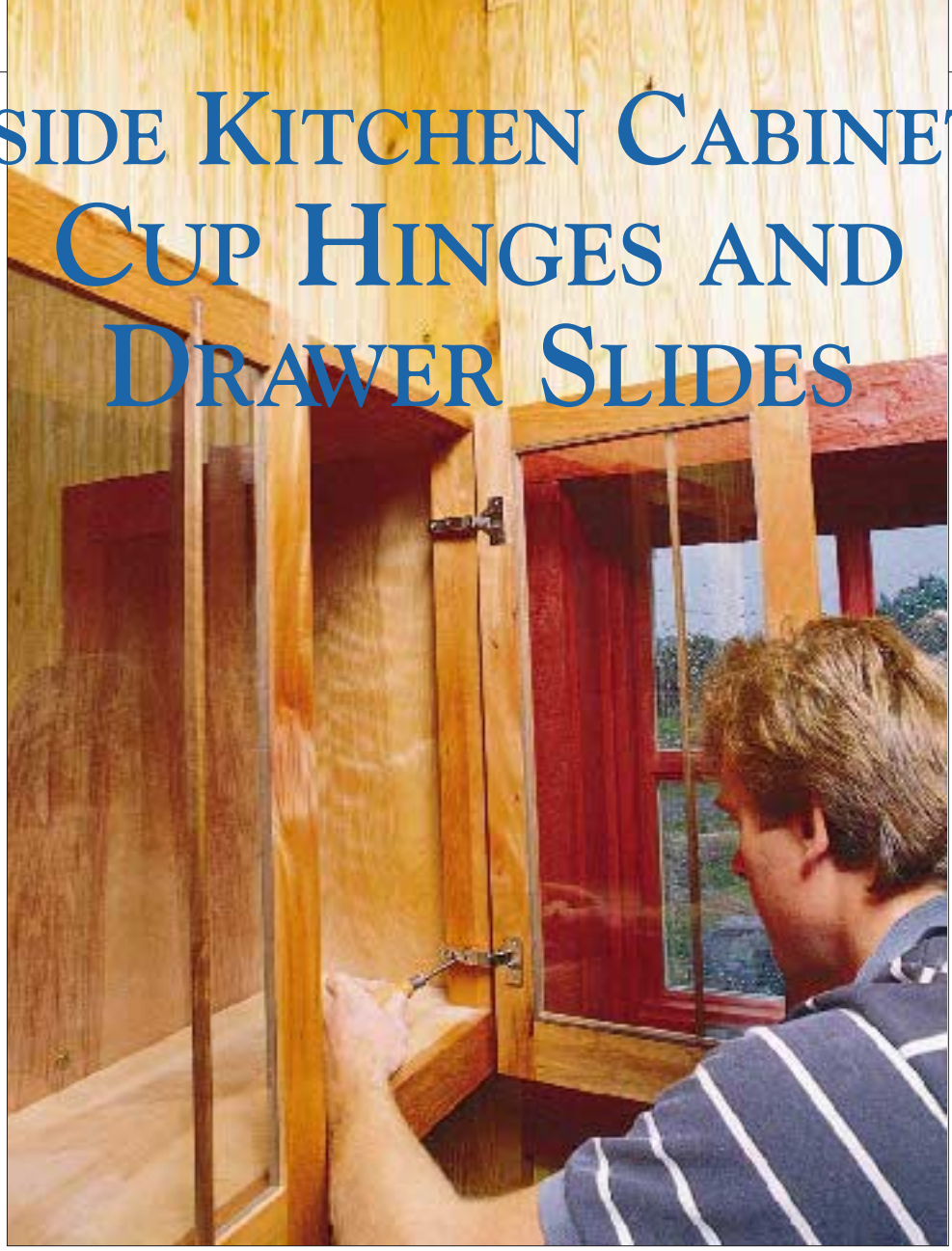
Inside Kitchen Cabinets: Cup Hinges and Drawer Slides



Besides being easy to install and adjust, cup hinges are completely hidden when the door is closed, giving cabinet faces a clean look.

