July 5, 1960 M. B. HALL ET AL 2,943,558

CONVEYOR FOR PACKAGES

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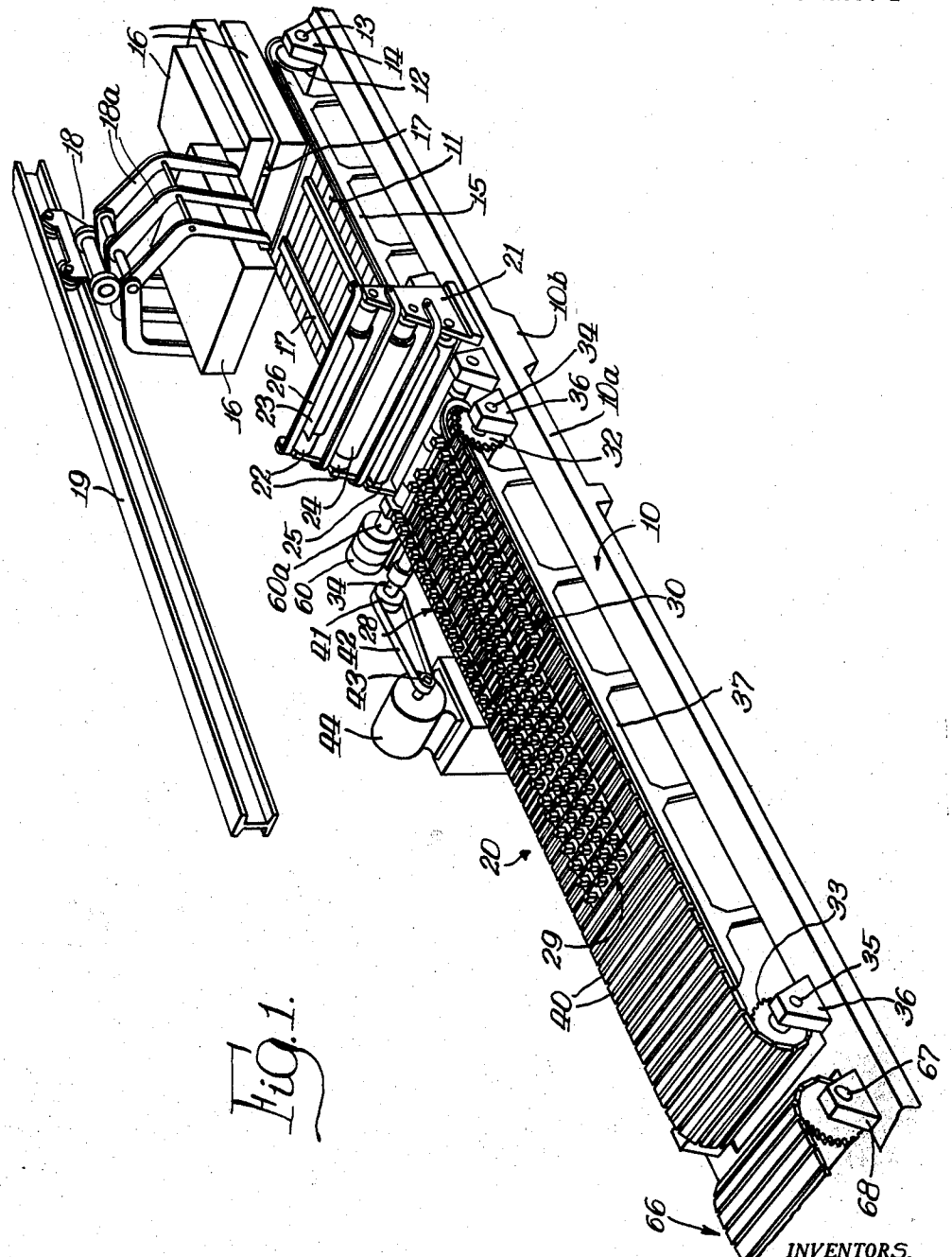


Fig. 1.

