Apparatus with a rotary printing machine for producing multileaved folded printed products

In the production of multileaved folded printed products by means of a rotary printing machine, the web material which, after being printed, contains the printed sides of the products still lying next to one another side by side or succeeding one another is subdivided, by means of folds and/or cuts extending in the longitudinal direction, into part webs which, lying on one another and combined to form sheets, are fed to the folding delivery of the printing machine. Here, the sheets are divided by means of cross-cuts into part products which, if appropriate, are collected together, folded a (further) time or twice and delivered in an imbricated formation.

To increase the production capacity and enhance profitability, among other things the width of the printing units has been increased, so that a large number of printed sides can be simultaneously produced next to one another. But of course, because of this, the wide web has to be divided into a correspondingly large number of part webs, in which case it is very expensive and complicated to design the print occupancy plan and to bring the part webs together via a large number of deflections in such a way that the correct printed sides lie on top of one another in the sheet and that the sequence of printed sides after folding is the right one.

US Patent Specification 4,179,107 is concerned with the difficulties which have arisen as a result of the increase in the printing width, especially when the multicolor printing process is employed. To prevent the problems from the outset, it is proposed to restrict the printing width in such a way that the web material must in each case be divided only into two part webs which are wound next to one another onto a common winding core. The formation of a sheet is thus basically avoided here. The two part webs are first unwound in a collecting station and are laid on top of one another as a result of appropriate changes of direction in such a way that adjacent printed sides come to rest on one another. To
obtain the desired number of sides, a plurality of such twin rolls is incorporated at the collection station into the formation of the sheet. The sheet thus formed can then be divided by means of cross-cuts into part products which, after being folded to provide the desired final product, can be collected or gathered together. So that the formation of a sheet from the part webs, which are unwound in pairs from respective twin rolls, laid on one another and combined with other webs, takes place satisfactorily, the part webs carry edge perforations which are made in the web material even before it is divided into part webs. According to this concept, therefore, the printing machine is returned to its elementary function, namely printing, and is freed of any equipment even if only for sheet formation, let alone for folding.

The present invention takes the diametrically opposite path. In fact, it is not based on the object of returning the printing machine to its elementary function, but on the contrary is intended, in association with the high production capacity brought about in the case of modern printing machines by the increase in the printing width, additionally to increase profitability by means of an increase in the speed above the degree possible today. In other words, the technical object on which the present invention is based is to utilize the capability of modern printing machines which these possess with regard to the conversion of wide web material into sheets which can be divided into part products, and according to the invention there is arranged, following the sheet guidance of a printing machine designed, according to the preamble of claim 1, for the processing of wide webs, a winding device with exchangeable winding cores, and this is preceded by a controllable cross-cutter, there being at least one unwinding device designed for simultaneously receiving at least two winding cores, and a cross-cutter controllable as a divider being arranged following a convergence for the unwound sheets.
Here, therefore, the part webs are not wound, but instead the sheet formation takes place in the proven way by means of the corresponding apparatus of the printing machine, and the printing speed can be increased without further action up to the limit determined by printing technology, since sheet formation by folding and/or by severing in the longitudinal direction and the winding of the sheets at any speed thus determined are possible. Since the sheets are obtained directly from the web and, while being obtained, are still actually connected to the web, the part webs do not have to be marked with a view to the sheet formation. Conversely, however, their marking or the marking of the sheets allows the convergence of a plurality of sheets in the unwinding device, in order, during the division or any folding, to produce final products from the part-product sheets. Since a plurality of unwinding devices can be provided for each printing machine, the delivery of the folded final products can take place at the same speed at which the printing machine can produce the part-product sheets. Conversely, this makes it possible to determine the number of sides of the part products such that the printing machine can print at maximum speed or under the best possible circumstances, since the collection of the part products takes place in the unwinding device. Accordingly, the main product which has to be printed at the last minute because it contains the latest news can also be restricted to a minimum, and therefore the start of printing can be postponed more than otherwise.

Exemplary embodiments of the subject of the invention are illustrated in the drawings. In these

Figure 1 shows a diagrammatic representation of one possibility of sheet formation by cutting the web material in the longitudinal direction and folding in the former-folder, the two sheets being combined to form a multiple sheet

Figure 2 shows a diagrammatic view, associated with Figure 1, of an exemplary embodiment of the
subject of the invention

Figure 3a-d shows, in conjunction with Figure 1, some possible sheet cross-sections.

Figure 4 shows a diagrammatic representation of a further possibility of sheet formation with subsequent winding of the sheet.

Figure 5a-b shows, in conjunction with Figure 4, some possible sheet cross-sections.

Figure 6 shows an unwinding device.

According to Figure 1, the web material 2 guided via an impression cylinder 1 is divided by means of a cutting knife 3 into part webs 21 and 22 which are folded in the longitudinal direction in the former-folder 4. The sheets 201 and 202 thereby obtained are then combined to form a multiple sheet 200. These operations and the rods 6 of the folder which are needed for them are known. Of particular importance here are the rods 7 which represent the sheet guidance. This sheet guidance is located at the end of the sheet formation.

Figure 2 shows the folder 8 with the sheet outlet 7, and a winding device 9 connected to the latter and having a driven winding core 10 and a sheet roll 11 being formed on this. The sheet coming out of the sheet outlet is guided through a rotating cross-cutter 12 which is primarily provided for severing the sheet for the purpose of exchanging a full winding core for an empty one. The operation corresponds to that when an emptied roll of the paper web to be printed is changed for a full one. The relevant measures therefore also need not be explained in any more detail here, the only essential feature being that the cross-cutter 12 is arbitrarily controllable.