When you need easy adjustment and close tolerances, European hardware is hard to beat

by Paul Levine

When I first started out building cabinets, the hardware was always a sore point. Invariably, the doors would sag on their hinges and I'd have to spend hours adjusting the reveals so the work didn't look sloppy. And the drawer slides were always noisy and had so much side sway that my beautiful dovetailed drawers were cheapened. But that was before I discovered the 32mm system — a comprehensive approach to manufacturing frameless cabinets. The system itself meant nothing to me, but the system's high-quality engineered hardware was just what I needed, and I quickly made the switch.

Hidden Hinges

The cup hinge is one of the workhorses of 32mm cabinetry. My customers like cup hinges because they are completely hidden, giving the cabinet faces a clean, uncluttered look. And because I like them they make hanging cabinet doors a breeze, plus they are forgiving of minor errors in installation.

Although cup hinges were developed originally for the sleek European look, this is no longer their only application. Traditional frame-and-panel doors are often mounted on frameless cabinets using cup hinges, and the manufacturers have even developed cup hinges for use on face-frame cabinets (Figure 1, next page).

Versatility of Cup Hinges

With the right tools, cup hinges are simple to install. Most cup hinges allow you to adjust the door in three directions, speeding the job of aligning cabinet doors with the cabinet and with each other. While cup hinges will not compensate for poorly made or improperly installed cabinets, they will overcome minor inconsistencies.

Probably the most widely used cup hinges are those designed for full overlay doors with an opening angle of 110 to 130 degrees. There are also cup hinges for door swings up to

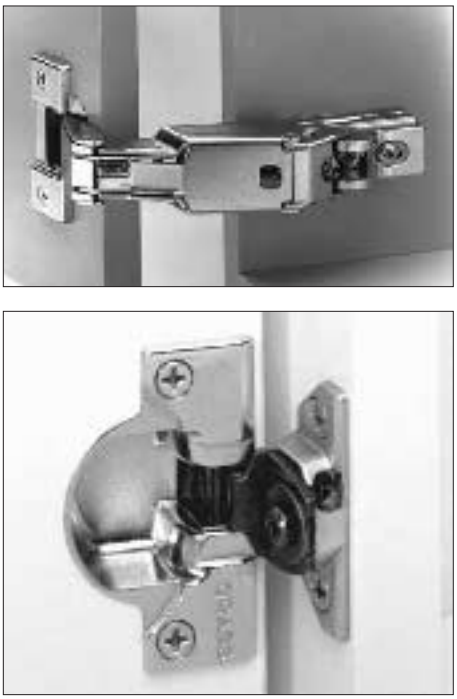


Figure 1. ***Cup hinge for face frames.*** *Though originally designed for frameless cabinets (top), cup hinges are also available for cabinets with face frames (above).*

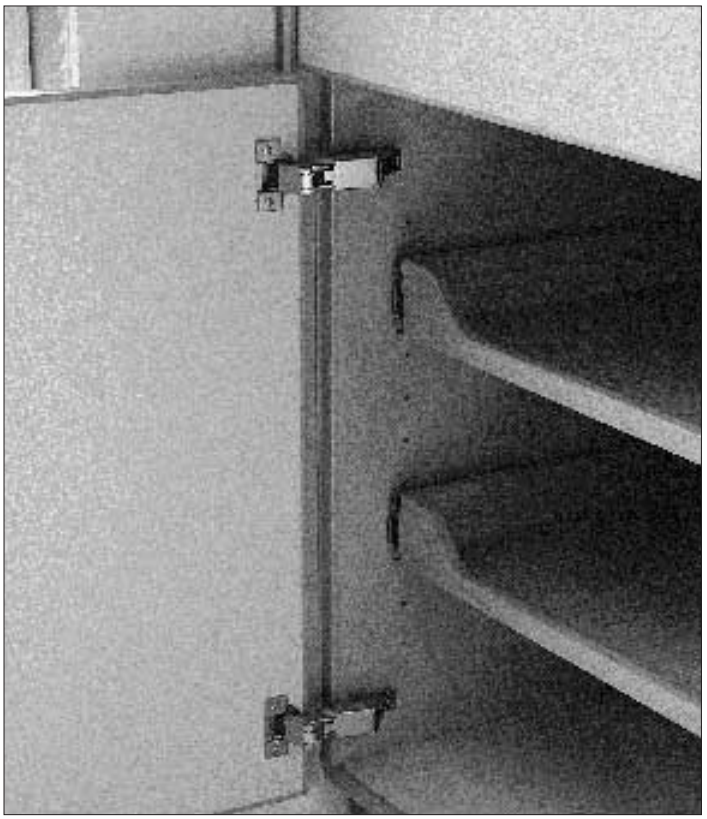


Figure 2. *Cup hinges are available in a wide variety of configurations for different cabinet locations and door reveals. The author uses a 165-degree hinge for base cabinets, which opens the door out of the way of the sliding trays.*