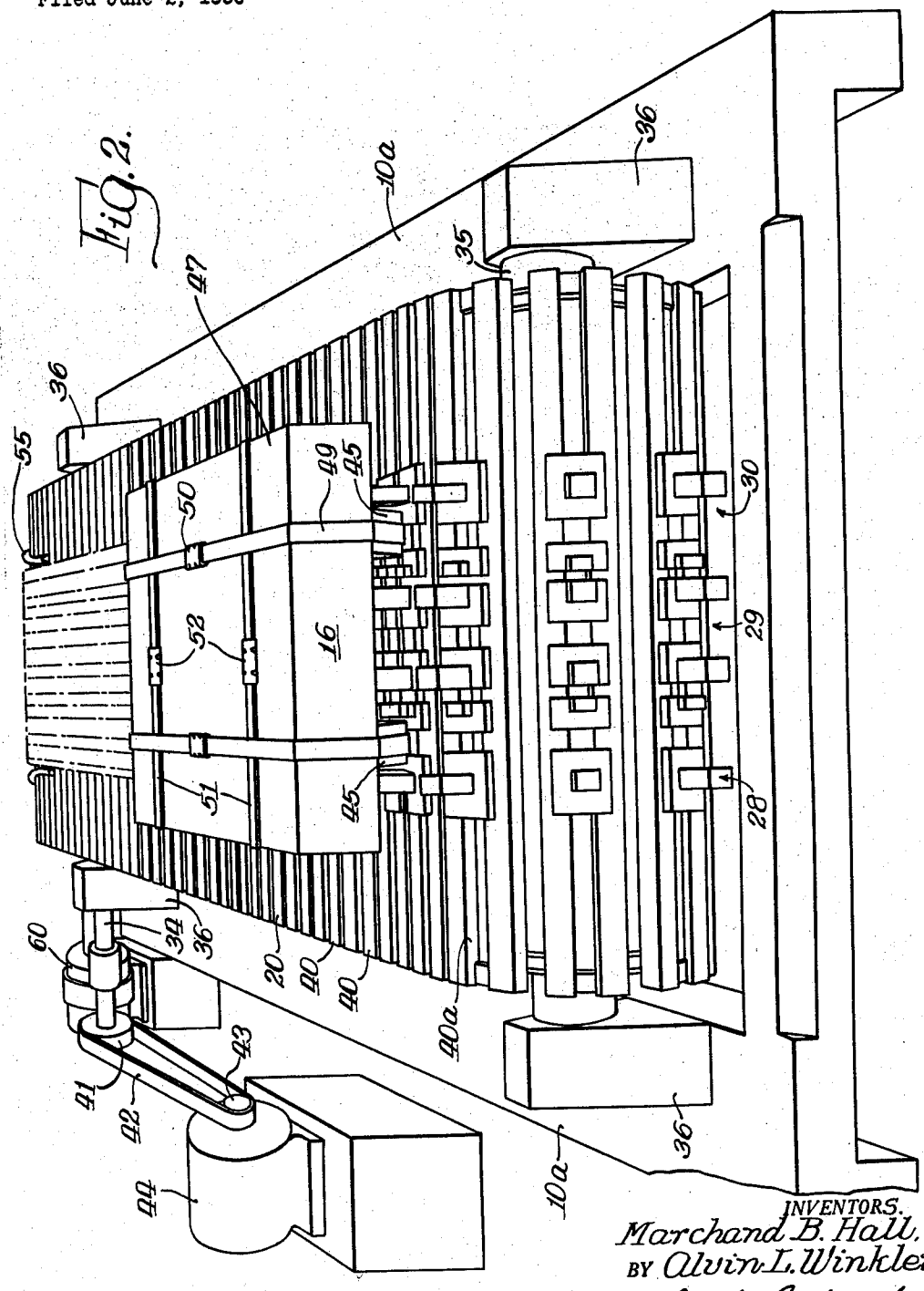
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CONVEYOR FOR PACKAGES

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Fig. 2.



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CONVEYOR FOR PACKAGES

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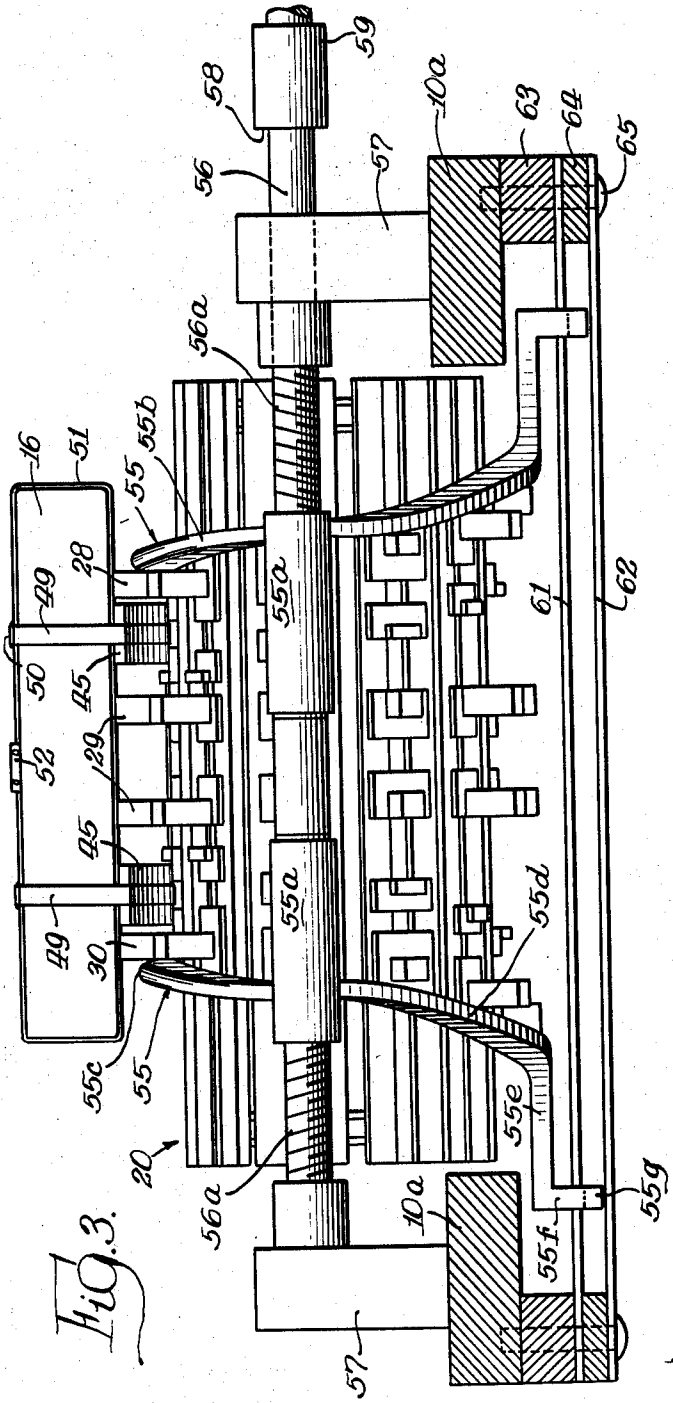


Fig. 3.