Of course, the sheet does not always have to be wound, particularly when the part products do not come from an intermediate store or are not joined together with part products extracted from an intermediate store to form the final product, but instead the final product, consisting of (a few) part products obtained simultaneously, can be extracted directly from the folding delivery of the rotary machine. For such instances,
a switch arrangement indicated at 13 is provided, which makes it possible to divert the sheet to the folding delivery of conventional type. In this case, the cross-cutter 12 can operate as a divider driven at the machine rate, and the part products obtained can, if appropriate, be collected, folded and delivered in the hitherto customary way. Conversely, this means that it is possible to control the cross-cutter of the current folding deliveries, which works as a divider, in addition to its conventional function, in such a way that the sheet is cut only for the purpose of changing the sheet roll for an empty winding core.

According to Figure 4, the web material 2 printed at 1 is cut by means of severing knives 3 into four part webs 21-24 which are guided via rods 6 of the folder and which are fed lying on one another (unfolded) to the sheet outlet 7. Once again, the multiple sheet 200 is wound onto a driven winding core 10 to form a sheet roll. The sheet cross-section of the sheet 200 corresponding to Figure 4 is shown in Figure 5a. Figure 5b shows the sheet cross-section for two-up production, the web material 2 being divided not into four, but into two part webs. With the exception of the winding of the sheet thus or otherwise composed, the abovementioned operations are once again known.

It emerges overall from the foregoing explanations that the printing machine can run at the maximum possible printing speed, since the sheet formation and the winding of the sheet need under no circumstances take place more slowly. The time saving at a reduced outlay is obvious.

This is shown even more impressively by reference to Figure 6 which illustrates an unwinding device 14 designed for receiving two winding cores. The unwound sheets 15 and 16 are combined by means of a convergence 17 and are then divided, by means of a cross-cutter 18 working as a divider, into the desired final product 20 which can be fed in a known way to any necessary concluding operation (folding, cutting, etc.). On the one
hand, it goes without saying that the unwinding device can receive any number of cores, and part products of any number can be combined to form a final product. On the other hand, it also goes without saying that a plurality of unwinding devices can be provided, so that the production capacity for the supply of the final products in no way lags behind the production capacity of the rotary printing machine for the supply of printed sheets.

It must also be pointed out that not only identical, but diverse part products can be connected to form a final product, and the "sheet" 15 according to Figure 6 could be a foreign product; in this way, for example, it would be possible to feed cover sheets or adhesive labels or cards which are transferred to the sheet 16 at the convergence.

As often hitherto, the part sheets can be marked, a marking for sheets too being obtained from this. It thereby becomes easier to combine sheets, if appropriate also with adhesive labels, inserts, etc. However, at all events, the cross-cutter can be controlled with the aid of the markings.

In the implementation of the invention, the problem of winding a plurality of paper webs onto a single reel, set forth in German patent specification 461,707, can be solved, for example, in the same way as it is therein. If the sheet is already folded longitudinally, the tension for winding the sheet could be selected so low that, as with a transverse tear, bumps form which are nevertheless smoothed out when the sheet is unwound. On the other hand, a sheet leaving the printing machine folded could be opened before being wound; during the unwinding, it can then easily be folded again and processed.
Abstract

It is customary to combine the web material, which is printed in a rotary printing machine and which contains the printed sides, if appropriate lying in multiples next to one another or succeeding one another, by means of cuts and/or folds to form sheets, in such a way that the printed sides lying on one another in this form are in the correct sequence. The sheets are then fed to the folding delivery, being divided by means of cross-cuts into part products which, if appropriate, are collected, folded and delivered in succession. In contrast to this, following the sheet guidance a winding device is arranged with exchangeable winding cores which receive portions of the sheets in the form of a sheet roll. The sheets are combined in one or more unwinding devices, thereby producing a multiple sheet which contains essentially all the parts of the final product and which is in conclusion divided appropriately.

(Figure 2)
Patent Claims

1. Apparatus with a rotary printing machine for producing multileaved folded printed products from printed web material (2) which, after being printed, contains the printed sides of the products still lying next to one another side by side or succeeding one another, folds and/or cuts which extend in the longitudinal direction subdividing the web material into part webs (21,22), and sheets (201,202,200) being formed from these, which sheets are guided towards the delivery of the printing machine, contain the part webs (21,22) in layers lying on top of one another and can be divided into part products by means of cross-cuts, characterized in that following the sheet guidance (7) a winding device (9) with exchangeable winding cores (10) is arranged, and this is preceded by a controllable cross-cutter (12), and in that there is at least one unwinding device (14) designed for simultaneously receiving at least two winding cores (10), a cross-cutter (18) controllable as a divider being arranged following a convergence (17) for the unwound sheets.

2. Apparatus according to claim 1, characterized in that the cross-cutter (18) controllable as a divider can be controlled by means of markings applied to the part webs (21,22) or sheets (201,202,200).

3. Apparatus according to claim 1 or 2, characterized in that the sheet guidance (7) of the printing machine can be changed over selectively (13) to the delivery of the latter for producing folds or to the winding device (9).

4. Apparatus according to claim 3, characterized in that the cutting cylinder of the folder can be controlled selectively at the machine rate or as a cross-cutter (12) preceding the winding device (9), the sheet being guided so as to run from the cutting cylinder selectively (13) round the folding-knife and collecting cylinder of the folder or in the direction of the winding device (9).

5. Use of the apparatus according to one of claims 1 to 4 for the production of folded part products and for
the formation of final products in the form of collected, gathered or interleaved part products.