175 degrees, for 45-degree diagonal cabinet doors, for blind-corner doors, for full-overlay, partial-overlay, or inset doors, for extra-thick doors, and for glass doors — to name a few of the options.

Cup hinges are available with a self-closing spring or as free-swinging hinges. While most applications will benefit from using the self-closing feature (it eliminates the need for a latch), there are times when you will want to use a standard hinge that doesn't spring closed. If, for example, you have a large pantry door that has four hinges, all those springs will create a lot of resistance, requiring extra pressure to open the door. For customers with arthritis, or just wet hands, this can be a nuisance. With many cup hinges, you can simply pop out the springs on two of the hinges. The door will still self-close, but will take less force to open.

When choosing the opening angle of the hinge, consider where the cabinet is placed. For wall cabinets, a 120-degree hinge is fine — once the door is past 90 degrees, the entire contents of the cabinet are visible and unobstructed. For base cabinets, though, 120 degrees is insufficient — the open door will become an obstacle in the traffic path if it can't spring back out of the way. This could be a hazard for someone carrying a hot casserole. So for base cabinets, I use hinges that open to 165 degrees (Figure 2). This permits the door to open almost back flat against the cabinets. Some base cabinets need a different hinge. For a base cabinet in a corner, with its side against a wall, I use a hinge that opens to 110 degrees to prevent the door from hitting the wall.

Snap-on feature. All the major manufacturers of cup hinges have added a snap-on feature that allows you to mount or dismount the door without tools. You simply pull a small lever to release the door. This allows you to transport cabinets without the doors attached and makes it easy at installation to remove and replace doors — without changing the adjustment settings. This means when it's time for the plumber to install the sink, you can quickly remove the sink cabinet doors and set them aside, lessening the chance of damage.

The latest innovation is the twist-in cup hinge, designed so that no tools are needed to mount the hinge in the door. This means you will be able to ship doors stacked flat (no hinges protruding). The hinges can then be quickly twisted in at the job site and the doors hung. You still need a screwdriver for adjustment, of course.

Mounting Cup Hinges

Installing cup hinges is usually a two-step process: The hinge itself mounts on the door and the base plate it fixes to mounts on the case. While there are many types of hinges and base plates, this is true for almost all of them.

The first step in mounting the hinge to the door is to bore a 35mm hole for the hinge. A special Forstner-type bit is needed, available through hinge suppliers (Figure 3). Get a carbide bit — it will last much longer than high-speed steel, especially if you ever have to bore through laminate.

You'll need a drill press — the hole cannot be accurately bored with a hand-held drill because the bit doesn't have a leading spike to start the hole (the mortise is 1/2 inch deep — a leading spike might go through the face of the door). With a drill press, you can set up a jig to locate the holes, then drill all your doors in one operation. It goes very quickly.

Mounting the base plates is just a question of positioning and fastening with screws. You can make your own jig for this or buy one from the hinge manufacturer. Placing the side of the cabinet down on a work surface puts gravity on your side and makes the job go more quickly.

However you go about mounting cup hinges, I strongly recommend making a trial setup with a plywood scrap for the cabinet side, and a piece of material at least 3 inches square and the same thickness as the door. Test your settings and get acquainted with the hardware. Fixing a misdrilled mortise in the back of a good door will be tedious at best.

Screws. For attaching the base plates to the cabinet sides, I use #6 5/8-inch oval-head sheet-metal screws. Unlike wood screws, sheet-metal screws have a consistent shaft diameter. This helps them hold better in particleboard products such as melamine, but they also work fine in plywood.

Watch out for hinges that have as their vertical adjustment a loosening of the screw that fastens the base plate to the case. This type base plate has elongated slots so you can slide the plate up or down. However, if you make repeated adjustments, be prepared to see the screw hole fail.

