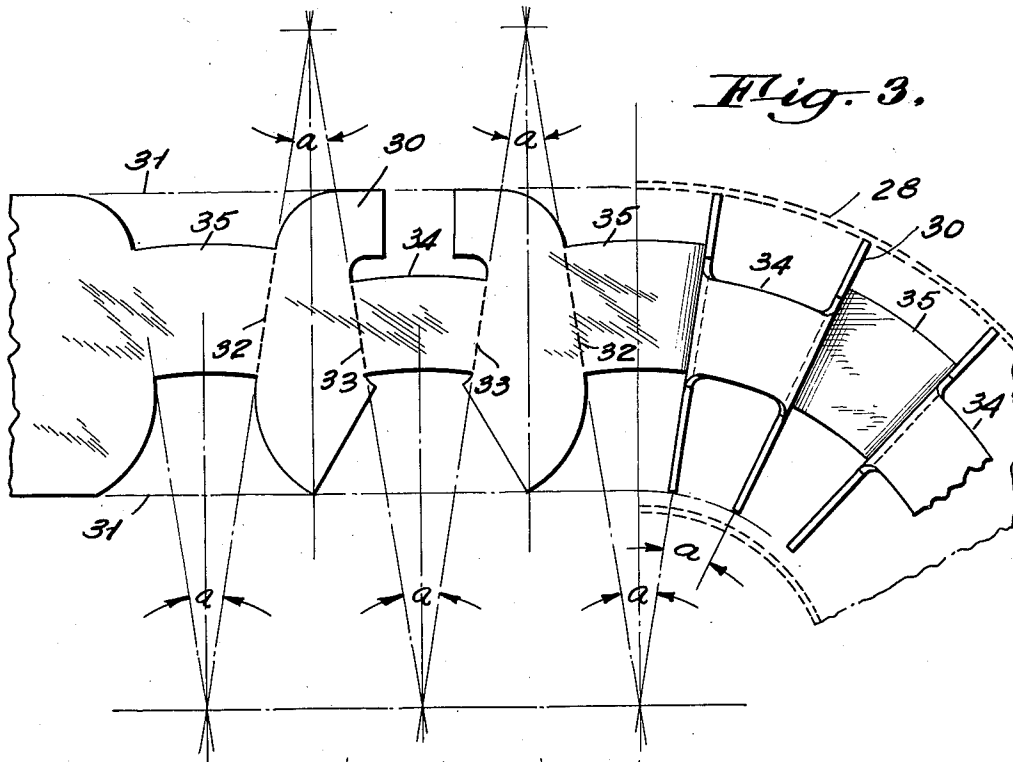
G. A. KLIMEK

2,216,747

BLADE CONSTRUCTION FOR FLUID POWER TRANSMITTER

Filed Sept. 6, 1935

3 Sheets-Sheet 2



INVENTOR.  
*Bustar A. Klimek*  
BY *Hoguet, Heary, Campbell*  
His ATTORNEYS

Oct. 8, 1940.

G. A. KLIMEK

2,216,747

BLADE CONSTRUCTION FOR FLUID POWER TRANSMITTER

Filed Sept. 6, 1935

3 Sheets-Sheet 3

Fig. 6.

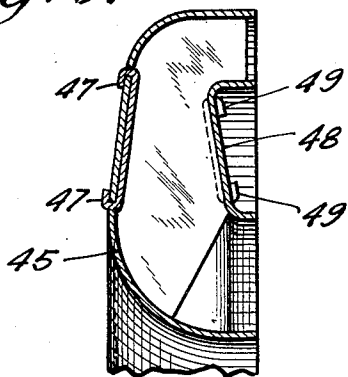


Fig. 9.

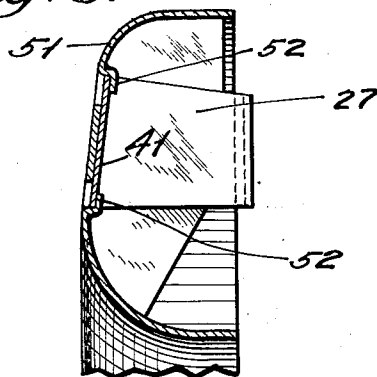


Fig. 7.

