

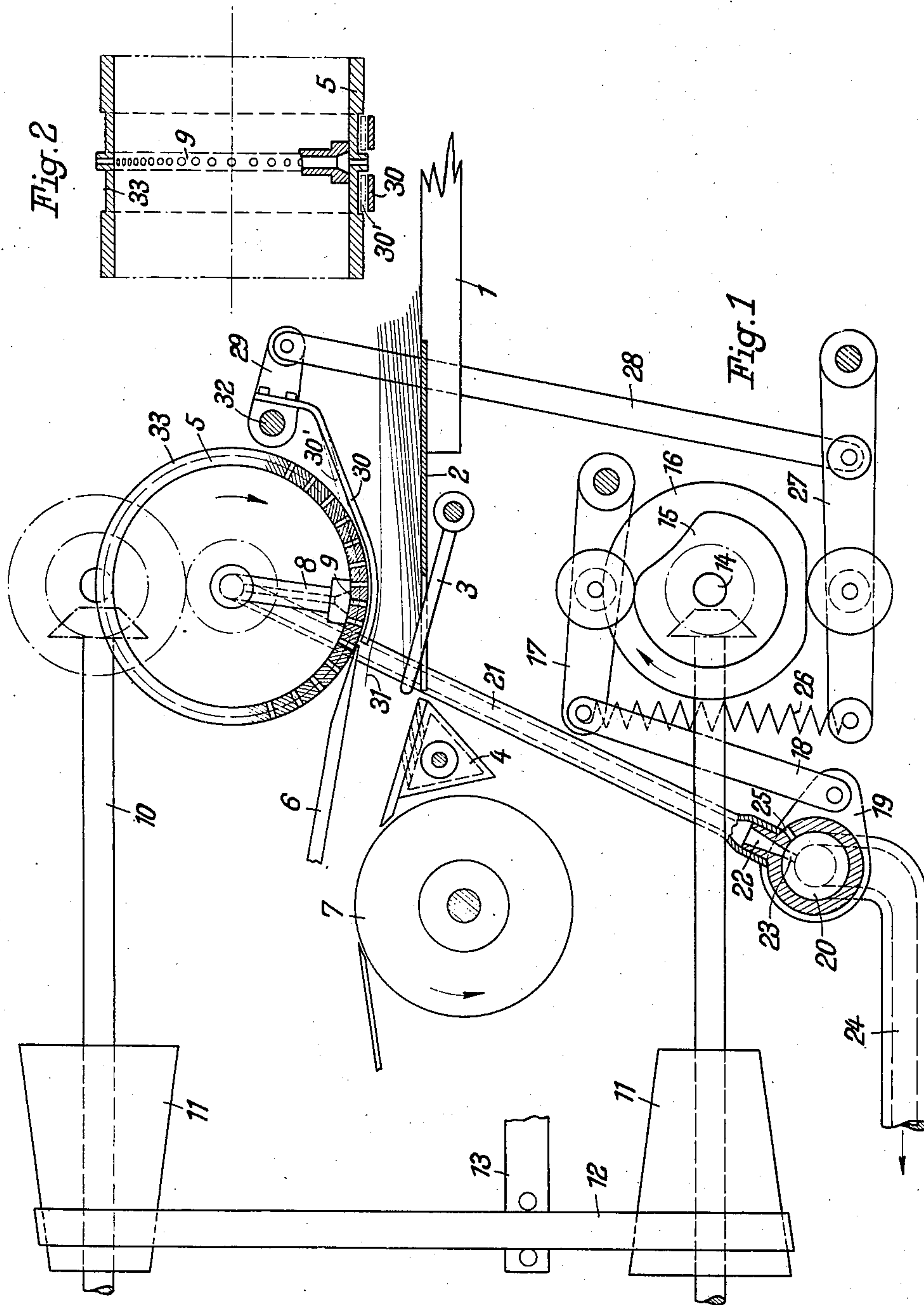
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G. SPIESS

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CONTROL DEVICE FOR SHEET FEEDING APPARATUS

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Inventor:

Georg Spiess,
by Frank S. Appelman,
attorney.

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CONTROL DEVICE FOR SHEET FEEDING
APPARATUS

Georg Spiess, Leipzig, Germany

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6 Claims. (Cl. 271-27)

This invention relates to an improved apparatus for separating and feeding the topmost sheet of a pile to a working machine by means of a constantly rotating forwarding roller or like member which is continually under suction action.