(If you ever do have to repair a stripped-out screw hole, bore a shallow hole with a 3/8-inch bit, then plug it with a wooden dowel of the same diameter. If the broken-down area is larger, as sometimes happens if a cabinet door rips off for some reason, you may have to rout a square area beneath the base plate, then glue in a thin plywood or hardwood patch.)

You may occasionally see 7.5mm "euro" screws in the cabinets you buy (Figure 4). These larger-diameter screws are designed specifically for particleboard. However, even these screws have significant limits on how many times you can successfully withdraw and replace them. Particleboard breaks down very easily under this type of strain. Another variation are nylon inserts that friction-fit into even larger holes, then accept a standard #6 screw. These are probably the best option for particleboard, as the nylon inserts allow the screw to be removed and replaced many times.

Figure 4. *Specialty mounting screws.* *In particleboard substrates, large-diameter euro screws, at left, help prevent stripping of the screw hole. An option that works even better is a friction-fit nylon insert, at right, which accepts a #6 wood screw.*

Cup Hinge Adjustment

Every brand of hinge has its own method of adjustment. Some hinges are adjustable in two dimensions, and others in all three dimensions. Take the Grass 1006 as an example. It has three adjustment screws in a row (Figure 5). To get to them, you open the door all the way and remove a plastic cover plate. The screw farthest back is for height adjustment — loosen this screw and the hinge can be moved up or down. The middle screw is the fixing screw, but also enables you to adjust the door in or out with respect to the front face of the cabinet. The outermost screw gives a side-to-side

Figure 3. *A drill press and a special 35mm bit are essential for mounting cup hinges.*

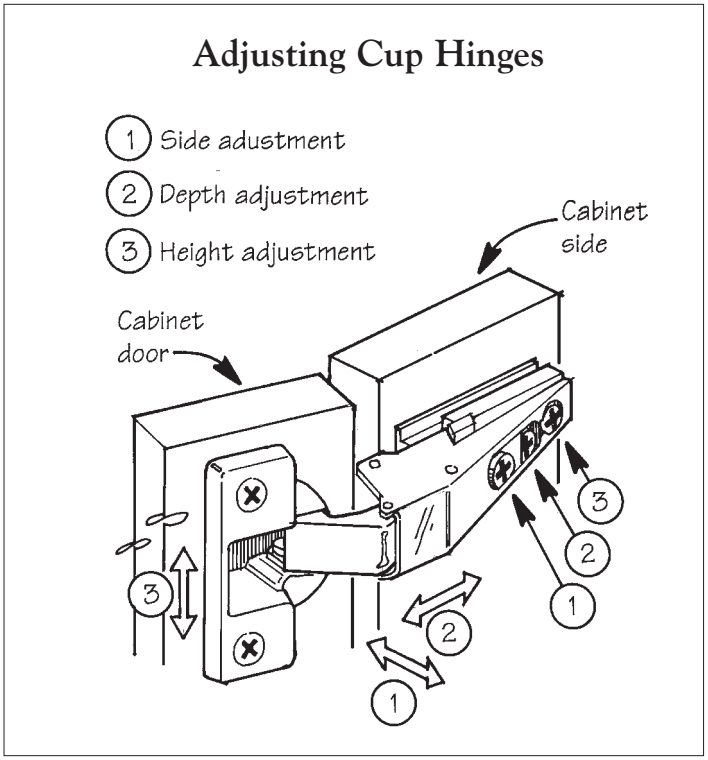


Figure 5. *Adjusting cup hinges.* *Cup hinges are easily adjustable in three directions, speeding the installer's task of aligning door reveals.*

Figure 6. *Affordable drawer slides.* *The epoxy-coated roller slide is the stock-in-trade of the manufactured cabinet industry. Most often available in three-quarter extension, these smooth operating slides are a vast improvement over the noisy metal slides of the past.*

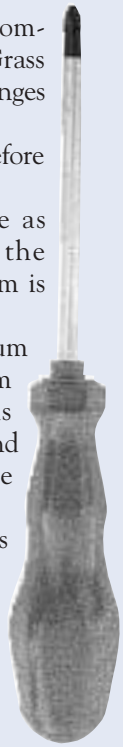
adjustment: When you loosen this screw, pulling it away from the base plate, the door moves away from the base plate. When you tighten it, the door will move towards the base plate.