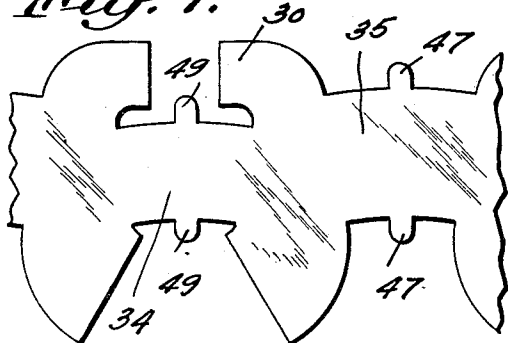


Fig. 10.

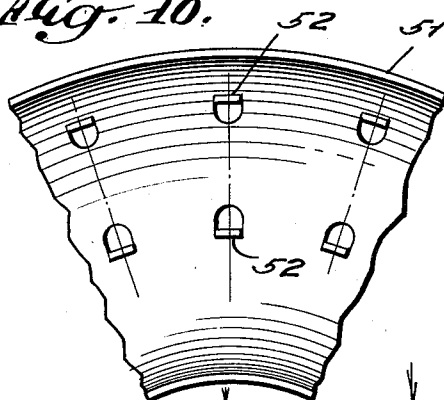


Fig. 8.

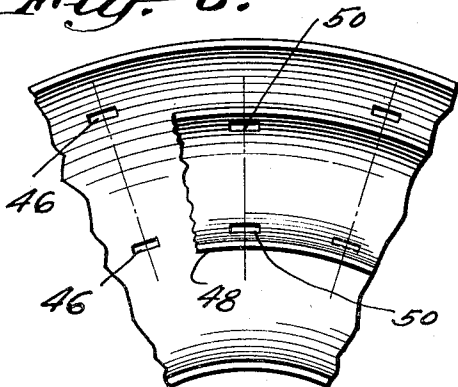
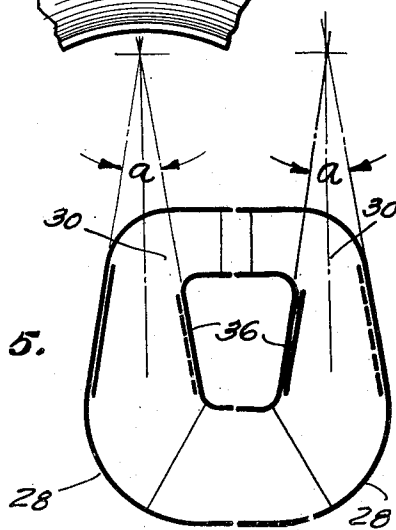


Fig. 5.



INVENTOR.

BY *Gustav A. Klimek*  
*Hogues, Mary, Campbell*  
ATTORNEYS.

## UNITED STATES PATENT OFFICE

2,216,747

## BLADE CONSTRUCTION FOR FLUID POWER TRANSMITTER

Gustav A. Klimek, East Rutherford, N. J.

Application September 6, 1935, Serial No. 39,409

2 Claims. (Cl. 29-156.8)

The present invention relates to power transmitting mechanism of the fluid type and embodies, more specifically, an improved form of hydraulic power transmitter wherein the blade construction is formed in a new and improved manner.

Hydraulic power transmitting mechanisms such as shown in the patent to Föttinger No. 1,199,359 utilize a plurality of impeller and runner blades by means of which the fluid within the housing of the transmitter is subjected to such motion as to transmit power in a predetermined fashion. Existing forms of transmitters have been of rather complicated construction and have required a considerable amount of labor and expert care in machining and assembling the elements. For example, the runner and impeller blades have been formed as individual elements and have been inserted in slots which have been milled in the respective driving and driven members, the assembly being secured in position by means of shroud rings which are formed to locate the blades properly when secured in assembled position. Not only have these prior constructions been expensive to manufacture from the standpoint of cost of materials, but the weight and extremely high cost of labor involved in the manufacture and assembly of the parts have been a serious disadvantage in promoting the use thereof.

In accordance with the present invention, it is proposed to provide a blade construction by means of which the transmitters may be readily manufactured and assembled with a minimum amount of labor, the construction being such that the blades may be stamped out of suitable material and introduced into the supporting structure with facility and by means of relatively unskilled labor. In this connection, it is proposed to provide a blade formation of such character as to enable the blades to be stamped out of stock material of strip or band formation, the forming operations being simple and the resulting blade structure entirely accurate in order that the elements may be assembled into an efficient and operative mechanism.

Accordingly, an object of the present invention is to provide an improved hydraulic power transmitter having a blade construction of such character as to enable the device to be manufactured and assembled with facility.

A further object of the invention is to provide a device of the above character wherein the blade elements are formed by stamping operations.