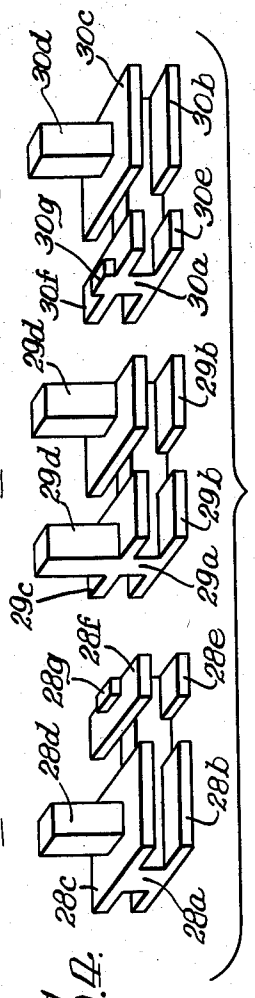


Fig. 4.

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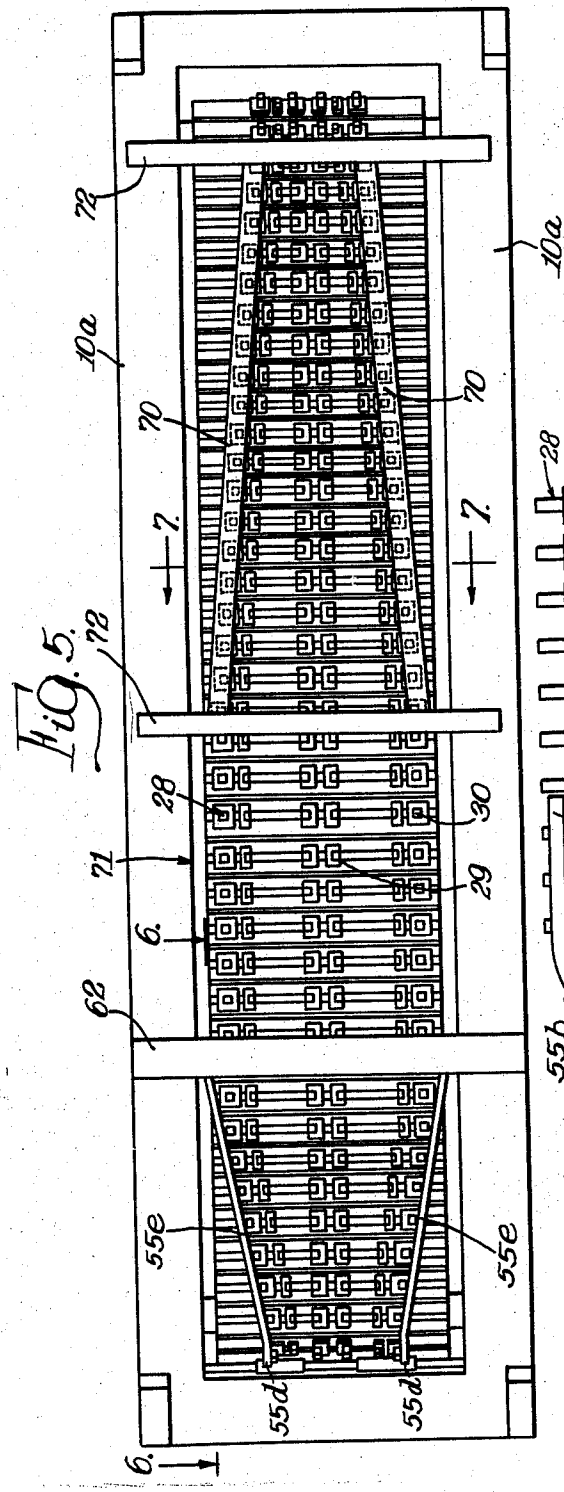


Fig. 5.

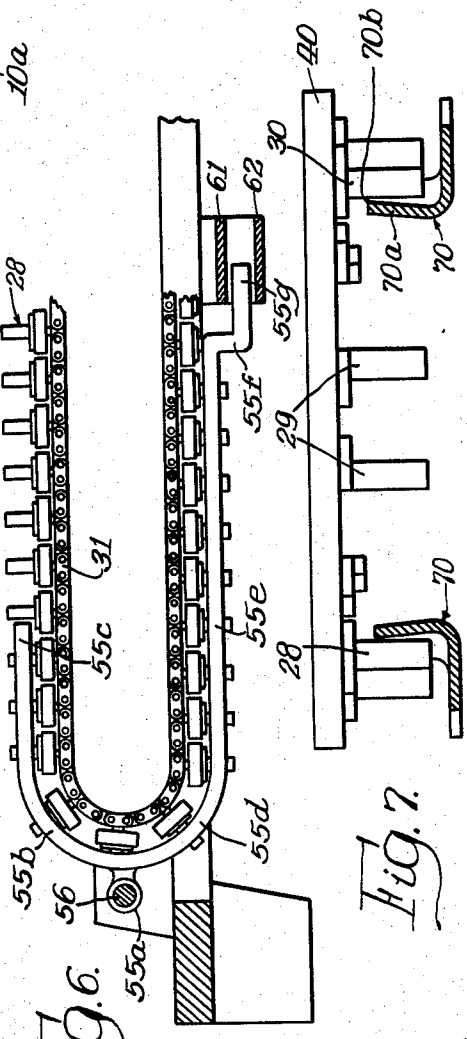


Fig. 6.