Some brands of cup hinges require you to loosen the fixing screw to make the side-to-side adjustment. I don't like this design because the side-to-side adjustment can change when you retighten the fixing screw. However the particular cup hinge you choose operates, you will find the ease of adjustment addictive — especially after using conventional hinges that allow little or no adjustment.

Tips for Installing Cup Hinges

Here are some general recommendations, adapted from Grass America, for mounting cup hinges and base plates:

- Always make test pieces before mounting the hardware.
- Keep the hinges as close as possible to the edges of the doors — 3 inches maximum is recommended.
- Don't exceed the maximum cup drilling distance from the edge of the door. This will cause doors to bind and put excess pressure on the hinges and plates.
- Make sure the hinge arm is square to the edge of the door. Improper mounting will make it harder to open the door and could eventually cause the hinge to fail.
- Attach the base plate using all available screw holes — there is a great deal of force applied to the plates when the door is being opened or closed.
- Always use a Pozi screwdriver for adjusting the hinges. This is available from hinge suppliers — it looks like a Phillips head, but it's not.
- Don't overuse hinge adjustments. If you find you are having to adjust hinges excessively, check your mounting jigs and measurements.
- Don't overload doors with heavy mirrors, racks, etc. This will cause early failure of the hinge.
- Avoid doors that are wider than they are tall.



Use only a Pozi screwdriver for adjusting cup hinges — a standard Phillips will eventually strip the heads of the adjustment screws.

A good way to get familiar with cup hinges is to order a catalog from one or more of the manufacturers listed at end of the article. The company can also send you a list of suppliers in your area. The catalogs are a rich source for information. Most contain a photograph of each hinge, with drawings showing mounting application, all clearances, and the appropriate base plate to use.

Drawer Slides

The other major player in cabinet hardware is the drawer slide. The most common European-style slides are three-quarter extension, though full extension are also available. Usually they are white or almond, epoxy-coated, and have two rollers (Figure 6). Each member of the pair has part that mounts in the cabinet and part that mounts on the drawer.

Usually one of the pair is captive, and the other free. This means that on one side, the rollers are captured in a U-channel, while on the other side they roll on a flat surface. This design positions the drawer correctly while at the same time offering a little tolerance for error in the width of the drawer or cabinet.

These slides are attractive, inexpensive, and they function respectably. Mounting them is also easy. You turn the drawer upside down on the work surface and position the drawer part of the slide on the bottom edge of the drawer, flush with the front. It screws right into the bottom edge of the drawer side. Since the slide supports the bottom of the drawer, there is no need to cut a dado for the drawer bottom. You can glue or staple the bottom after the drawer is assembled, and the slide will help hold it. This gives a small amount of extra space in the drawer.

As with hinges, roller slides can be fastened with #6 screws. A pan head is best to avoid interfering with the drawer travel. Elongated holes in the slides allow you a small amount of vertical adjustment.

New and improved? One innovation with roller slides is the self-closing feature. With self-closing slides, the drawer rises as it comes out of the cabinet. As you close the drawer, it reaches a certain point where it runs slightly

downhill and closes. But while this solves one problem, it creates another: Raising the drawer as it comes out of the case means that the clearance between the drawer face and the countertop must allow for this climb. The 1/8-inch clearance I typically use is unacceptable here. You need at least 1/4 inch, possibly more, depending on the slide.

If you decide to go with a self-closing slide, get one with the slope at the back, rather than at the front of the slide. This type does not affect the clearance at the front — the slide action creates a slight tipping of the front as the drawer opens, and is almost unnoticeable. Instead, you need clearance at the back of the drawer. Since drawers are often 1/2 inch smaller than the opening, this isn't a problem.

The Cadillac of Slides

Although epoxy-coated roller slides represent a huge improvement over the rattly metal slides of the past, I hardly ever use them. Instead, I use Accuride's 3017 almost exclusively (Figure 7). This slide costs about five times what a roller slide does. So what gives?

For me the answer is simple — the Accuride 3017 is a great advertisement. As my customers use their kitchen, they come to love these smooth-operating, full-extension slides.