A further object of the invention is to provide

a blade construction for power transmitters of the above character wherein the blades are adapted to be stamped out of a strip of material and in the form of a single stamping in which a plurality of the transmitter blades are included.

A further object of the invention is to provide a blade construction of the above character wherein the blades are stamped out of a strip of material in such fashion that the resulting stamping includes all of the blades for one of the elements of the transmitter.

A further object of the invention is to provide a blade construction of the above character in which blades are adapted to be stamped out of a continuous strip of material, the resulting continuous stamping being adapted to be cut into suitable lengths, each of the lengths including any desired number of blades.

A further object of the invention is to provide a power transmitter having an improved blade construction resulting in a structure wherein the weight is greatly reduced without sacrificing strength.

Further objects and advantages of the invention will appear as it is described in further detail in connection with the accompanying drawings, wherein

Figure 1 is a view in central longitudinal section, showing a power transmitting device constructed in accordance with the present invention;

Figure 2 is a partial view in section taken on line 2-2 of Figure 1 and looking in the direction of the arrows;

Figure 3 is a plan view showing the progressive development of the impeller blades from a blank to their final assembly form;

Figure 4 is a view showing the progressive development of the runner blades from a blank to their final assembly form;

Figure 5 is a graphical view showing the blade formation and particularly the included angle formed by the rotor casing and shroud ring. This view shows this angle to be equal to the angle formed by the blade spacing;

Figure 6 is a partial view in section, showing a modified blade and ring assembly, together with means for securing the elements in assembled relationship;

Figure 7 is a fragmentary plan view of the blade strip of the construction shown in Figure 6, this view illustrating the means for fastening the blade ring to the rotor casing and shroud ring;

Figure 8 is a partial view in end elevation

showing a segment of the rotor casing and shroud ring, this view showing the slots formed in these elements through which the lips of the blade ring pass prior to being upset, as shown in Figure 6;

Figure 9 is a view showing a modified form of device for fastening the blade ring to the rotor casing; and

Figure 10 is a view in end elevation showing the rotor casing of the blade fastening means of the construction shown in Figure 9.

With reference to Figure 1, the driving and driven shafts are shown at 11 and 12, a plate 13 being secured to flange 14 on shaft 11 by means of bolts 15. Plate 13 may have gear teeth 16 formed on the periphery thereof, if desired, these teeth being suitable for power take-off or other auxiliary instrumentalities which may be used in connection with the power transmitter of the present invention. A housing 17 is secured to the plate 13 and provided with an inwardly extending sleeve 18 within which the shaft 12 may be journaled by means of bearing 19. Packing 20 may be provided between the shaft 12 and sleeve 18, the gland within which the packing is provided being defined by means of a packing ring 21 against which a spring 22 seats to maintain the packing under suitable compression. A sealing plate 23 is provided for the bearing 19 and is formed with a seal 24 which cooperates with the shaft 12 in a manner which will be readily apparent.

Shaft 12 is provided with a plate 25 which is rigidly secured thereto and which serves as a carrier for a blade ring 26 within which runner blades 27 are secured. Cooperating with the blade ring 26 and runner blades 27 is a blade ring 28 which is secured to the housing 17 by means of suitable fastening elements 29, the blade ring 28 having impeller blades 30 mounted therein. The construction of the runner and impeller blades is of particular importance in the present invention and, in order that the construction thereof may be more readily apparent, reference is made to Figures 3 and 4 wherein a development of the blade construction is shown. In Figure 3 is shown a development of the impeller blades which are stamped or otherwise formed out of a continuous strip of material indicated by the dot and dash line 31. The edges 32 and 33 of the blades 30 are inclined at an angle to each other which equals the angular spacing of the blades within the blade ring 28. This is clearly shown in Figure 3 wherein the angle  $\alpha$  included between the lines drawn through the edges 32 and 33 equals the angle  $\alpha$  included between the planes of adjacent blades when in assembled position, as shown at the right hand end of Figure 3. Adjacent blades in the strip are formed to extend in opposite directions before the stamping is formed into an assembled blade member, connecting strips 34 and 35 being provided between the respective blades and integral therewith at the edges 33 and 32, respectively. Connecting strips 34 are preferably formed with the edges thereof concentric with the axis of the ring inasmuch as they define an annular path within the impeller blades and contiguous to a shroud ring 36 carried thereby. The shroud ring may be spot welded as at 37 or secured in any other suitable fashion to the strips 34.

Strips 35 are also preferably formed with their edges concentric to the blade ring and serve as a means to facilitate securing the blade struc-

ture to the blade ring and housing as shown at 29.