In such apparatus, with a constant feeding speed, a larger number of sheets are fed in the same interval of time in the case of small sheet sizes than in the case of large sheet sizes, for, as soon as the end of the sheet gripped in the forwarding mechanism leaves the forwarding suction openings, the suction effect acts on the next sheet which is lying ready to be taken and draws it to the forwarding openings. Moreover, a definite space existing between the forwarding member and the sheet to be separated has to be overcome. The time necessary for this naturally varies somewhat, depending on the "ready" position of the sheet or any sinuosity or other irregularities which may have been imparted thereto. The result is that while the duration of a working cycle of the apparatus is about proportional to the particular size of sheet being used, the time taken by each sheet cannot be entirely accurately predetermined, so that with a constant size of sheet and an unvarying speed of feeding, the number of sheets worked on per unit of time can vary.

Now, if on the feeding apparatus itself or on the working machine an operation which must be repeated for each sheet must be carried out, this operation cannot, for the above mentioned reasons, in particular, on account of the different lengths of time required to overcome the space between the sucker and the sheet, be controlled rhythmically, but it must be made to conform to the sheet sequence, that is to say must be released by the sheet itself, or the sheet sequence must be conformed to the rhythmic operation and both be controlled synchronously by a common member.

In the known apparatus of this kind, the suction action of the forwarding means is controlled in synchronism with the machine, the speed of sequence of the control operations being made to conform to the capacity of the particular machine, for example, by changing the control cams or the pinions connected in the drive of the said cams. By means of this synchronism or rhythmic control of the suction action, the above mentioned time variations in the sheet feeding, caused by the raising of each sheet to the suction forwarding means through a relatively large, and in the main, different sized space, are not

avoided. This fault in the known apparatus is not overcome by making the suction roller or the suction disc adjustable in regard to its distance from the uppermost sheet of the pile.

According to this invention, for overcoming the unavoidable variations in the sheet feeding, the sheets do not rise from their position on the pile directly to the suction forwarding means, but first to suitably controlled intermediate members operable adjacent the separating position, which members, in one position, allow the sheet to rise to within a short distance of the suction forwarding disc or the like, and in another position are withdrawn from the space between the suction forwarding disc or the like and the pile, for the purpose of transferring the sheet to the suction forwarding disc or roller at a definite predetermined moment. These intermediate members thus allow the more certain sucking of the sheet through a very short distance directly to the surface of the suction forwarding disc or roller.

Moreover, by this arrangement, a space is provided for the entrance of separating air between the sheet to be raised and the pile, which is per se known; on the other hand, the still necessary transference of the sheet from the intermediate members to the rotating suction forwarding means through a very small space is positively mechanically controlled, the same length of time and indeed a very small one being necessary in each case.

The control intermediate members are advantageously formed as sheet holding tongues displaceable into recesses formed in the suction forwarding disc or roller.

In order that the speed of sheet sequence shall conform to the sheet size, the working rhythm of the holding tongues is made regulatable by means of a regulating gear, electric resistance or the like, provided in the drive of its control means.

Moreover, by applying the known synchronous control to the suction action of the forwarding means, the operation of the raising of the sheets to the holding tongues is brought into a definite time relation to the operation of the sheet transference.

In order that the invention may be fully understood, I will now describe one embodiment thereof by way of example by reference to the accompanying diagrammatic drawing, in which:

Fig. 1 is a part sectional elevation of the control device in accordance with the invention together with the most important sheet separating and forwarding members, and

Fig. 2 is a part sectional side view of the suction roller and the sheet holding tongues.

On a table 1 having an extension 2, the sheets arranged in echelon or fanned-out formation are fed to inclined rods 3 by which they are opened out and subjected to the air current of the blast nozzle 4, for the purpose of effecting a preliminary separation thereof. From this position the uppermost sheet is sucked up by the forwarding roller 5 and subsequently fed past the strippers 6 to the roller 7. The suction air acts through the stationary nozzles 8 and the lowest perforation of the pertaining row of perforations 9. The suction roller is driven by the bevel wheel shaft 10 through the medium of intermediate pinions. Thus far the arrangement does not differ from the known apparatus. The novel features consist, however, in the control of the suction air by means of a speed change gear. In the particular example shown in the drawing a known stepless belt drive with conical belt discs 11 and thus conformable to any size of sheet is illustrated. The speed adjustment is obtained by displacing the belt 12 by means of the fork 13. The rotary motion is transmitted to a control shaft 14 on which are arranged the cam discs 15 and 16. The cam 15 actuates through the lever 17 and the rod 18 a valve lever 19, which is securely connected to a rotary slide 20. The air is thus sucked from the suction roller 5 through the conduit 21 and the longitudinal slot 22 through the channel 23 and the hollow rotary slide 20 into the conduit 24 and from there to an air pump not shown in the drawing. If the slide 20 is in a position corresponding to the position of the cam 15 other than that shown in the drawing, the channel 23 will be in communication with the free air opening 25. On each rotation on the control shaft the suction effect is thus interrupted once. The speed of rotation of the control shaft is so adjusted that it is somewhat greater than a sheet feeding period. In this way it is ensured that a sheet feeding corresponds to each rotation of the shaft.