One of my customers once asked me to build a dresser of drawers. When the unit was finished and I was about to install the hardware I discovered I was two slides short. When I told him that it would take about one week for me to order, receive, install, and deliver, he asked for alternatives. "Isn't there any way I can get it sooner?" There was — I could substitute a very good slide from another manufacturer, one that cost about the same.

"Do it!" came the answer. So I installed the other brand and delivered the dresser. About three weeks later, a phone call came: Could I exchange that last pair of slides for the Accuride 3017? Yes, he knew he had to pay for both the new slides, and installation — a testament to a fine product.

The Accuride 3017 is a full-extension slide with 1 inch of overtravel. It has a cabinet part (the slide) and a drawer part (the rail). After mounting the slides on the cabinet and the rails on the drawer, you pull out the slides and drop the drawer in between them, clipping the rails into the slides. Removing the drawer is a matter of pressing the black plastic horns on the slide and lifting the drawer out.

The 3017 is rated for 100 pounds. Accuride makes a whole line of high-quality slides rated for loads up to 200 pounds. The company also makes less expensive slides for lighter duty, as well as TV swivel shelves, computer keyboard slides, and slides for disappearing cabinet doors. One big difference between Accuride slides and the roller slides described above is the Accuride's ball-bearing construction, which the company uses in its entire line of products. Installation varies from product to product, but is typically straightforward. With many of the products, a small margin of error is allowable, and some of the Accuride slides allow you to fine-tune the side-to-side location of the drawer for the smoothest possible drawer travel. With the 3017, however, it's important not to build the drawer too wide. I typically try to build drawers 1/16 inch smaller, then shim out for adjustment if necessary. ■

Paul Levine is a custom cabinetmaker in Sherman, Conn.

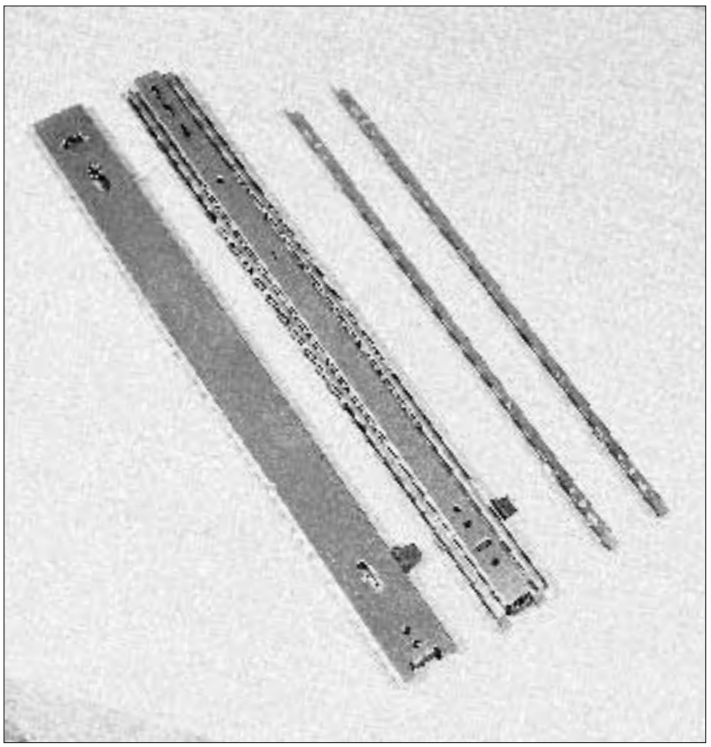


Figure 7. *The custom touch.* *The full-extension Accuride 3017 is the author's drawer slide of choice. Though it costs substantially more than a roller slide, it has proved to be a great selling point for the high-quality custom cabinets he builds.*

Hinge and Slide Manufacturers

Accuride
12311 Shoemaker Ave.
Santa Fe Springs, CA 90670
310/903-0200
Ball-bearing drawer slides

Julius Blum Inc.
Blum Industrial Pk.
Highway 16 - Lowesville
Stanley, NC 28164
800/438-67885
Hinges, drawer slides

Grass America
P.O. Box 1019
Kernersville, NC 27284
800/334-3512
Hinges, drawer slides

Hettich American L.P.
1607 Anaconda Rd.
Harrisonville, MO 64701
800/438-8424
Hinges, drawer slides

Mepla
909 W. Market Center Dr.
High Point, NC 27261
910/883-7121
Hinges, drawer slides