The runner blades are shown in Figure 4 and are also stamped or otherwise formed from a strip of material indicated by the dot and dash lines 38. These blades are formed with edges 39 and 40, the angle included between these edges being one-half the angular spacing of the blades in the runner blade ring. Between the edge 39 of one blade in the stamping and the edge 40 of an adjacent blade is a connecting strip composed of two segments 41 and 42. Segment 41 is integral with the edge 40 of the adjacent blade and has its edges formed concentric with the axis of the blade ring. Between segments 41 and 42 is an edge 43, the angle between edges 40 and 43 being equal to the angular spacing of the blades within the runner blade ring. The edges of segment 42 taper down and merge with the edge 39 of the adjacent blade 27, and the angle included between the edges 43 and 39 is one-half of the angle between the planes in which adjacent blades lie when in assembled position. This is illustrated clearly in Figure 4 wherein the various angles are designed between these edges.

As shown in Figure 2, the edges 39 of the blades 27, when the mechanism is assembled as shown in Figures 1 and 2, lie within the shroud ring 36, the strips 35 being secured to the blade ring 28 by any suitable means such as welding 44. The edges of the blades 27 and 30 may be curved and formed to fit the respective blade rings and terminate in edges to facilitate fluid flow within the device during operation thereof.

As will be seen from the drawings and foregoing description, all of the blades are blank and formed from one single straight strip of steel which is secured within the blade rings in any suitable fashion. The unit blade construction expedites the production and assembly and materially reduces the cost thereof. The formation and blade spacing is such that the passages formed thereby, together with the rotor casing and shroud ring, are such that the impelling fluid will have a uniform velocity in its flow therethrough.

In the form shown in Figures 1 through 4, the device is only suitable for unidirectional drive inasmuch as no shroud ring has been provided for the runner blades. If the transmitter is to be capable of transmitting power in either direction, both impeller and runner blades would be of identical formation, as illustrated in Figure 5.

In the construction shown in Figures 6 through 10, the blades are secured to the blade ring and shroud ring in a manner different from that shown in the construction illustrated by Figures 1 through 4. In Figure 6, the blade ring 45 is formed with apertures 46 within which lips 47 are received, the lips being upset on the outside of the ring. The lips 47 are preferably formed during the stamping operation and, in order that the shroud ring 48 may be similarly secured to the device, lips 49 are formed on the connecting strip 34. These lips 49 are received in apertures 50 formed in the shroud ring 48 and thus facilitate positioning and securing the elements in assembled relationship.

In the construction shown in Figures 9 and 10, blade ring 51 is formed with inwardly extending lips 52 which are adapted to be placed over the adjacent segments 41 of the runner blades in order that the parts may be secured in assembled relationship. The constructions shown in Figures 75

6 through 10 are adapted for use in devices wherein the metal is not suitable for welding.

5 The structure shown in the drawings and described in the foregoing specification is of simple, durable, and practical construction, the number of parts being reduced to a minimum and thus the cost of materials and labor in the manufacture of the device is reduced substantially. While the invention has been described with specific reference to the construction shown in the accompanying drawings, it is not to be limited, save as defined in the appended claims.

I claim:

15 1. The method of forming a fluid power transmitting member comprising forming, as by stamping, along the edges of a flat strip spaced pairs of notches, each pair symmetrical about an axis transverse to the strip and each notch having an inner edge extending substantially longitudinally of the strip, said inner edges of the notches along one side of the strip being longer than the inner edges of the notches along the other side, bending the strip along straight lines connecting the ends of said inner edges at angles to the plane of the strip to provide blades and connecting strips spacing the blades, alter-

nate pairs of notches having undercut portions around which blade portions of the strip project, and securing a blade ring to the blades and strips, the blade ring seating against said undercut portions.

5 2. A power transmitting member comprising a plurality of blades and strips spacing the blades, the blades and strips being formed from a flat strip by stamping spaced pairs of notches along the edges thereof, each pair symmetrical about an axis transverse to the strip and each notch having an inner edge extending substantially longitudinally of the strip, said inner edges of the notches along one side of the strip being longer than the inner edges of the notches along the other side, bending the strip along straight lines connecting the ends of said inner edges at angles to the plane of the strip to provide blades and connecting strips spacing the blades, alternate pairs of notches having undercut portions around which blade portions of the strip project, and securing a blade ring to the blades and strips, the blade ring seating against said undercut portions.

GUSTAV A. KLIMEK. 25