The required working operation or a plurality of such operations, which are to be rhythmically controlled, are actuated from the same shaft. In the arrangement illustrated in the drawing, the cam disc 16 actuates, against the action of the spring 26, the levers 27 and thus through the lever 28 the lever 29. On the axis of the lever 29 are arranged tongues 30 close to both sides of the row of suction holes 9 (see Fig. 2). The tongues 30, in the position shown in the drawing, prevent the sheet, on the initial jumping thereof, from reaching the suction roller as is clearly shown by the sheet 31 in Fig. 1. The sheet thus adheres not to the roller but to the tongues and an inlet gap is provided for the blast air between the sheet and the pile. The distance from sheet to sheet must, if a longer duration of blast is desired, be made correspondingly greater. On the further rotation of the cam disc 16 the tongues 30 are swung around the pivot 32 into grooves 33 formed in the suction roller 5 and take up the position shown in dotted lines in Fig. 2. The tongues thus lie inside the feeding surface. The sheet is thus presented to the suction roller and the forward operation commences. As the sheet is lying ready on the tongues in direct proximity to the roller and only quite a small stroke or movement is necessary to pass it to the roller, a uniform time for this transference is attained for each sheet in contradistinction to the varying lengths of time in apparatus which does

not have the improved device according to the invention.

It will be understood, of course, that further working operations can be controlled from the same control shaft, and furthermore instead of using a variable gear for driving the control shaft a controllable motor independent of the suction roller drive can, if desired, be provided as the driving mechanism for the control shaft.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. Apparatus for separating and feeding the topmost sheet of a pile to a working machine by means of a constantly rotating forwarding roller, disc or like member, which is continually under suction action, wherein suitably controlled intermediate members operable adjacent the separating position are provided, which members allow, at each operating sequence in one position thereof, the raising of the sheet to within a short distance of the suction forwarding roller, disc, or the like, but in another position thereof are withdrawn from the space between the suction forwarding roller, disc or the like and the pile for the purpose of transferring the sheet to the said suction forwarding roller or the like, and in this manner allow the sheet to be sucked through a very short space directly to the surface of the said suction forwarding member and said apparatus including means for controlling the relative speeds of the forwarding roller and the controlled intermediate members.

2. Apparatus as claimed in claim 1, wherein the intermediate members are formed as sheet holding tongues displaceable into recesses formed in the suction forwarding roller.

3. Apparatus as claimed in claim 1, wherein the working rhythm or sequence of operation of the holding tongues bears a definite relation regulatable by suitable means to the forwarding speed, so that the control operation can be made to conform to the sheet length.

4. Apparatus as claimed in claim 1, wherein the suction action of the suction forwarding means is controlled in the same working rhythm, that is synchronously with the holding tongues, for example by means of cam discs disposed on the same control shaft.

5. In a device of the kind described, a feeding roller consisting of a hollow cylindrical member having suction openings extended through its wall, rotating means for said member, a fixed suction pipe having an end extending into said feeding roller and provided with an inlet opening wherewith the suction openings of the roller successively register, said roller having a plurality of peripheral grooves on its outer surface, guard tongues rockingly supported beneath said roller with their forward ends extending both forwardly and rearwardly with respect to the mouth of the suction pipe, said guard tongues being rockingly mounted to swing into and out of said peripheral grooves, means driven from the first mentioned means for effecting swinging of the guard tongues in timed relation to the rotation of the roller, and means for varying the swinging of the guard tongues in timed relation to said rollers.

6. In a device of the kind described, a feeding roller consisting of a hollow cylindrical member having suction openings extended through its wall, rotating means for said member, a fixed suction pipe having an end extending into said

feeding roller and provided with an inlet opening wherewith the suction openings of the roller successively register, said roller having a plurality of peripheral grooves on its outer surface, guard
5 tongues rockingly supported beneath said roller with their forward ends extending both forwardly and rearwardly with respect to the mouth of the suction pipe, said guard tongues being

rockingly mounted to swing into and out of said peripheral grooves, and means driven from the first mentioned means for effecting swinging of the guard tongues in timed relation to the rotation of the roller, said last mentioned means including a change speed device for varying the
5 relative actions of the roller and guard tongues.

GEORG SPIESS.