Fig. 7.

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CONVEYOR FOR PACKAGES

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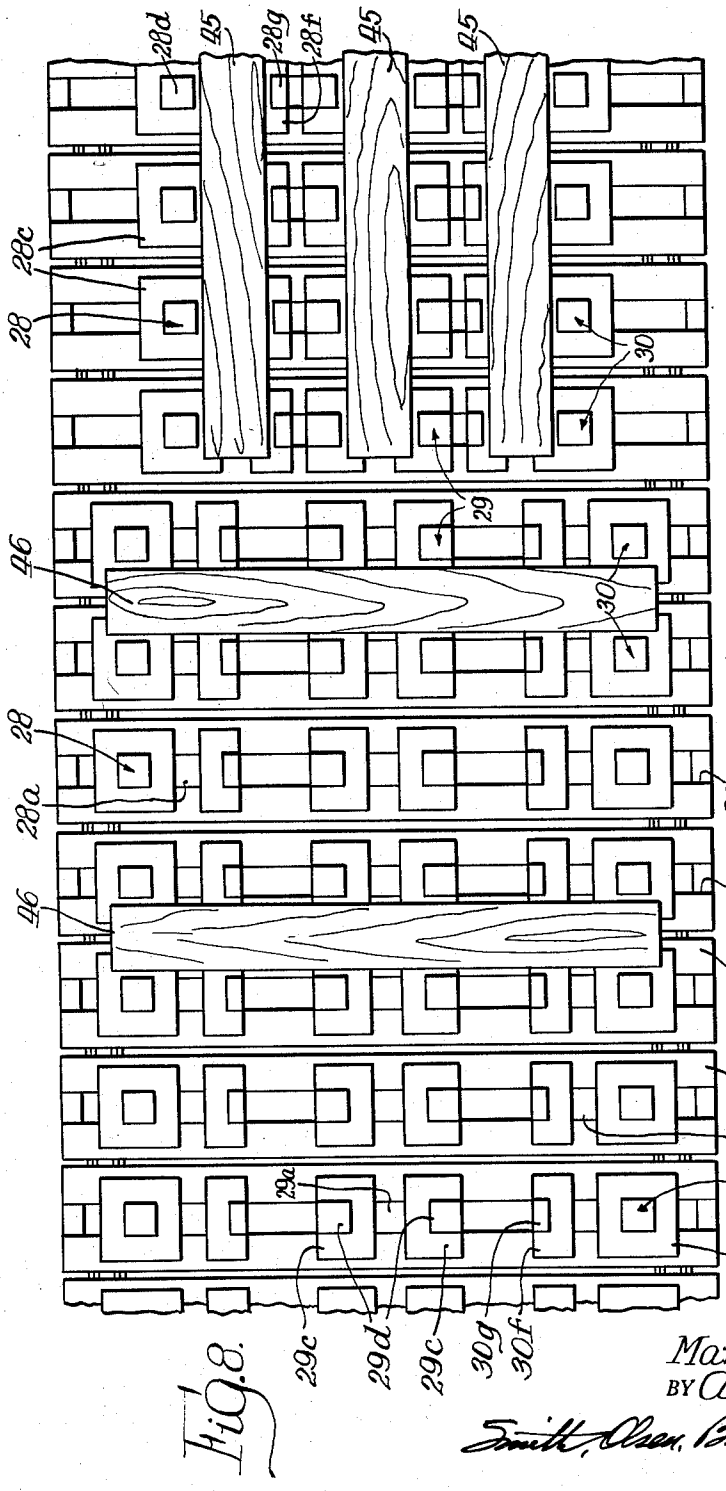


Fig. 8.

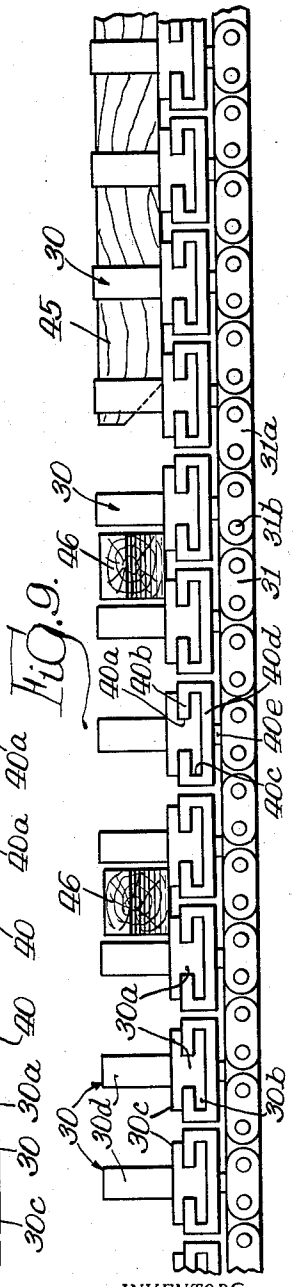


Fig. 9.

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CONVEYOR FOR PACKAGES

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5 Claims. (Cl. 100—1)

This invention relates to improvements in conveyors for use in handling packages or bundles during the wrapping and binding thereof by steel strapping or other binders in order to facilitate the wrapping and binding operations.

