This invention relates to turbines with radial admission having blades in two or more groups which are displaced axially in relation to each other and through which the steam flows in series. Reference is made to the applicant's pending applications, No. 614,989 and No. 614,110.

One purpose of the invention is to effect a perfectly controlled bleeding of steam of intermediate pressure, said bleeding steam being drawn off entirely or partially in front of one group of blades.

A further purpose of the invention is to effect an efficient sealing between said groups of blades displaced axially in relation to each other, by use of a sealing device having a small diameter so that the same sealing effect as that attained by use of the sealing devices hitherto used for the same purpose may now be attained by use of a device having substantially smaller dimensions.

A further purpose of the invention is to provide for an increased number of steam bleeding points, steam of very different temperatures and very different pressures being very desirable in many cases in which turbines are used, for instance, in the cellulose industry. An increased number of bleeding points is, therefore, desirable.

A further purpose of the invention is to utilize said additional bleeding points also for supplying additional steam for overloading the groups of blades.

One embodiment of the invention is illustrated in the annexed drawing showing an axial section through a part of a turbine with two blade wheels or groups of blades running in the opposite directions and displaced axially in relation to each other. The steam flows through said groups in series.

Referring now to the drawing 1 and 2 indicate two shaft ends carrying the turbine disks 3 and 4 rotating in the opposite directions. The shaft end 2 carries further a second turbine disk 5, said disk being, preferably, constructed in such manner as to lock the disk 4 on the shaft end 2. At its periphery the disk 3 carries a disk 6. Between the disks 3 and 5 and the disks 4 and 6, respectively, blade rings 21 and 22 of the usual construction are provided.

Such blade rings 21 may also be arranged between the disks 5 and 6, if desired. Just as in the normal radial flow turbines, the journals or shafts 1 and 2 are encircled by steam chambers 7 and 9, respectively, concentric with the shafts, and said chambers are encircled by outer concentric chambers 8 and 10, respectively. Between the shaft ends 1, 2 and the steam chambers 7, 9, 11 and 12, respectively, for the shafts are provided and between the steam chambers and the turbine disks labyrinth packings 13 and 14, respectively, with their plates 15, 16 or 17, 18, respectively, are placed. To the chamber 7 a steam inlet tube 19 leads and from said chamber 7 there are bores 20 through the turbine disk 3 to the centre of the groups of blades 21. A valve 70 is provided between the chambers 7 and 8. From the chamber 8 to an intermediate stage of the blades 21 there are channels 23 through the plates 15, 16 and the turbine disk 3.

The series channel or passage channel 24 from the group of blades 21 to the group of blades 22 communicates at the point of its narrowest diameter via openings 25 in the turbine disk 4 with the chamber 9. Between the chamber 9 and the chamber 10 a valve 26 is arranged and from said chamber 10 to an intermediate stage of the group of blades 22 channels 27 pass through the plates 15, 17 and the turbine disk 4. To the chamber 9 a pipe 28 leads and with the chambers 8 and 10 tubes 29 and 30, respectively, may be connected.

In front of the group of blades 23 a packing 31 is provided, constructed as a labyrinth packing. In the direction of flow of the steam the packing 31 is behind (after) the openings 25. From the chamber 9 openings 32 pass through the packing plates 18, 17 and the turbine disk 4 to the blades 22 ahead the packing 31. A rotatable annular slide valve 33 is provided in the chamber 9 to render it possible to vary the communication between the chamber 9 and the openings 32 at will and also to cut off said communication entirely, if desired. Thus, it is possible to draw off,
from the passage channel 24, any quantity of the steam before the latter passes through the blades 22. In accordance with the position of the annular slide valve 33 more or less of the steam or no steam at all, is supplied to the blades 22. It is evident that the bleeding of steam of intermediate pressure may thus be completely controlled. In this embodiment it is further also possible to bleed steam of intermediate pressure via the channels 29 and 31 and the chambers 9 and 10, respectively, through their corresponding bleeding tubes 29 and 30, respectively. Through the chambers 8, 10 and their corresponding pipes and channels overload steam may be supplied to the corresponding groups of blades, as is evident without any detailed description. The high pressure steam is supplied through the pipe 19, the chamber 7 and the channels 20 to the centre of the group of blades 21, whereupon the steam passes through said group of blades and the passage channel 24 to be bled in the manner described above or to be supplied, partially or entirely, to the group of blades 22.

With regard to the balance, the labyrinth packing 14 must have greater plates than those of the packing 15 inasmuch as the steam leaking out through 14 has a lower pressure than the steam leaking out from 13. To render it possible to reduce the dimensions of the labyrinth plates 17 and 18 some of the steam is, in the embodiment shown, drawn off from the packing 13 via openings 34, chamber 35, pipe 36, chamber 37 and openings 38 and supplied to the packing 14, so as to increase the pressure in 14.

Some modifications may be made in the devices shown and described without leaving the scope of the invention. For instance, blades may be arranged also in the passage channel 24, as stated above.

What I claim is:—

1. In a radial admission turbine, a number of groups of blades and associated blade-carrying members displaced axially in relation to each other and arranged substantially in the same radial zone, channels between said groups of blades to cause the steam to pass through said groups in series, a packing in at least one of said channels at that end thereof which discharges at the subsequent group of blades, a central steam bleeding chamber communicating with said last-mentioned channel in front of said packing, a passage from said central steam bleeding chamber to said subsequent group of blades, and an adjustable valve in said passage to control the same.

2. In a radial admission turbine, disks carried at their inner periphery and one disk at least carried by its outer periphery in an overhung manner, blades carried by said disks so as to constitute a number of groups of blades displaced axially in relation to each other and arranged substantially in the same radial zone, channels between said groups of blades to cause the steam to pass through said groups in series, a packing in at least one of said channels at that end thereof which discharges at the subsequent group of blades, said packing being placed between the inner periphery of an overhung disk, carried at its periphery, and a disk connected at its inner periphery with the turbine shaft, a central steam bleeding chamber communicating with said last-mentioned channel in front of said packing, a passage from said central steam bleeding chamber to said subsequent group of blades, and an adjustable valve in said passage to control the same.

In testimony whereof I have signed my name.

OLOV MÖLLER.