It is common practice to form bundles or packages of metal sheets and other articles by arranging a plurality of such articles in a pile, surrounding the pile with a wrapping of paper or the like and then binding the wrapping and the enclosed articles together by surrounding metal binders which may be in the form of steel straps drawn taut and having their overlapping ends secured together with the use of metal seals. Where the bundle or package is heavy, as when it is formed of a pile of metal sheets, for example, it is common practice to support the wrapped pile on parallel wooden skids or runners which are included in the bundle or package by the wrapping operation and which are spaced apart to receive between them the usual fork of a lift truck, so that the truck may be readily moved into position to lift the bundle or package and then used to transport the bundle or package to the desired location. These heavy bundles vary greatly in size and width and the handling of them during the wrapping and binding operations has heretofore presented a substantial problem.

The principal object of the present invention is to provide improved apparatus for handling bundles during the wrapping and binding thereof whereby bundles or packages may be quickly and conveniently formed. Another object is to provide improved apparatus including a conveyor upon which the bundles are carried during the wrapping and binding operations, so that these operations may be carried on with respect to successive bundles in an assembly line, thereby minimizing the labor and time required in forming the wrapped bundles or packages. A further object is to provide a conveyor for use in wrapping and binding bundles or packages with the use of skids, comprising adjustable means for properly locating the skids with respect to bundles or packages of various widths. Still another object of the invention is to provide a conveyor for facilitating the packaging of bundles and the like with the use of skids, comprising an endless conveyor carrying skid spacers and bundle supports which may be readily adjusted while the conveyor is in operation to accommodate the spacing of the skids to bundles of varying widths. Other objects relate to various features of construction and arrangement which will appear more fully hereinafter.

The nature of the invention will be understood from the following specification taken with the accompanying drawings in which one embodiment is illustrated. In the drawings,

Figure 1 shows a perspective view of conveying apparatus embodying the present invention and adapted for use in supporting bundles or packages during the wrapping and binding thereof;

Fig. 2 shows an enlarged end elevation of the central portion of the apparatus illustrated in Fig. 1, looking toward the right as viewed in Fig. 1;

Fig. 3 shows an enlarged end elevation of the central portion of the apparatus illustrated in Fig. 1 looking toward the left as viewed in Fig. 1;

Fig. 4 shows a perspective view of the three forms of bundle supports which are included in the conveyor illustrated in Figs. 2 and 3;

Fig. 5 shows a bottom plan view of the conveyor illustrated in Figs. 2 and 3;

Fig. 6 shows a longitudinal section taken on the line 6—6 of Fig. 5;

Fig. 7 shows a transverse section taken on the line 7—7 of Fig. 5;

Fig. 8 shows an enlarged top plan view of a portion of the conveyor shown in Figs. 2 and 3; and

Fig. 9 shows a side elevation of a portion of the conveyor which is shown in Fig. 8.

Referring to Fig. 1 of the drawings, the invention is illustrated as being embodied in a machine comprising a frame **10** having parallel side frame members **10***a* provided with downwardly extending legs or projections **10***b* which are adapted to rest upon a floor or other support. At the right-hand end of the machine there is provided an endless conveyor **11** adapted to move around pulleys **12** mounted on shafts **13** which are journaled in bearing blocks **14** carried by the side frame members **10***a*. The upper stretch of this endless conveyor **11** is supported at its sides by upright frames **15** which are secured to the side frame members **10***a*. This conveyor **11** is adapted to support a number of separate piles **16** of metal sheets or other articles to be bound, the piles being separated from each other by spacers **17**. The piles **16** which constitute the objects to be bound are adapted to be moved from the conveyor **11** by means of an overhead conveyor **18** adapted to travel upon a track **19** and comprising a series of grappling hooks **18***a* which are adapted to extend around the sides of a pile of articles **16** to permit the pile to be lifted from the conveyor **11** and then transported endwise of the machine on the track **19** to a position on a second endless conveyor **20** on which the wrapping and binding of the pile of articles is performed.

Between the conveyor **11** and the conveyor **20** are a pair of racks **21** secured on the side frame members **10***a* and extending upwardly therefrom. These racks support a series of cylindrical rollers **22** on which are mounted coils of wrapping paper **23**, **24** and **25** which are of different widths. The brackets **21** are connected by a series of transverse members **26** and sheets of paper of appropriate length are adapted to be drawn off from the coils **23**, **24** and **25** and placed in position on the conveyor **20** preliminary to placing a pile of articles **16** in position on the paper sheet to be wrapped. The conveyor **20** is provided with three series of bundle supports **28**, **29** and **30** upon which the paper sheet is laid before moving a pile of articles **16** on to the paper sheet with the use of the overhead crane **18**.

The conveyor **20** comprises two endless chains **31** made up of links **31***a* which are connected together by pins **31***b* and these chains are adapted to travel around sprocket gears **32** and **33** mounted on shafts **34** and **35**, respectively, which are journaled at their ends in bearing blocks **36** secured to the side frame members **10***a*. The upper stretches of these chains **31** are supported by upright frames **37** which are also secured to the side frame members **10***a*. The links **31***a* of the side chains **31** are adapted to support a continuous series of channel-shaped guide members **40** which extend transversely of the conveyor from one side thereof to the other. Each guide member **40** has a slot **40***a* extending throughout its length transversely of the conveyor and this slot of

each guide member is bounded by flanges 40*b* which form the top walls of the passages 40*c* in which portions of the supports 28, 29 and 30 are adapted to slide. The bottom walls 40*d* of the guide members 40 are connected by studs 40*e* to the links of the endless chains 31 (see Fig. 9). The endless conveyor 20 is adapted to be actuated through the shaft 34 by means of a pulley 41 connected through a belt 42 to a driving pulley 43 mounted on the shaft of an electric motor 44. This motor is provided with suitable controls so that it may be started and stopped intermittently in order to locate one or more bundles on the conveyor 20 in the desired positions for wrapping and binding.

The bundle supports 28, 29 and 30 which are adapted to have parallel paths of travel on the upper stretch of the conveyor 20 are adapted to be spaced apart transversely of the conveyor in order to locate in proper positions the skids on which the pile of articles is supported in the formation of the bundle or package. In Fig. 8, three such skids 45 are shown extending longitudinally of the conveyor and occupying spaces between the central row of supports 29 and the lateral rows of supports 28 and 30. Also, the supports of each series 28, 29 and 30 are spaced apart longitudinally of the machine by the guide channels 40 to a sufficient extent to permit bundle reinforcing members 46 to be inserted between them as shown in the lefthand portion of Fig. 8. In Fig. 2 a pile of articles 16 is shown as being covered by a wrapping 47 of paper or the like and resting upon two parallel skids 45 which are carried by the conveyor 20 between the intermediate series of supports 29 and the two lateral series of supports 28 and 30. The wrapped bundle and the sheets or other articles of which it is composed are bound together by metal binding straps 49 extending longitudinally thereof with their overlapping ends secured together while they are in a taut condition by means of joints 50 which may be the usual type of joints formed by threading the overlapping ends of the strap through a tubular metal seal and then deforming the edges of the strap and seal to provide an interlocking joint. The bundle is also bound by transversely extending binding straps 51 which extend around the bundle transversely of the conveyor with the ends of the straps secured together by joints 52. The longitudanlly extending binding straps 49 extend not only around the articles which are in the pile 16 but around the paper wrapping 47 and also around the skids 45 so that a unitary bundle or package is formed which may be conveniently moved by means of the usual lift truck, as indicated above.

The construction of the bundle supports 28, 29 and 30 is shown particularly in Fig. 4. Each support 28 comprises a body portion 28*a* which is adapted to slide in a slot 40*a* of a guide member 40 and this body portion is formed integrally with bottom flanges 28*b* which are adapted to slide in the channel 40*c* of the guide member. The body portion 28*a* is also formed integrally with top flanges 28*c* which are adapted to overlie the top flanges 40*b* of the guide member. Each support 28 is further provided with an upwardly extending pedestal 28*d* of rectangular cross section having a flat upper end which is adapted to form a seat for the bundle being wrapped and bound.

The body portion 28*a* extends laterally from the flanges 28*b* and 28*c* and has formed thereon a lower flange 28*e* which is adapted to slide in the groove 40*c* of a guide member 40 and also an upper flange 28*f* adapted to extend above the top flanges 40*b* of a guide member. The top flange 28*f* has extending upwardly therefrom, above the body portion 28*a*, a lug 28*g*. When the support 28 is mounted on the guide member the pedestal 28*d* and the lug 28*g* are adapted to locate in proper position one of the longitudinally extending skids 45.

The supports 30 which extend along the forward side of the conveyor as viewed in Fig. 1 are similar in construction to the supports 28 except that the parts are reversed in position. Each member 30 comprises a body portion 30*a* having formed thereon a lower flange 30*b* adapted to travel in the groove 40*c* of a guide member and an upper flange 30*c* adapted to extend above the top flanges 40*b* of the guide member. Above the body portion 30*a* and midway between the ends of the flanges 30*c* a pedestal 30*d* extends upwardly to engage and support the object or bundle to be bound. The top surfaces of the pedestals 30*d* are flat and these parts are of the same length as the pedestals 28*d* so that when a number of these supporting members are assembled on the top stretch or run of the conveyor 20 the top surfaces of the pedestals lie in the same plane. The body portion 30*a* of the member 30 extends laterally and has formed thereon two flanges 30*e* and 30*f* which correspond in location and function to the flanges 28*e* and 28*f*, respectively. From the top surface of the flange 30*f* a lug 30*g* extends upwardly and is adapted to serve with the pedestal 30*d* to locate one of the skids 45.

The intermediate supporting members 29 which are located midway between the ends of the guide members 40 comprise body portions 29*a* having two pairs of spaced lower flanges 29*b* which are adapted to slide in the grooves 40*c* of the guide members and each body portion 29*a* is further provided with two pairs of top flanges 29*c* adapted to slide over the top flanges 40*b* of the guide members. From the opposite ends of the body portion 29*a* of each support 29 two pedestals 29*d* extend upwardly and terminate in flat top surfaces adapted to engage the object or bundle to be bound in the same plane with the top surfaces of the adjacent pedestals 29*d* and 30*d*. Thus, there are four pedestals of equal height and size mounted in a row transversely of the conveyor on each guide member 40 and these pedestals in each row are spaced apart from the corresponding pedestals of each adjacent transverse row sufficiently to accommodate the reinforcing members 46 previously referred to.

The intermediate supports 29 are adapted to occupy at all times positions midway between the ends of the guide members 40 and they are preferably secured against sliding movements longitudinally of the guide members so that they remain in alignment with each other in a longitudinal row. The supports 28 and 30 are adjustable laterally of the conveyor with respect to the intermediate support 29 mounted on the same guide member in order to vary the spaced relation of the supports to accommodate objects or bundles of different widths and to locate the skids 45 in proper positions under the object to be bound. As shown in Fig. 2, the two skids 45 are positioned beneath the bundle 16 and there are two longitudinally extending binding straps 49. If desired, an additional longitudinal skid 45 could be located on the top flanges 29*c* of the intermediate supports 29 and positioned properly thereon by the upwardly extending pedestals 29*d*, in which case an additional binding strip 49 would be required.

The lateral adjustment of the supports 28 and 30 on the guide members 40 is effected by two cams 55 which have integrally formed internally threaded hub portions 55*a* adapted to be engaged by the screw threaded portions 56*a* of an operating shaft 56 which is journaled in bearing blocks 57 carried by the side frame members 10*a*. The shaft 56 has mounted thereon a pulley 58 engaged by a belt 59 extending around a driving pulley fixed on the shaft 60*a* of a driving motor 60. This motor is operated by suitable controls so that it may be started and stopped at the will of the operator in order to effect the lateral spacing of the cams 55 through the operations of the oppositely threaded portions 56*a* of the shaft 56. The shaft 56 extends laterally of the machine at one end of the conveyor in proximity to the location of the guide members 40 as they travel with the sprocket chains around the sprocket wheels 32. The cams 55 have upwardly extending arms 55*b* which are curved inwardly toward each

other and also curved longitudinally to extend partially around the end of the conveyor. The tips **55***c* of these arms are adapted to engage the outer sides of the supports **28** and **30** so that as these supports move upwardly about the end of the conveyor they are cammed inwardly toward each other. Beneath the hub portions **55***a*, the cams **55** are provided with outwardly curved downwardly and forwardly extending arms **55***d* which are united with horizontal outwardly and angularly extending portions **55***e*. These parts **55***e* terminate in downwardly directed portions **55***f* which terminate in flanges **55***g* (see Fig. 6) which extend between bars **61** and **62** which extend transversely of the machine and which are secured to the under sides of the side frame members **10***a* and at the same time spaced apart, by means of blocks **63** and **64** and studs **65**. The flanges **55***g* extending between the bars **61** and **62** thus hold the cams **55** from rotation about the axis of the shaft **56** when this shaft is operated to effect relative movement of the cams transversely of the conveyor.

The arms **55***d* extend longitudinally of the conveyor beneath the lower run or stretch thereof as shown in Fig. 5 so that these lower arms engage the outer sides of the supports **28** and **30** as these supports travel along the lower run or stretch of the conveyor toward the left-hand end of the conveyor as viewed in Fig. 5. Then, as the supports move upwardly through curved paths around the end of the conveyor, they are guided inwardly by the upper arms **55***b* of the cams so that they eventually assume on the upper run or stretch of the conveyor the desired lateral spaced relation which is required to cause the supports **28** and **30** to locate the skids **45** in suitable locations for the size of the object or bundle which is being bound. In Fig. 1 of the drawings some of the supports **28** and **30** are shown closely spaced with respect to the intermediate supports **29** and in another portion of the upper stretch of the conveyor the supports **28** and **30** are spread apart substantially to the maximum extent, in order to illustrate the possibilities with respect to variation of the lateral spacing of the rows of supports, but it will be understood that in normal operation in the binding of a package of a particular size the supports would be spaced apart to the same extent throughout their path of travel on the upper run of the conveyor. Also, in Fig. 1 a number of the guide members **40** do not have any supports, **28**, **29** and **30** mounted thereon, which may be desirable in some instances for the temporary storage of a bundle after it has been wrapped and bound, but the supports **28**, **29** and **30** would ordinarily be mounted on all of the guide members **40** so that they would extend throughout the length of the conveyor. After a bundle has been wrapped and bound it may be conveniently moved to a third conveyor **66** supported at one end by a shaft **67** journaled in bearing blocks **68**. This conveyor is of use in carrying away the bound bundles or packages after they have been wrapped and bound on the conveyor **20**.

When the supports **28**, **29** and **30** reach the discharge end of the conveyor **20**, i.e., the left-hand end of this conveyor as viewed in Fig. 1, the supports then move downwardly and are carried along the lower stretch or run of the conveyor as illustrated particularly in Fig. 5. As the supports **28** and **30** begin this reverse movement on the lower stretch or run of the conveyor **20**, the inner sides of the supports **28** and **30** are brought into engagement with angle shaped cams **70** which diverge rearwardly from the left-hand end of the conveyor and which are adapted to spread the rows of supports **28** and **30** apart. These cams **70** are in the form of angle shaped bars having upwardly extending flanges **70***a* which are inclined outwardly to a slight extent so that their upper tips **70***b* contact the inner faces of the supports **28** and **30** and push them outwardly as these supports move toward the front end of the conveyor. The cam bars **70** are so located that they will engage the inner sides of the supports **28** and **30** when these supports are spaced apart to the minimum extent so

that, regardless of the degree to which the supports **28** and **30** may be spaced apart as they travel toward the left as viewed in Fig. 1, their inner sides are engaged by the flanges **70***a* of the cams at some point in the rearward travel on the under side of the conveyor so that they are then spread apart until they occupy the maximum degree of spread as indicated in the region **71** in Fig. 5. The cam bars **70** are adapted to be supported by cross frame members **72** which are secured to the under sides of the side frame members **10***a*. After passing through the region **71**, the supports **28** and **30** are adapted to engage the arms **55***e* of the cams which are then spaced apart to the desired extent in order to secure the proper spaced relation of these supports as they move upwardly to the upper stretch or run of the conveyor.

In the operation of the apparatus which has been described a supply of the objects or bundles **16** which are to be bound is maintained on the conveyor **11** through the use of the overhead crane or conveyor **18**. After the cams **55** have been operated to adjust the lateral supports **28** and **30** in the proper spaced relation to suit the size of the uppermost object or bundle **16** on the conveyor **11**, the skids **45** are positioned on the conveyor **20** by the use of the pedestals **28***d* and **30***d* and the lugs **28***g* and **30***g*. A sheet of paper of the appropriate size is then withdrawn from one of the rolls **23**, **24** or **25** and is laid over the skids and over the supports **28**, **29** and **30**. The object or bundle **16** to be bound is then moved to position on a sheet of paper by the crane or conveyor **18** and the paper sheet is wrapped around the bundle preliminary to binding it with the use of the straps **49** and **51** as shown in Fig. 2. In practice, it is desirable to lay the straps **49** and **51** in position beneath the skids **45** and beneath the paper sheet before the object or bundle **16** is lowered into position on the paper sheet so that, after the paper sheet has been folded into the desired position, the straps may readily be drawn taut and the joints **51** and **52** formed. However, the metal straps **49** and **51** may be fed beneath the skids **45** after the paper sheet and the bundle are in place, if desired. When the binding of the bundle has been completed it may be moved by the conveyor **20** to the conveyor **66** and the binding operation may be repeated on the conveyor **20** with respect to a new bundle **16**.

With reference to the binding of the bundle or other object **16** by the straps **49** and **51**, it is an important feature of the present invention that the structure of the supports **28**, **29** and **30** and their spaced relation on the guide member **40** transversely of the machine and the spaced relation of adjacent guide members are such that the binding straps may be threaded beneath the bundle and the wrapping paper, both longitudinally and transversely of the machine, after the bundle and the paper are in place on the pedestals of the supporting members. Thus, the proper locations of the binding straps may be determined if desired after the bundle and the paper are mounted on the pedestals of the supports. The elevation of the pedestals and the spaced relation of the supports on which they are formed thus permit the straps, as well as the skids **45**, to be properly located with respect to bundles or other objects **16** of various sizes.

Although one form of the invention has been shown and described by way of illustration it will be understood that it may be constructed in various other embodiments which come within the scope of the appended claims.

We claim:

1. Apparatus for use in the binding of objects of varying width comprising, a conveyor, means for actuating said conveyor, a series of guide members mounted on said conveyor to extend transversely thereof, said guide members being hollow and having longitudinal slots in their upper sides, supports mounted on said guide members, said supports having parts extending through said slots and slidably engaging said guide members and having upwardly extending pedestals adapted to support on

their upper sides an object to be bound, and means for adjusting certain of said supports longitudinally of said guide members.

2. Apparatus for use in the binding of objects of varying width comprising, a conveyor, means for actuating said conveyor, a series of guide members mounted on said conveyor to extend transversely thereof, said guide members being hollow and having longitudinal slots in their upper sides, supports mounted on said guide members, said supports having parts extending through said slots and slidably engaging said guide members and having upwardly extending pedestals adapted to support on their upper sides an object to be bound, means for adjusting certain of said supports longitudinally of said guide members, and lugs extending from some of said supports for cooperation with said pedestals for locating skids to be bound with said object.

3. Apparatus for use in the binding of objects of varying width comprising, an endless conveyor having upper and lower runs, means for driving said conveyor, a plurality of transversely extending guide members on said conveyor, a plurality of supports slidably mounted on said guide members for free sliding adjustable movement thereon laterally of the direction of movement of said conveyor, said supports maintaining their adjusted positions on said guide members and being arranged in laterally spaced rows longitudinally of said conveyor, upstanding posts on said supports for supporting on their upper ends along the upper run of said conveyor an object to be bound, a pair of diverging cams along the lower run of said conveyor in the path of said supports for engaging one side of each of said supports for progressively and slidably spreading said rows of supports apart during movement of said supports along said lower run of said conveyor, a pair of converging cams in the path of said supports thereafter engaged by the opposite side of each of said supports for progressively and slidably moving said rows of supports toward each other as said rows are carried from said diverging cams toward said upper run of said conveyor, and means for selectively varying the spaced relation of said converging cams so as selectively to control the spaced relation of said rows of supports along said upper run of said conveyor.

4. Apparatus for use in binding an object that is to rest on skids comprising, a plurality of individual supports arranged in longitudinal and transverse rows, each of said supports including a horizontally projecting flange for supporting a skid and a pedestal extending upwardly from said flange and having an upper end for supporting said object, said supports being spaced apart in each row with spaces between said flanges and pedestals of adjacent supports to provide openings through which binding straps may be threaded beneath said object and said skids both longitudinally and transversely, said supports being shiftable transversely and remaining in the position in which placed, and means for adjusting the transversely spaced relation of said supports.

5. Apparatus for use in the binding of objects that are to rest on skids comprising, a conveyor, a plurality of individual supports on said conveyor arranged in longitudinal and transverse rows thereon, each of said supports including a horizontally projecting flange for supporting a skid and a pedestal extending upwardly from said flange and having an upper end for supporting said object, said supports being spaced apart in each row with spaces between said flanges and pedestals of adjacent supports to provide openings through which binding straps may be threaded beneath said object and said skids both longitudinally and transversely, said supports being shiftable transversely on said conveyor and remaining in the position to which they are shifted, and means for adjusting the transversely spaced relation of said supports.

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